



Department of
Transport

PUBLIC TRANSPORT FOR PERTH IN

2031

MAPPING OUT THE FUTURE FOR PERTH'S
PUBLIC TRANSPORT NETWORK.

Destination
Clarkson **5car** **Departs in 1 min**
Stops: Perth·Leederville
Glendalough·Stirlings·Warwick
Greenwood·Whitfords·Edgewater
Joondalup·Currambine·Clarkson
Then: Clarkson All Stops 8 min

Mandurah Platform 2
Escalators
Perth Platform 1
Toilets

© State of Western Australia

Published by the
Department of Transport
140 William Street
Perth Western Australia 6000

Published July 2011

Internet: www.transport.wa.gov.au

Phone: (08) 6551 6000

Fax: (08) 6551 6001

CHAIRMAN'S FOREWORD

We have much to be proud of in Perth's public transport system. Over the past 25 years successive Western Australian Governments have made bold and strategic decisions to modernise and significantly extend the passenger rail network and maintain a fully integrated system that allows people to move around the city with ease.

Our public transport system is regarded as one of the best, newest and most efficient in the nation. A recent benchmarking study ranked Perth's rail services number one for average network speed, on-time running, operating cost per service kilometre and energy cost per service kilometre. However, much more needs to be done to ensure the system has the capacity and quality of service to meet the transport needs of a rapidly growing city.

To provide a 'transit map' for the future, the Minister for Transport set up the Independent Panel to oversee the preparation of this public transport network plan. Our task has been to identify a mass transit network for

the next 21 years and to propose projects that will see construction of infrastructure such as new railways, transit ways and bus lanes to better support public transport and improve the quality of services.

We have worked closely with the Western Australian Planning Commission. The *Directions 2031 and Beyond* spatial framework for Perth and Peel has informed our planning. We recognise that an increasing concentration of housing, employment and major services in the central and inner parts of the city will shape the future public transport system. We also recognise that our Plan is one of the key enablers for successfully implementing *Directions 2031 and Beyond*. As traffic congestion, the cost of travel and environmental issues become more acute, major centres will require quality, high capacity public transport services.

Our Plan envisages Perth's public transport system carrying more than twice as many people by 2031. Our Vision for the Plan is to see public transport become the preferred choice of travel to Perth's strategic centres and through the growth corridors.

Limited cost-effective options for building railways between strategic centres in the Central Sector and the prohibitive cost of tunnels mean the city

has reached a stage in its development where another tier of service is needed – an on-road Rapid Transit System. Without priority for public transport on roads, the quality and level of service cannot be achieved and the network will not be able to meet demand. This will lead to pressure for wider roads and increasing congestion on roads in constrained environments.

A strategic alignment of objectives between state transport agencies and local government is needed to find a balance between travel demands and community amenity. This needs to start with a clear realisation that the major roads in the central areas of the City will move substantially more people than now and that public transport is a key part of the solution, especially for access to the strategic centres.

Active engagement and collaboration across the three tiers of government, business and the community should form the foundation of successful implementation of this Plan. Detailed project planning should involve these stakeholders to further progress the initiatives identified, including master planning, technical feasibility and opportunities for land use and transport integration.

The State Government's acceptance of this plan will be aided by strong and clear support from major stakeholders. I encourage you to lend your support to this Plan.

Stuart Hicks AO

Chair
Independent Panel



metable

s shown are approximate

Monday to Friday	Saturdays	Sundays & Public Holidays
Routes	Time Routes	Time Routes
500	am 7:38 500	am 8:38 500
500	8:38 500	10:38 500
500	9:38 500	pm 12:38 500
500	10:38 500	2:38 500
500	11:38 500	4:38 500
500	pm 12:38 500	6:38 500
500	1:38 500	
500	2:38 500	
500	3:38 500	
500	4:38 500	
500	5:38 500	
500	6:38 500	

to know
entLine
with hearing d
Website

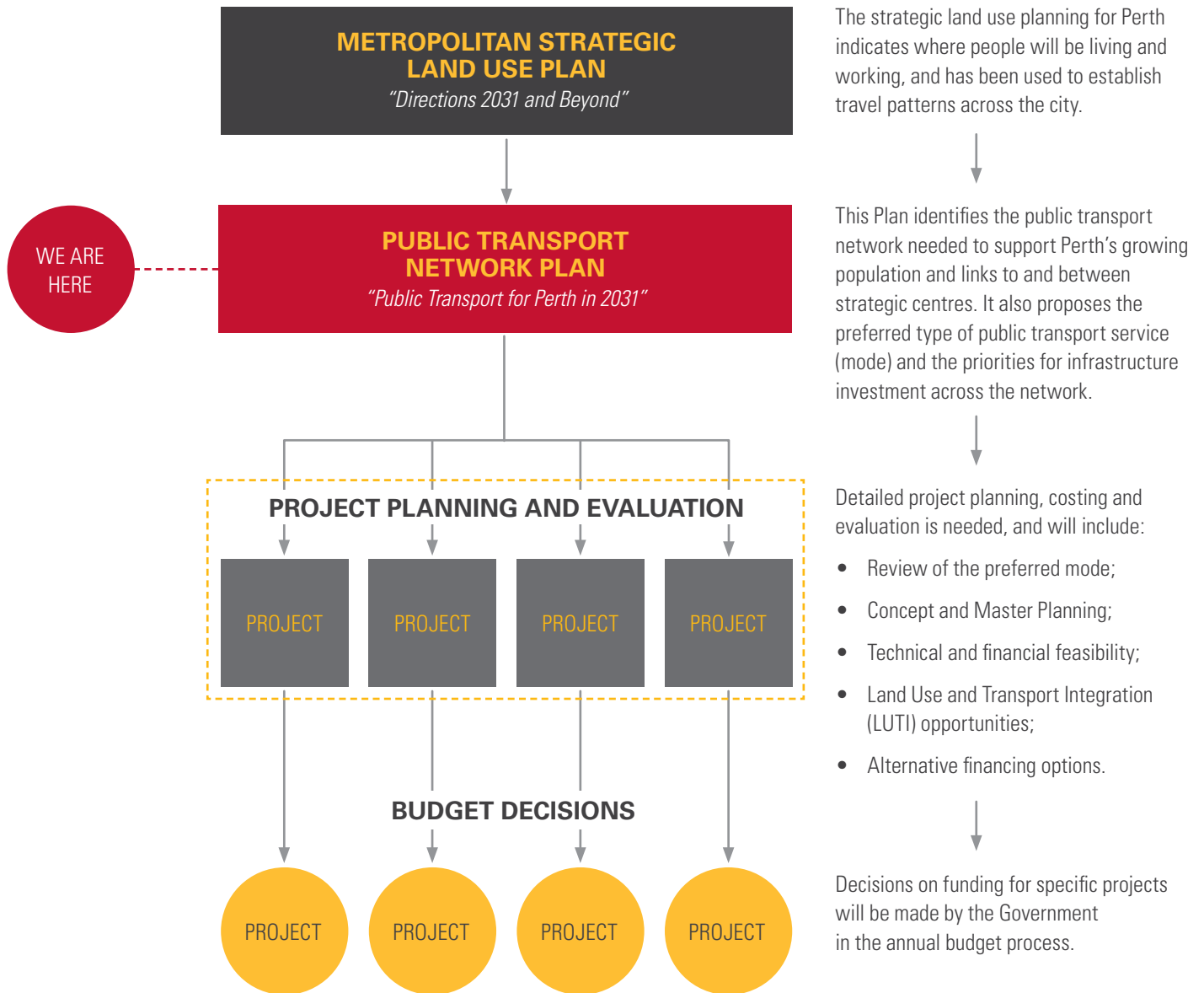
Don't run for the



Plan your journey at
www.transperth.wa.gov.au.

DECISION MAKING FRAMEWORK

for preparation and implementation of this plan



KEY FINDINGS

The current network will not be able to cope with the projected increase in public transport use and growth of the city.

A significant change in the way public transport operates will be needed if it is to play its crucial role in reducing congestion, improving accessibility and reducing the consumption of fossil fuels.

Over the next 21 years, much of the investment in public transport infrastructure and system improvements is needed within 15km of the Perth central area.

Importance of public transport for Perth

Good cities need effective public transport. It plays a vital role in creating competitive economies, and liveable, inclusive communities. It also has a role in reducing our reliance on fossil fuels and our carbon footprint.

Public transport enables people to access families and friends, jobs, recreation, education, health care and the many activities that contribute to individual and community wellbeing. It provides independence for people who cannot or do not drive.

Over the past ten years public transport usage in Perth has increased by 67%, three times the rate of population growth over the same period.

Some 330,000 trips are made by public transport every weekday. Two-thirds of public transport trips are for work and education

purposes. These are generally made during the peak period to and from the central city area.

The current network strongly supports the central city area. However, there are major differences in the quality of services, with limited quality mass transit services for the central northern sector of the Perth metropolitan area and between major centres outside of the central area.

Developing a mass transit system

For the level and quality of public transport services to continue to improve, there will need to be real improvements in reliability, speed of travel, service frequency, safety and security, and ease of use.

There are limited options to further develop the rail system in a cost effective way. 'Right-of-way' reserves do not exist between many of the strategic centres in the Central Sector (largely within 15km of the CBD) where consolidation and higher intensity of activity is planned. The alternative of constructing tunnels is very expensive and not feasible for extending services to new areas.

Most of the new growth corridors can be served by road-based services, but strategic decisions need to be made to ensure these services have substantial priority over general traffic. Without this priority, the quality and level of service cannot be achieved.

To provide a quality level of service for more people, the future transit system will need to have three integrated types of service – train services, road-based rapid transit services and buses. A road based rapid transit service can be either light rail or bus rapid transit.

Future growth

By 2031, Perth residents will collectively more than double their use of public transport.

Public transport will account for:

- one-in-eight of all motorised trips (currently one-in-fourteen);
- one-in-five motorised trips in the morning peak period (currently one-in-eight);
- over 30% of peak hour distance travelled (currently around 20%); and
- nearly 70% of all trips to the CBD (currently around 47%).



RAPID TRANSIT INFRASTRUCTURE COMBINED STAGE 1 & STAGE 2 PROJECTS

Developing the network

The public transport system can be enhanced by increasing capacity on the existing network, expanding the network and developing transformational projects.

The project proposals are grouped into two categories – Stage One or shorter term/before 2020 and Stage Two or medium term/before 2031. The proposed combined network to be developed by 2031 is shown in the figure on this page.

Increasing capacity on the existing network

The capacity and efficiency of the existing network will need to be increased by:

- Purchasing new trains and buses;
- Upgrading major bus interchanges and providing faster bus services to transfer passengers to rail services;
- Building new train stations;
- Providing effective access to the system including adequate park and ride facilities.

Expanding the network

The network will need to be expanded by:

- Providing priority bus lanes along routes that connect major centres and through congested intersections;
- Adding a rail spur to service the Airport and the Hills area;
- Extending the Armadale line to Byford and Mundijong in the longer term; and
- Extending the Northern Suburbs Railway to Yanchep and other transformational projects (detailed below).

These projects are integral to the creation of Perth's long-term public transport network. However, in themselves, they will not be enough to meet the expected demand for public transport.

Transformational projects

A new rapid transit system, with the capacity to move large volumes of people during peak hours, is needed for the central northern



suburbs. The current rail network cannot include another line to service these northern suburbs along Alexander Drive and through North Perth, without significant cost and disruption to existing commercial and residential areas.

The projected volumes for this corridor suggest that this should be planned as a light rail route. The significant capacity and fleet needs could be fully harnessed by extending the route through the city to Curtin University and UWA/QEII, creating a network that supports the spine with contra passenger flows.

Fast tracking the extension of the Northern Suburbs Railway to Yanchep will transform the style of outer urban development. However, this should have a significant involvement and

contribution from the Federal Government and major land owners to support the funding of the project and to ensure a commitment to a 'smart growth' sustainable model for greenfields urban development.

These transformational projects ought to be conditional on specific criteria, including:

- A contribution to the capital cost of the projects by the private sector, based on value transfer from increased property value;
- Alignment of support from local authorities to achieve a practical network across local boundaries;
- Minimum development outcomes being secured.

For light rail, project proposals would need to demonstrate how they are consistent with, and can be effectively expanded into, a broader network, would need to ensure a consistent use of technology to maximise operational flexibility and synergies across the network and would need to be subject to detailed master planning and a business case.

The investment required

By 2031, it is estimated the total annual cost to operate and maintain the public transport system will have risen to \$1.2 billion (compared to \$691.2 million in 2009/10).

Over the next 21 years the total cost for fleet expansion is estimated to be \$1.2 billion. The major components of the cost are:

- Additional railcars – \$624 million (156 additional railcars at \$4 million each);
- Additional buses – \$482 million (900 additional standard size buses at \$535,000 each);
- New light rail vehicles – \$131 million (29 light rail vehicles at \$4.5 million each).

Over the next 21 years the estimated cost to construct the infrastructure recommended in the public transport plan is \$2.9 billion.

The major components of the proposed infrastructure expenditure are:

- Rail system expansion – \$1.2 billion;
- Light rail – \$1 billion;
- Bus rapid transit and bus priority infrastructure – \$343 million;
- Additional rail, bus and light rail depot and maintenance facilities – \$180 million;
- Transit interchanges, including park and ride – \$135 million.

Note: All costs and benefits in this plan are expressed in 2010 dollars.

Funding plan

A detailed funding plan and strategy needs to be prepared by the Department of Transport and the Public Transport Authority in consultation with Treasury and Finance for consideration by the Government. The Independent Panel recommends that a number of new funding sources be examined for inclusion in the funding plan and that these be the subject of consultation with key stakeholders.

The opportunities to adopt alternative or additional funding sources will change over time. For that reason, a short term (5 year) funding plan and a longer term funding plan will need to be prepared.

Policy issues

The development of the Public Transport Network Plan has identified a number of important policy issues that are related to either the development and operation of public transport or to the broader urban transport system. These policy issues need to be addressed to ensure that the urban transport system can continue to support a fast growing city with an expanding rapid transit public transport system.

Integrating land use and transit

Western Australia has a suite of policies focussed on the integration of public transport with land use planning. The implementation of *Directions 2031 and Beyond*, through growth management strategies, provides more opportunities to reinforce this integrated approach.

The Activities Centres State Planning Policy also supports this approach, as does the Transit Oriented Development (TOD) Development Control Policy. It is understood that the TOD policy is under review. This should ensure that there is a focus on, and investment in, areas that have genuine development potential and that can have a positive influence on public transport use.

The transformational projects are a further opportunity to achieve strong alignment and integration with land use. Existing planning policies may need to be enhanced to secure minimum development outcomes and contributions to projects from the private sector. The recent changes to the Planning and Development Act to provide for Improvement Schemes provide such a mechanism. A careful focus on application of those schemes is needed.



CONTENTS

CHAIRMAN'S FOREWORD	3
DECISION MAKING FRAMEWORK	5
KEY FINDINGS	6
INTRODUCTION	10
STRATEGIC CONTEXT	11
WHY IS PUBLIC TRANSPORT IMPORTANT TO PERTH?	12
THE CURRENT PUBLIC TRANSPORT SYSTEM	14
TRAVEL DEMANDS FROM A GROWING CITY	16
A VISION FOR A MASS TRANSIT SYSTEM IN PERTH	20
DEVELOPING THE NETWORK	23
DEVELOPING THE NETWORK – STAGE ONE PROJECTS	24
DEVELOPING THE NETWORK – STAGE TWO PROJECTS	28
RAPID TRANSIT SERVICES CONCEPT	30
VALUING PUBLIC TRANSPORT INVESTMENT	31
FUNDING OPTIONS	35
ACTIVATING AND INTEGRATING	37
POLICY ISSUES	41



INTRODUCTION

The State Government asked an Independent Panel to consider the public transport needs of the Perth and Peel Regions for 2031 supported by a longer-term vision that considers public transport in a city of 3.5 million.

The Independent Panel comprised members from the private sector with strategic policy and transport planning expertise, and chief executive and senior executive staff from a number of government agencies.



Report structure

The Plan provides an overview of Perth's current public transport system along with the manner in which it has evolved. The strengths and weaknesses of the system are then considered along with the opportunities to develop and enhance the network.

It includes a long term vision for a public transport network to support a population of 3.5 million which provides clear guidance for the medium term network (to 2031). Short term priorities, along with current commitments are identified.

An assessment of the value of the investment in public transport is included, along with the opportunities for land use transport integration to make the best of the Government's infrastructure investment.

The Plan identifies funding issues and opportunities and emerging policy issues required to support the strategic role of public transport.

Independent panel

Chair:

Mr Stuart Hicks AO – Transport policy and strategy expert

Members:

Mr Reece Waldock – Director General, Transport

Mr Eric Lumsden PSM – Director General, Department of Planning

Mr Mark Burgess – Managing Director, Public Transport Authority

Mr Menno Hennevelde – Managing Director, Main Roads WA

Mr Anthony Kannis – Executive Director, Infrastructure and Finance, Department of Treasury and Finance

Mr Neil Smith – Bus industry expert

Mr Fred Affleck – Rail industry expert

Mr Howard Croxon OAM – Transport Industry

The Terms of Reference for the Panel were:

1. Network

Taking into account the anticipated growth and structure of the Perth and Peel Regions to support a population in the order of 2.5 million people, recommend the future primary public transport network and the most appropriate mode for each component of the network.

2. Investment

Recommend capital investment proposals that identify and prioritise enhancements to the primary public transport network, taking into account the costs, including those of acquiring, constructing and operating the system, as well as the benefits. This should include railcar and bus fleet requirements to meet required service levels across the public transport system.

3. Funding

Consider the range of public and private funding mechanisms, involving either infrastructure or land development, that could support the development of the primary public transport network.

4. Land use/transport integration

Recommend measures that would maximise the potential for the primary public transport network to positively influence, or be positively influenced by, future urban planning and development.

STRATEGIC CONTEXT

The Public Transport Network Plan has been developed in close consultation with the Western Australian Planning Commission (WAPC) and is consistent with *Directions 2031 and Beyond*.

The WAPC has released *Directions 2031 and Beyond*, which provides a spatial framework for the growth of the Perth and Peel Regions.

The WAPC has based *Directions 2031 and Beyond* on a projected population of 2.2 million people by 2031. Public transport needs have been based on this projection.

This Plan is data based – it uses modelling to determine patronage levels for alternative routes and to look at the overall connectivity of the proposed network.

The public transport network for 2031 has been designed to be compatible with a longer-term vision for a city of 3.5 million people and projects included in the 2031 plan are important building blocks towards achievement of a longer term connected network.

Imperatives for action

A long term view on the future of public transport and a commitment to develop the network and system is essential because:

- 1** We need to plan for a continually growing city in the short, medium and long term. This expectation is clearly identified in the WAPC's *Directions 2031 and Beyond*, which envisages a city of 2.2 – 3.5 million people.
- 2** Traffic congestion will be a growing and significant economic cost. In 2009 the cost of Perth's congestion was estimated to be nearly \$1 billion. By 2020 this figure will more than double to \$2.1 billion. Steps taken to reduce congestion will have a significant positive impact on productivity, especially in inner and central areas.
- 3** Access to Federal infrastructure funding will depend on States having integrated land use and transport plans for the long term development of their cities.
- 4** Transport contributes 14% to Australia's total greenhouse gas emissions. Of this, 90% is generated by private vehicles. Encouraging a greater uptake of public transport by making a high quality transport system available to more people will make a significant contribution to the reduction of greenhouse gases.
- 5** The State Government currently spends \$691.2 million (2009/2010) on the public transport system. It is financially prudent to have a plan that guides the Government's investment in public transport to ensure robust and 'fit-for-purpose' investments are made, and for these investments to maximise the efficiency of the system.

WHY IS PUBLIC TRANSPORT IMPORTANT TO PERTH?

An effective public transport system is essential for the long term health, vitality and sustainability of Perth.

Moving people

Perth has developed as a linear city. The Perth Metropolitan Area now stretches 120 kms from Mandurah in the south to Yanchep in the north. In area, Perth is one of the largest cities in the world. Its elongated shape means that residents travel long distances for work and other purposes.

Development in Perth, particularly on the urban fringe, is characterised by low density residential development, with limited land use diversity. These suburban tracts have limited employment opportunities. Most people have to commute long distances for work with one in ten workers from the outer metropolitan areas commuting to the central area.

This central city area (including Northbridge, East Perth and West Perth) provides nearly 120,000 jobs. This represents 18% of all jobs in the metropolitan area. Most of these jobs are white collar, retail or service industry jobs.

The current public transport network and services support and reinforce the concentration of employment, jobs and commuter activity in the central area. The figure on this page shows the dominance of the central city area as an employment generator.

In addition to moving commuters, public transport has an important role to play in improving the mobility of people who may not have access to any other form of transport – eg. children, young adults, students, older residents, people with disabilities and those who cannot afford a car. Public transport provides access to essential education, health and social services.

Managing congestion

Perth is already experiencing increasing levels of traffic congestion. The dominance of the central area as a major employment centre for much of Perth’s white collar and service industries, along with a predominance of private car usage, has resulted in significant peak period traffic.

Public transport has the potential to significantly reduce the growth of peak period commuter traffic. Currently the public transport network is focused on the Perth CBD, with 76% of trips occurring within 15 kms of the Perth CBD.

Seventeen percent of distance travelled in the peak hour is by public transport. It is much higher to the Perth CBD (over 60%) and along major transport corridors such as the Mitchell Freeway (50%). Public transport already makes a significant contribution to lowering road congestion in the most congested areas of Perth. Its contribution to limiting congestion will increase in the future as the city grows.

Creating development opportunities

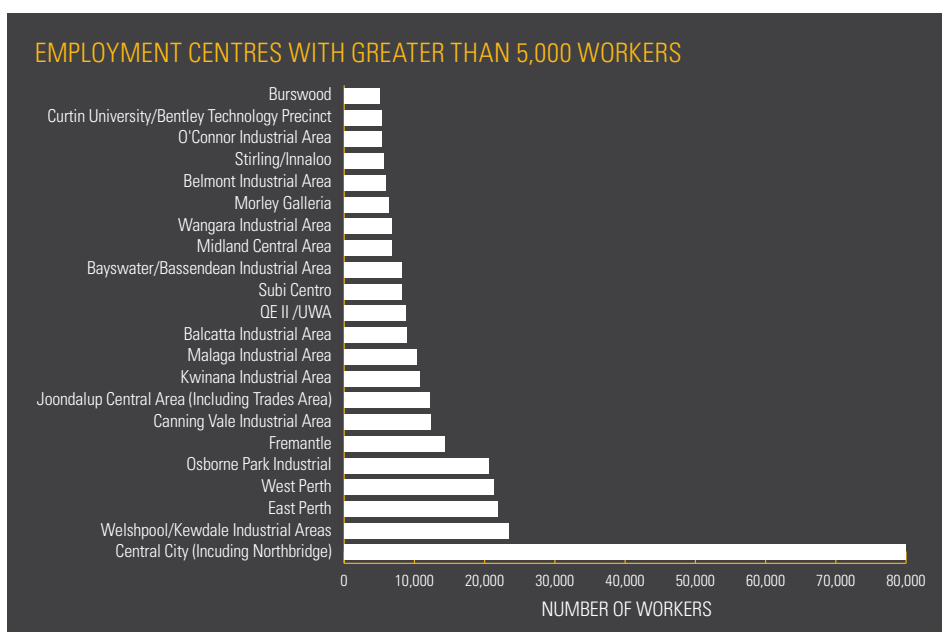
Public transport can act as a catalyst for more intensive and diverse land uses. Transit oriented development provides a focus of higher density development around well-serviced transit nodes. Mixed-use developments in these areas provide people with employment opportunities and with access to goods and services while reducing car dependence.

Higher residential densities around transit nodes provide more people with the opportunity to walk or cycle to public transport or to access employment within the core of the development.

As centres develop, land values rise. The cost to provide parking coupled with finite road capacity, means that the provision of quality public transport is essential.

Connecting centres

Not all people want to travel to the central area. University and school students, people who work at strategic centres and those who wish to access goods and services from other areas of Perth all have public transport requirements that may not be met adequately by a radial system.



A public transport network that provides east-west as well as north-south connections will open up opportunities for many more travellers for work, education and other purposes.

Environmental and social benefits

Public transport will play an increasingly important role in reducing other impacts associated with a transport system that is dependent on private vehicles.

Studies such as the Garnaut Climate Change Review (2008) highlight that Australian cities are among the most car dependent cities in the developed world. Transport contributes some 14% of Australia's total greenhouse gas emissions, of which 90% is generated by private vehicles.

Wider environmental benefits, including improved air/water quality and a reduction in noise pollution can improve the local environment and help to mitigate the health impacts experienced within the community from increasing carbon emissions and other particulates associated with motorised transportation.

Public transport also has the added benefit of promoting more active lifestyles simply by encouraging individuals to walk or cycle to the bus stop / train station. Research indicates that public transport commuters will, on average, accumulate seven times more incidental exercise than private motorists and that each additional hour spent behind the wheel of a car increases the likelihood of obesity by 6%. These associated personal fitness benefits will lead to improvements in individual health, thereby reducing the burden on the health system.

Greater use of public transport, and consequent reductions in car travel, can have a positive effect on the number of road fatalities and serious injuries and the resultant costs of road trauma.

Current Government commitments

The Government's commitment to public transport is demonstrated by a number of network improvements that have been announced. These include:

- Undergrounding of the city end of the Fremantle rail line and the Wellington Street Bus Station. This project is part of the Perth City Link development project for city centre land between Wellington Street and Roe Street. One of its major aims is to better link Northbridge with the Perth CBD. All rail lines between Perth Station and King Street will be placed underground. A new underground bus station will replace the ageing Wellington Street Bus Station and enable the construction of inner city development and public spaces in this prominent central city location. This project has been part funded by the Federal Government and the City of Perth.
- Extension of the Northern Suburbs Railway from Clarkson to Butler by the end of 2014. This 7.5km rail extension will see a new station constructed in the Butler Town Centre. The developer of the land surrounding the new rail station will provide high/medium density mixed use development around the station. A park and ride facility for 1,000 bays and a bus transfer facility are included as part of the project.
- A bus bridge across the Fremantle railway and Roe Street, linking the Wellington Street Bus Station to Fitzgerald Street. This project has enabled the bus level crossing of the Fremantle railway to be removed and improved bus travel times.
- Murdoch Activity Centre Main Street. The construction of the Fiona Stanley Hospital and other developments in the Murdoch Strategic Centre will include a main street with public transport priority to link the rail station with the hospital. Planning is currently underway for the next stage through Murdoch University linking to South Street, west of the University.
- The construction of an additional 3,000 Park and Ride bays at stations on the Mandurah and Joondalup Lines.
- Increase in the railcar fleet. Recent completion of a contract for the purchase of 15 additional three-car train units has increased the number of railcars from 189 to 234 single cars. A further commitment in the 2011/12 budget for an additional 15 three-car train units will increase the number of railcars to 279 single cars. Delivery is due to commence in 2013/14.
- A 5-year program to increase bus service kilometres by a total of 15.2 million kilometres (29%) by 2015/16. This includes procuring an additional 158 buses by 2017/18 to facilitate growth in peak period services, in addition to a commitment to a new 10 year bus replacement contract for Transperth buses, commencing in 2011.
- Allocation of \$11.3 million over 2011/12 to 2012/13 for transit planning projects, including future rapid transit infrastructure and integrated transport planning initiatives.

Activating development

The sinking of Subiaco Station and the creation of Subi-Centro provides a model of how urban redevelopment and transit oriented development can lead to higher public transport use.

Patronage has increased from 1,600 boardings per day before the development to 3,000 boardings per day in 2010.



THE **CURRENT** PUBLIC TRANSPORT SYSTEM

67%

the increase in public transport patronage in the last decade. This has been due to population increase and an increase in proportion of people using public transport

44%

of public transport trips are made using rail services. This is a significant increase from 10% of trips in 1990

56%

of public transport trips are made using the bus network. Buses provide the majority of transfers to rail services

330,000

public transport journeys per day

35%

of trips use more than one public transport vehicle

82%

of all rail passengers go to or pass through CBD stations

2/3

of trips are for work and education, largely during the peak periods.

Perth's public transport system has met growing demand better than any other Australian capital city. The system is fully integrated between train, bus and ferry services and the SmartRider electronic ticketing system operates for all travel.

The network that supports the City is based on train lines radiating from the Central Area. The original train lines (Fremantle, Midland and Armadale) were built in the 19th Century. The closely spaced stations were built when most people walked to public transport services and development patterns were more concentrated. The Joondalup line (1993) and the Mandurah line (2007) are located primarily in freeway reserves with stations further apart than those on the other lines. These stations, which are mainly serviced by feeder buses and park and ride, generally cater to much larger catchment areas.

Public transport use has already increased due to fast, reliable and frequent bus and train systems with good interchange facilities providing access to stations by both bus and car.

Major recent train and bus system improvements have reversed the declining proportion of travel on public transport from

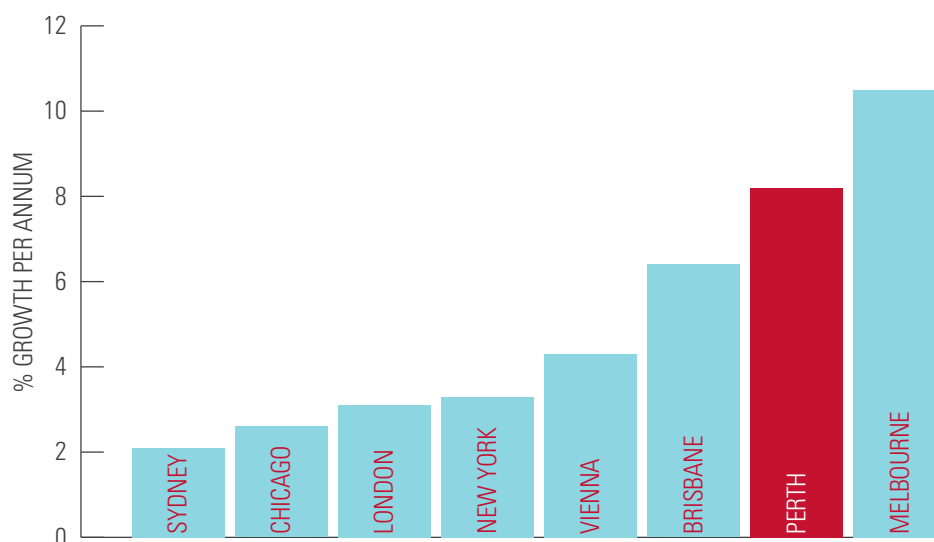
the 1960s to the late 1990s. Public transport patronage in Perth grew 67% from 1999 to 2009, at a time when the population grew by 22%.

The train network has been expanded from 66 kms in the early 1990s to 173 kms in 2010. Annual train patronage increased more than four-fold from 9.7 to 54.7 million passengers in this same time. As shown below, Perth has experienced a growth in rail passengers that is significantly greater than a range of national and international cities.

Bus patronage increased by 43% between 1999 and 2009. This increase was associated with a bus system expansion of some 27% (in terms of service kilometres). During the same time, the bus fleet grew by 27% from 889 to 1134 buses. This was necessary to provide:

1. improved "line-haul" services in corridors where there are no train lines
2. improved feeder bus services to support the expanded train network
3. new services in outer residential growth areas
4. better distribution services in, and between, strategic centres.

PERCENTAGE GROWTH IN RAIL USAGE PER ANNUM 2004-2008



Source: Moving People: Solutions for a growing Australia (p.15)

Passenger expectations

The Public Transport Authority carries out annual customer satisfaction surveys to assess the views of existing passengers on the quality of its services. Bus and train users generally value the same service characteristics. They want services that are frequent, on time and affordable; they want to be able to travel quickly to their destination, and they want to feel safe and secure.

Whilst people generally express high levels of satisfaction with public transport, there are some variations between areas.

Over the past six years, the average level of satisfaction on the bus network has remained fairly constant at around 81%. However, the satisfaction measure for passengers in the Morley bus contract area has reduced from 92% to 58%. Overall, bus passengers in the Morley/Mirrabooka area were the most dissatisfied with their service. Their level of dissatisfaction rose from 6% in 2005 to 39% in 2010.

A major factor influencing the result in this area is that there are virtually no infrastructure priority measures to improve the effectiveness of services, particularly in the congested peak periods. As a result, many people drive to the train lines for better services.

Overall, passengers across the public transport network were most likely to express dissatisfaction with:

- frequency of services;
- overcrowded vehicles;
- perceptions of personal safety/security;
- service punctuality; and
- bus/train connections.

The Australian Bureau of Statistics, in its 2008 Social Trends publication, identified a number of reasons why people did not use public transport. The main reason was because it was inconvenient – either there was no service or it did not run at a convenient time.

People also valued the comfort and privacy offered by their own private vehicle. The length of travel time on public transport was considered to be too long by one in five respondents.

2010 Transperth Passenger Satisfaction Monitor Results

93%

Train passengers satisfied or very satisfied with services
Most satisfied Mandurah and Fremantle Lines (94%)
Least satisfied Joondalup Line (91%)

92%

CAT bus passengers satisfied or very satisfied with services
Perth CAT – 94%
Fremantle CAT – 95%
Joondalup CAT – 70%

81%

Bus passengers satisfied or very satisfied with services
Most satisfied – Belmont (88%)
Least satisfied – Morley (58%)

Strengths and weaknesses of Perth's public transport system

Strengths

The current public transport system has a number of significant strengths:

1. It is fully integrated – people can move easily between trains, buses and ferries.
2. Decisions on timetabling and routes are made by a central agency – Transperth.
3. The train system provides a fast, reliable service bypassing congestion on parallel city roads, with service frequencies greater than many other Australian cities.
4. The system has been continuously upgraded and extended providing a safe, comfortable and reliable service.

Weaknesses

There are some weaknesses that may leave the current public transport system unable to meet the future challenges that face it. These include:

1. Bus services are vulnerable to delays caused by road congestion.
2. The bus system is less legible than rail services with frequencies generally lower than trains in Perth and bus systems in other Australian cities.
3. The current focus on the Perth CBD does not support connectivity between the strategic centres identified in *Directions 2031 and Beyond*.
4. Some routes are almost at capacity in peak periods and only operating additional trips is unlikely to provide the capacity and quality of services needed, and may create congestion problems at stops and with traffic.

TRAVEL DEMANDS FROM A GROWING CITY

Directions 2031 and Beyond provides a spatial planning framework for a city with a population of 2.2 million residents. Over half a million new residents will need to be housed in 330,000 new dwellings and travelling to 350,000 new jobs.

The growing city

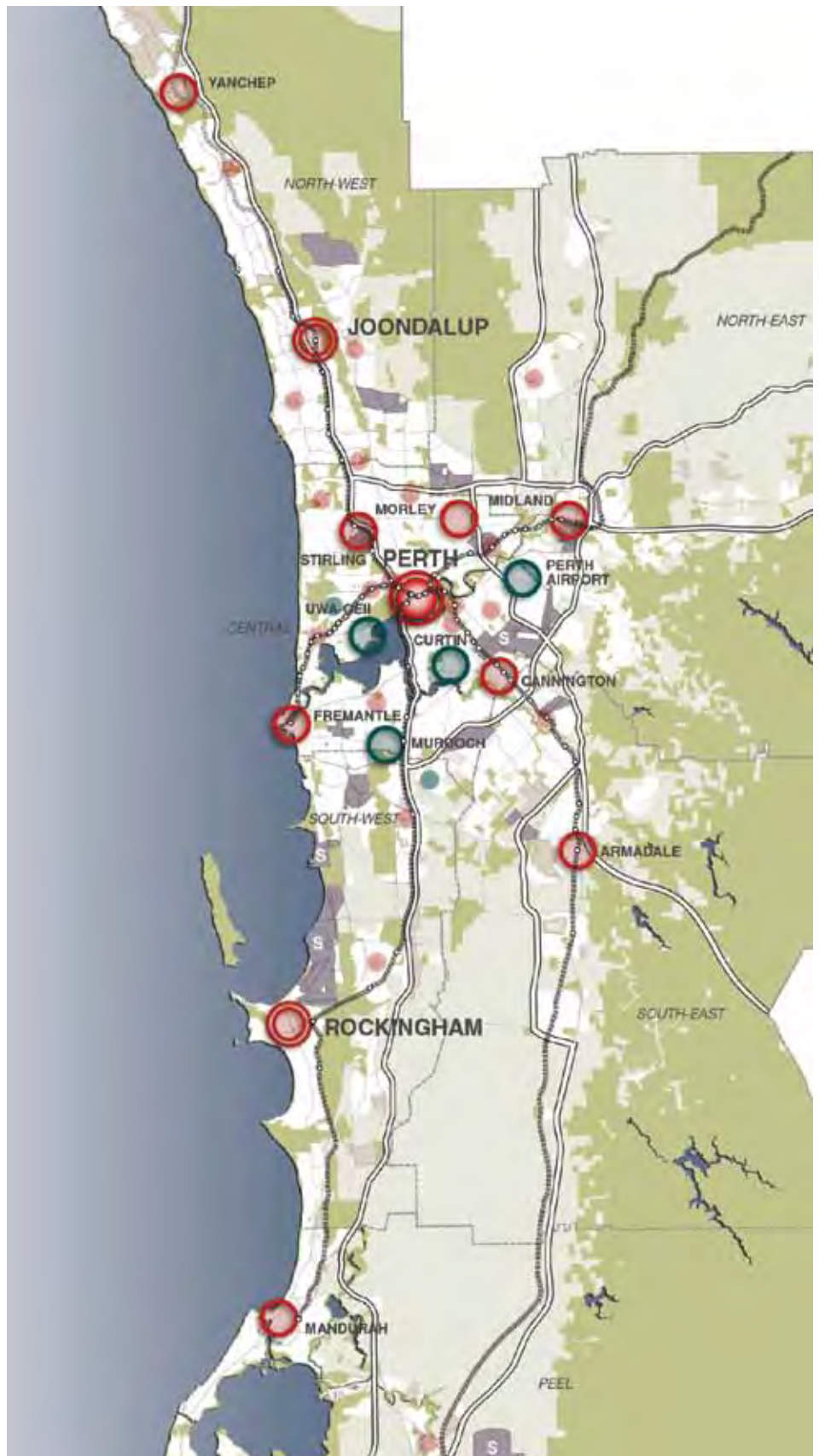
Directions 2031 and Beyond places an emphasis on consolidating development around existing and future public transport infrastructure and around strategic centres including UWA/ QEII, Curtin, Murdoch, Stirling, Perth Airport and Midland. These centres are, and will continue to be, major employment centres and destinations and there is a need to ensure that they are well connected into the public transport network.

In addition the public transport system will need to be enhanced to service future growth areas to the north and north east of the City and to the south between Rockingham and Mandurah.

Directions 2031 and Beyond identifies the need for two key strategies for public transport. These are improving the relationship between public transport and land use planning and ensuring ongoing access to public transport.

It also identifies key public transport connections required to support and service the strategic centres. This plan builds on these network connections and includes the infrastructure and a service model needed to support this future urban development.

The Public Transport Network Plan supports the medium and long term planning direction for the City, particularly the need for consolidation and higher levels of activity in the Central Area.



DIRECTIONS 2031 AND BEYOND – STRATEGIC CENTRES AND AREAS OF FUTURE URBAN DEVELOPMENT.

In the future it will be difficult to rely on private vehicles for many trips. Roads will be congested, petrol prices will be high and parking will be less available in strategic centres and/or costly.

As a consequence, by 2031 public transport will account for:

- one-in-eight of all motorised trips (currently one-in-fourteen);
- one-in-five motorised trips in the morning peak period (currently one-in-eight);
- over 30% of peak hour distance travelled (currently around 20%); and
- nearly 70% of all trips to the CBD (currently around 47%).

Forecast travel activity

The forecast growth of Perth's population will have profound implications for how people move around the city to jobs, education and to strategic centres.

The population growth to 2031 will see a 33% increase in personal travel from 5.8 to 7.7 million trips per day (ie cars, public transport, walking and cycling). The longer term city with 3.5 million people could see a further 59% increase in passenger travel to 12.25 million trips per day, or more than double the current level of activity.

Planning strategies to consolidate urban development and create large mixed use centres will gradually reduce the current reliance on the car for many trips. A number of fundamental transport factors will also play a critical role in influencing travel behaviour:

- There is already significant and worsening congestion on the major arterial road spines and the Mitchell/Kwinana freeway system is unable to be expanded within 10 kms of the CBD
- Our highly car dependent city is vulnerable to high oil prices, as shown in recent years.
- For strategic centres in the central area, the supply and cost of car parking will impact on the ability to drive.

Public transport has a critical role to meet travel demands, especially to major centres and to the central area.

Assessing public transport demand

A Strategic Transport Evaluation Model (STEM) has been used to assess the demand for public transport and to identify current pressure points and future corridors of demand. STEM is a comprehensive analysis tool that predicts travel demand and patterns using a number of sub-models (eg. household structures, car ownership, trip generation, trip distribution, mode choice and network assignment).

The mathematical functions used in these sub-models have been developed and calibrated using observed travel behaviour from surveys taken over many years.

While these functions remain valid over time as a basis for predicting travel patterns, variables such as demographic data, socio-economic data, travel cost data and transport network data will change over time.

Directions 2031 and Beyond has provided updated demographic and socio-economic data to predict where people will live and work and the major centres of activity that will influence travel patterns. The Independent Panel has also considered other major influences on travel behaviour and patterns, such as the cost of travel, the availability of parking and investment in the transport network. Conservative values for these variables were used in the modelling.

By 2031 it is predicted that Perth's 2.2 million people will make more than twice as many trips by public transport than they do now, in the order of 760,000 trips per day. This 120% increase is an average of 3.85% per annum, or slightly lower than the average for the past decade to 2009 due to a lower forecast rate of population growth. By the time the city grows to 3.5 million people, nominally by 2050, daily patronage is likely to be in the order of 1.5-2.0 million trips per day.

Criteria for public transport priority

The Independent Panel has considered a rationale and policy context for when priority for public transport is warranted. Currently,

there are 346 kms of rail lines and 29 kms of bus priority lanes in Perth. New and extended commuter railways should always be provided in a full 'right-of-way' corridor with grade separation from general traffic. However, the warrants for public transport priority on roads will vary depending on the level of service and patronage, and impacts on land uses.

- Queue jump lanes are generally provided on the approach to a signalised intersection that is causing significant delay to buses, and should generally have a daily patronage of more than 3,000 people.
- Bus lanes are necessary where the speed and reliability of the service is being adversely impacted on a regular basis, not only through intersections but along the length of a road. Services operating along these corridors should typically average 6,000 passengers or more per day.

In certain locations, such as through some town centres, bus lanes may be converted to kerbside parking during off-peak times to support local businesses. However, consideration will be given to regional and local accessibility and the ability to provide off-street parking as an alternative.

Where a traffic lane has to be converted to a bus lane, the projected patronage of the planned facility should exceed 1,200 passengers in the peak hour within 5 years of opening, which compares to the average maximum carrying capacity of a single lane of traffic.

- Corridors with significantly higher forecast patronage, or with large growth potential, may justify a high capacity rapid transit system using a combination of conventional and articulated buses and/or light rail. These should be provided in a restricted access corridor with full transit priority to support the investment and to allow relatively unimpeded transit movement without the constraints of congested traffic or safety issues with turning vehicles.

Initial patronage of 10,000 passengers per day, or generally 1,500-2,000 passengers in the peak hour, would be needed.

Major public transport corridors

The major public transport corridors in Perth are shown in the two diagrams below comparing now with 2031. The diagrams highlight those corridors that carry 3,000 passengers or more per day.

At present, the five railways are the major corridors. There are also a number of bus corridors that carry 3,000 to 10,000 trips or more per day, mainly to the central area.

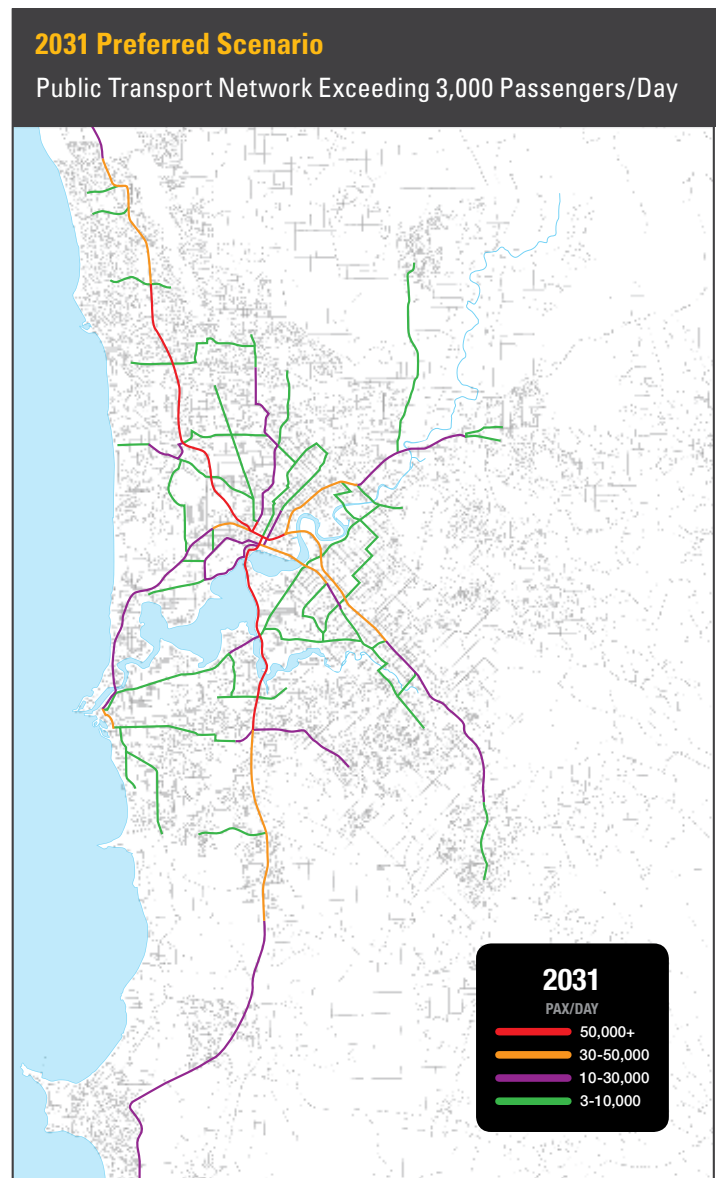
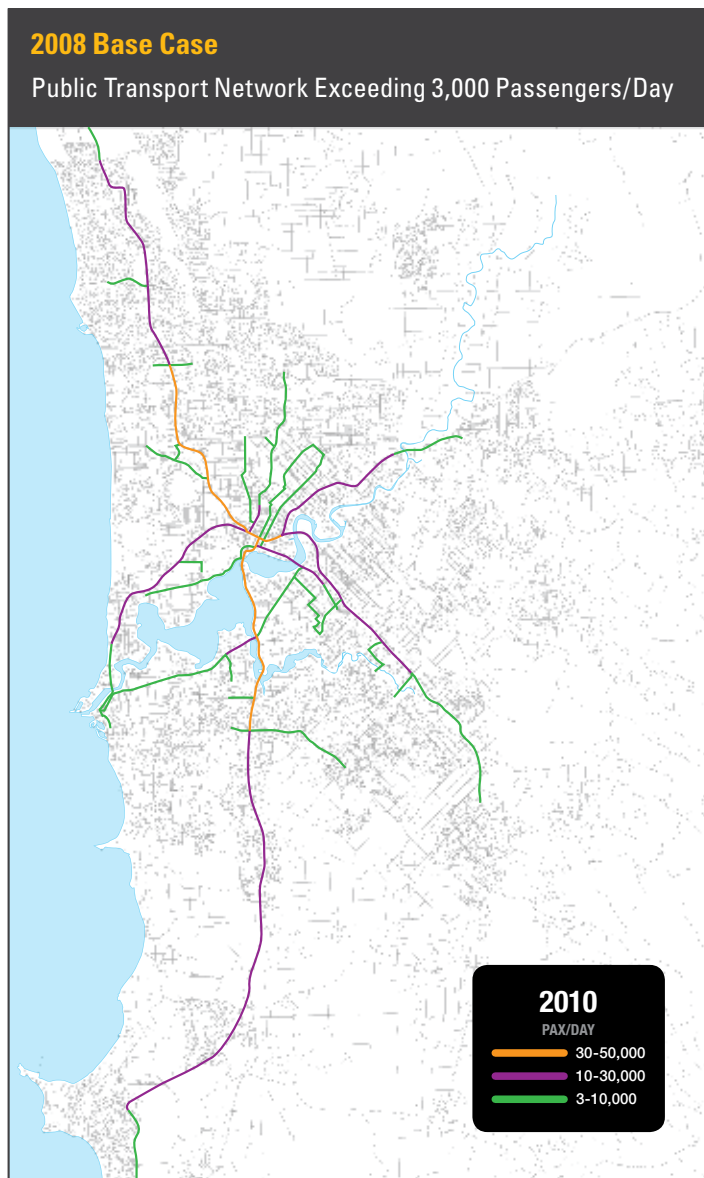
The picture changes significantly by 2031. The five existing railways continue to be the

major corridors and there continues to be a very strong focus of trips to the central area and the CBD. However, a number of new corridors are evident, including:

- the spines through the central northern suburbs and to the north eastern urban growth area – these areas do not currently have the same level of access to rapid transit services as other corridors;
- the additional demand from the north-west urban growth areas;

- the connections to and between major centres such as Stirling, Murdoch, Subiaco, UWA/QE11, Curtin University and Perth Airport; and
- the cross city services to and between the radial spines.

The demand modelling underpinning these diagrams provides a strategic overview of where future demand is greatest, and the areas that will need rapid transit infrastructure to address this demand for quality public transport services.





A VISION FOR A MASS TRANSIT SYSTEM IN PERTH

The Terms of Reference required that the Independent Panel recommend the future primary public transport network and the most appropriate mode for each component of the network.

Vision

Public transport will be the preferred choice of travel to Perth's strategic centres and through growth corridors.

This Plan includes a long-term vision for a public transport network to support the growth of Perth over the next 50 years and, nominally, a population of 3.5 million.

This ultimate vision network, shown on page 22, provides clear guidance for investment over the next 21 years.

Public transport will play a very significant role in meeting Perth's travel needs by the time the City's population reaches 3.5 million people. During peak periods the total distance travelled by public transport passengers is likely to be close to the total distance travelled by car users.

Developing a mass transit system

For the level and quality of public transport services to continue to improve, there will need to be real improvements in reliability, speed of travel, service frequency, safety and security, and ease of use.

There are limited options to further develop the rail system in a cost effective way. 'Right-of-way' reserves do not exist between many of the strategic centres in the Central Sector (largely within 15km of the CBD) where consolidation and higher intensity of activity is planned. The alternative of constructing tunnels is very expensive and not feasible for extending services to new areas.

Most of the new growth corridors and strategic centres can be served by road-based services, but strategic decisions need to be made to ensure these services have substantial priority over general traffic. Without this priority, the quality and level of service cannot be achieved and public

transport will not be able to meet demand.

This will lead to pressure for wider roads and increased congestion on roads in constrained environments.

The City has reached a stage in its development where another type of service is needed – on-road rapid transit. This reflects the reality that the major roads in the central areas of the city will need to move substantially more people and that public transport can move many more people in a road lane than cars.

As a result Perth's future transit system will have three types of integrated service – train services, road-based rapid transit services and buses. These elements of the future system are highlighted on the map on page 22.

A road based rapid transit service could be either light rail or bus rapid transit. These will operate with dedicated priority within existing streets, although there could be short sections where operation in mixed use traffic is permitted. Similarly there will be areas where the services need overpasses or tunnels to bypass areas of major congestion, or will need to operate in traffic controlled transit malls.

Passenger travel on the future network will likely be more dependent on transfers between local bus services and rapid transit services. This is a normal transition that occurs when a city develops from a small to a medium sized city. Perth has already seen the first phase of this transition, with feeder buses linking to bus and train stations across the network, particularly on the Joondalup and Mandurah rail lines. Already 35% of public transport journeys use more than one vehicle (i.e. bus/bus or bus/train).

High frequency services during peak periods and timetabled co-ordination of services at other times, in conjunction with high quality interchanges, will ensure that transfers are considered by passengers to be a normal part of their trip.



The network and infrastructure

As the City grows, two main issues are likely to impact on the rapid transit system servicing the central area:

1. Central city transit facilities will be unable to handle the number of bus services accessing the CBD bus stations and the physical capacity to move rail patrons through stations with train frequencies of 3 minutes is limited.
2. Development of medium to large scale transit oriented developments at railway stations within 10 kms of the City (such as Stirling, Glendalough, Leederville and Canning Bridge) will lead to increasing boardings at these stations.

To address these issues, an inner “circle route” is needed in the long term to link Glendalough on the Joondalup line with Canning Bridge on the Mandurah line, and Subiaco and UWA/QE11 before entering the City from the east via Curtin/Bentley at Victoria Park.

The ultimate network for a city of 3.5 million people should comprise:

Railway network 220 kms

Future rail expansion will build on the existing network to meet demand in growth corridors and to provide efficient access to, and connectivity between, strategic centres and central Perth. Future rail network proposals include:

Within 21 years

- extension of the Northern Suburbs Railway from Butler to Yanchep with stations at Alkimos, Eglinton and Yanchep (13.8kms)
- an eastern suburbs line linking to the Midland line at Bayswater with a station at the new consolidated airport terminal and in the vicinity of the current Domestic Airport terminal, with a park and ride and bus interchange to service the hills and foothills area (7 kms)
- new stations and interchange facilities on the Mandurah line at Success and Karnup.

In the longer term

- extension of the Armadale line to Byford and Mundijong (15kms)
- extension of the Thornlie line to link with the Mandurah line with a major interchange station in the vicinity of Ranford Road and a station to serve the Jandakot Airport growth precinct (11.5kms)

Road Rapid Transit network 413 kms

Daily public transport patronage in the Central Sector is expected to exceed 1.5 million trips by the time Perth’s population reaches 3.5 million. This will be driven by continued high employment and education activity within the existing area and a projected increase in resident population of more than 500,000 people.

Most of this network is proposed for the existing developed Central Sector to provide connectivity between centres, to link with train services and to ensure overall system capacity can keep ahead of demand.

In addition the north west growth area will have transit services in Alkimos-Eglinton and Yanchep-Two Rocks and the south west growth area will have transit services through Keralup and from Rockingham-Baldivis.

Transit services will be highly interconnected with the train system. Both trains and transit services will be served by feeder bus services where appropriate. The transit services will be designed to provide a greatly improved level of access to, and connectivity between, strategic centres and central Perth.

Over time the routes will be developed to provide a network with priority for transit services over other traffic. Journey times will be faster with fewer, more widely spaced stops up to 800m apart.

The system should initially be designed around 15 to 20 transit routes. However, the transit infrastructure will enable additional services to be introduced as required.

Bus services

Local bus services will act as feeders to the train and transit network, connect local centres and destinations across the metropolitan area, and provide a local distribution function. The majority of trips will still involve a local bus and they will form a very important part of the network.

Bus routes will be designed to maximise accessibility, whilst maintaining travel speed and ride comfort. Buses will take advantage of bus priority infrastructure to move through congestion and maintain on-time running.

Bus stops will have good levels of information including destinations, timetables and local maps. Major stops and stations will be designed to support fast and efficient transfers to train and transitway services. Overall, the bus network will benefit from improved legibility and frequency.

Ferries

The current ferry service is small in the context of overall public transport travel. Some additions to ferry services along and across the Swan River can be anticipated, perhaps linking Burswood, East Perth, Perth and Applecross. Growth beyond this is likely to be small due to speed constraints for ferries on the Swan River, parallel road/rail routes with faster journey times and limited opportunities for both high density development and transit interchanges at river nodes.

RAPID TRANSIT INFRASTRUCTURE ULTIMATE NETWORK FOR CITY OF 3.5 MILLION



DEVELOPING THE NETWORK

The Terms of Reference required that the Independent Panel recommend capital investment proposals that identify and prioritise enhancements to the primary public transport network, including railcar and bus fleet requirements.

Key investment areas

The development of the network and services in the next 21 years should be based around:

1. Enhancing current capacity, particularly the railways.
2. Transformational projects that will redefine travel and development patterns.
3. Projects that provide strong connections to strategic centres.
4. Projects that support the growth in the Central Sector and the Perth CBD.

The projects are grouped into two categories – Stage One or shorter term/before 2020 and Stage Two or medium term/before 2031.

Enhancing capacity

Fleet requirements

As the demand for public transport increases over time, the number of rail cars and buses will need to be increased. In addition to growth, provision has been made in the economic analysis for replacement of railcars after 35 years and buses after 20 years of service.

Railcars

The demand for railcars is projected to increase to 390 equivalent one-car units by 2031, an increase of 156 beyond the fleet at the end of 2010 when delivery of the existing order is completed. On average the equivalent of eight one-car units will be required each year to 2031.

Light railcars

It is estimated that 29 light railcars would be required to support the 2031 network. These would replace approximately 65 buses.

Buses

The demand for buses is projected to grow from the current 1134 buses in 2010 to approximately 2050 in 2031.

Stations

Canning Bridge Station transit interchange is at capacity and requires an upgrade to improve bus connections and pedestrian access. This project would include introduction of priority lanes along Canning Highway between Reynolds Road and Henley Street.

Stirling Station is in need of an upgrade to improve the bus interchange and pedestrian access. This is compatible with the Stirling City Centre project.

Both of these projects are needed in the next 5 to 10 years.

In order to provide access to the transit network where growth is occurring within the vicinity of existing railways, two new stations are envisaged on the Mandurah Line. A station at Karnup, near Paganoni Road, would be constructed to serve the rapidly expanding population between Warnbro and Mandurah, as well as the proposed urban development at Keralup, east of the Kwinana Freeway. This station will be a transit interchange and needs to be constructed in the next 5 to 10 years.

Accessibility to the rail network is also required between Cockburn Central and Anketell Road to serve the expansion of the urban corridor on either side of the Freeway. The exact location of this station is yet to be determined, however it



STIRLING INTERCHANGE



CANNING BRIDGE INTERCHANGE



KARNUP STATION CONCEPT

is necessary for it to perform a significant park and ride function for the local community. There is no short-to-medium term need for this station as Cockburn Central is currently accessible for the existing urban area.

Other stations are proposed as part of the expansion of the railway north to Yanchep and the Airport Rail Link.

DEVELOPING THE NETWORK

STAGE ONE PROJECTS

Projects that can be implemented to provide a network of rapid transit services across Perth before 2020 are grouped into:

- Transformational projects;
- Connections to strategic centres using on-road priority measures that will contribute towards a network of rapid transit services; and
- Projects that support the central area.

Transformational projects

These projects have the ability to redefine travel and development patterns.

Northern Suburbs Railway (NSR) extension

The NSR is committed to extend north to Butler. Extending north to Yanchep will support the development of the Yanchep City Centre with a station precinct at its centre. Future developments between Butler and Yanchep will lead to future development of stations, potentially at Alkimos and Eglinton.

The early development of this line will provide developers with the certainty required to develop at a higher density, particularly around train stations and within walkable catchments of services. It will support a much more sustainable form of urban development with significantly lower levels of car use.

Central Northern Corridor/Curtin/UWA Light Rail

The Central Northern Corridor connecting Perth to Mirrabooka and suburbs to the north has a projected patronage equivalent to that on the Fremantle, Armadale or Midland railways. Efficient movement of this number of people could only be achieved by a railway, light rail or a Brisbane style busway.

A railway connecting the Perth CBD to Mirrabooka and beyond through East Wanneroo to Joondalup was considered, but it could not be justified based on the projected scale and density of future development in East Wanneroo and the cost to construct tunnels from the City to north of Mirrabooka.

Also a railway is less suited to this corridor due to the need to provide more closely based stops between Edith Cowan University and Perth where patronage is projected to be highest.

A Brisbane style bus rapid transit system could cater for projected demand, but only if full segregation from other traffic occurs and passing lanes are provided at stations. This would require a dedicated transitway with a width of 25 metres at stations. In reality, busways of this nature would not be feasible along inner city Perth streets such as Fitzgerald Street and expensive tunnelling would be required through North Perth from Aberdeen Street to north of Walcott Street.

In these circumstances the panel received specialist advice that light rail is the most feasible rapid transit option to provide capacity and service from Perth to Mirrabooka. Bus feeder services from the north could connect to the light rail service at Mirrabooka. Park and ride facilities could also be provided along the light rail route. The light rail service could be extended through East Wanneroo to Joondalup in the longer term.

An on-road light rail system has the capacity to move up to 7,500 persons per hour, operating at a frequency of about 2 minutes, if it is provided with priority running along the route. The light rail service would need to be introduced at a frequency of about 4 minutes initially with capacity to move about 3,250 persons per hour in the peak direction and in excess of 30,000 persons per day two way at the point of highest demand. As well as accommodating the projected travel demand along the corridor, light rail has two other significant advantages:

- The sense of permanence of light rail provides certainty and encouragement for developers to move towards more consolidated, higher density development along the route;

- The observed phenomenon, often known as the “sparks effect”, that applies to rail or light rail, results in between 10% and 25% additional patronage when compared with buses operating at an equivalent frequency. This is a result of improved comfort, improved legibility and other factors relating to passenger preference for rail.

The light rail service between Mirrabooka and Perth could provide direct through-services to UWA and Curtin University and in so doing provide an excellent network of services through the central area, as well as providing high capacity links into the city. This part of the light rail proposal is similar to the “Knowledge Arc” proposal advocated by Curtin University. However, it uses the high demand for travel along the Mirrabooka to Perth part of the route during the morning peak as a counter balance to high demand from the city to both Curtin and UWA, thus ensuring high demand along the entire route.

The “wishbone” light rail service linking Mirrabooka, Perth and three universities provides a significant network of light rail. The proposed light rail network will enable growth to occur at all of the three universities and at QEII hospital, without unacceptable levels of congestion due to high levels of car traffic that could otherwise be expected. It will also encourage and facilitate transit oriented development at various points along the route, including West Perth, North Perth, East Perth, Victoria Park and Bentley on the periphery of Curtin University.

The precise route of the light rail requires further investigation with full involvement from local authorities along the route and other key stakeholders such as universities and hospitals. It would also require a detailed master plan and business case.

PROPOSED **STAGE 1** PROJECTS FOR RAPID TRANSIT INFRASTRUCTURE



KEY

- Existing Railway Infrastructure and Committed Extensions at 2010 *
- Railway Infrastructure before 2020
- Light Rail Infrastructure before 2020
- Existing Bus Rapid Transit Infrastructure at 2010
- Bus Rapid Transit Infrastructure before 2020
- Future Rapid Transit Infrastructure

Please Note:

* Only new train stations and stations linking with the proposed rapid transit network are shown.

Connections to strategic centres

These centres have a large workforce or are centres of education and/or health. Public transport to these centres is currently high and is expected to grow significantly. The projects listed here are important in providing city-wide connectivity and transferring large numbers of passengers to public transport.

Access for Ellenbrook

The Plan supports the development of a rapid transit service for Ellenbrook, with the projected numbers of passengers justifying a road-based rapid transit service for the next 10 to 20 years. An option of running a Bus Rapid Transit (BRT) service between Ellenbrook and Bassendean and across to Morley is feasible. This provides quick transfer to the railway at Bassendean for trips to the central area and Midland, and access to commercial/community facilities at Morley. A railway reservation should be identified and secured, and a master plan prepared, to provide a long term rail option for the corridor (It is noted that the Government has allocated funding in 2012/13 for a Master Plan to be undertaken).

Access to UWA

As well as the light rail system, there is a need to support effective bus connections from UWA to the City via priority bus lanes on Mounts Bay Road. This will provide services for students to and from the Esplanade Busport and Train Station.

Access to Curtin University

The ultimate network light rail proposal will provide major access to Curtin University from Canning Bridge Station and the City via Victoria Park. Subject to infrastructure planning and staging associated with light rail, the following infrastructure measures are necessary to support bus services in the short term to Curtin University:

- bus priority along Canning Highway, Henley Street and Jackson Avenue to link to Canning Bridge Station; and
- bus priority along Shepperton Road as far as Miller Street to improve access to the city.

Access to Morley

Morley is a major centre for the eastern part of Perth and the City of Bayswater is currently undertaking planning for the Morley City Centre to coordinate its growth. This will include priority access to the bus station.

Priority lanes are proposed to link Morley to the City via Beaufort Street through Inglewood. Initially the priority lanes would be extended to Walcott Street. Discussions are currently underway with the City of Perth and the Town of Vincent with the objective of installing priority bus lanes into the City as part of the return to two way traffic along important streets.

Access to Stirling

The Stirling Alliance is promoting light rail through the Stirling Strategic Centre development. Planning for road infrastructure that would provide priority for light rail and/or buses in the centre of Stephenson Boulevard and Scarborough Beach Road is well advanced. The Alliance is currently considering timing and staging options for light rail, designed to encourage higher density development in the Stirling Strategic Centre and along Scarborough Beach Road between Stirling and Glendalough Stations. The Stirling Alliance is also investigating funding options that include contributions from development and parking levies.

Whilst this project is being developed by the Stirling Alliance to enhance development opportunities at Stirling, it will be a key component of a future light rail network that would be developed by 2031.

Access to Fremantle

Priority access to Fremantle currently consists of full time bus lanes on Hampton Road, between Douro Road and South Street. Priority is required south of Douro Road to Rockingham Road, and investigations are underway to look at options between South Street and Fremantle Station. It is likely that services south of Fremantle would be bus rapid transit.

Access to Murdoch

A committed project exists for bus priority west of Murdoch Station through the Main Street between Fiona Stanley Hospital and St John of God Hospital and into Murdoch University. The final part of this project connects the western end of Discovery Drive in Murdoch University back to South Street.

A further project is proposed to extend the South Street bus lanes east of Vahland Avenue to the freight railway bridge and to construct a park and ride facility in Canning Vale to supplement capacity at Murdoch Station.

Access to Perth Airport and Belmont

Priority bus lanes are proposed for Great Eastern Highway between the Victoria Park Bus Interchange and Kooyong Road, and 'queue jump lanes' at intersections from Kooyong Road to Tonkin Highway. This will enable improved access between the Perth CBD and other centres to the Airport for buses and other forms of public transport (e.g. taxis and airport shuttle buses) in the short to medium term. It will also provide for significantly improved services to Belmont Forum.

In the next ten years, when consolidation of the airport terminals is proposed (and prior to construction of a railway to the Airport), options to service a consolidated airport terminal will need to be resolved, but will likely incorporate either Great Eastern Highway and/or services via Belmont Forum.

Access to Midland

Rail will continue serving a redeveloped town centre including new health campus and other commercial activity and Government facilities, increasing contra-flow patronage. Investigations are underway for TOD development, redevelopment of Midland Station and a separate park and ride facility for Hills transit users.

Supporting the Perth central area

Light rail serving the Central Northern Corridor, UWA/QEII and Curtin University will provide an excellent network of services through the Perth CBD, East Perth, West Perth and beyond, as well as providing high capacity links into the City.

In the short term, prior to the implementation of light rail, changes to bus operations need to be considered for travel through the City

to help reduce congestion and allow for better coordination of bus services in peak hours. The system would operate on priority routes along St Georges and Adelaide Terrace and William Street. Passengers could catch buses at “superstops”, which would include no-step entry and off-vehicle ticket validation to improve vehicle loading speeds. Enhanced passenger information could be available through real time information on individual services.



DEVELOPING THE NETWORK

STAGE TWO PROJECTS

The following projects are considered to be required in the period before 2031. They build on the Stage 1 projects and are all essential building blocks toward achievement of the long term (vision) network.

Glendalough/Subiaco/UWA

This route will be required by about 2031 to relieve pressure on the inner section of the Northern Suburbs Railway and create an important connection between the Stirling Strategic Centre, Subiaco, the Fremantle line and UWA/QE11 precinct.

It is likely that this route would need to be serviced by light rail in the longer term, although the technology would be determined following master planning closer to the time of implementation.

Railway to Perth Airport

A railway connection to Perth Airport will be required by around 2031. The railway will link to the Midland line to the east of Bayswater Station. Two rail stations are proposed. Airport West Station will be an important employment and business centre and a park and ride and bus interchange to serve the foothills area to the east of the Airport. The other station will serve the consolidated airport terminal and will provide access for air passengers and airline and airport employees.

Cannington to Fremantle cross city link via Murdoch

This important east-west link will connect three strategic centres (Fremantle, Murdoch and Cannington), connect to three railway lines and provide access to two major hospitals (Fiona Stanley and Fremantle) and two universities (Murdoch and Notre Dame).

It will build on priority infrastructure already provided along South Street, through Murdoch University and into Fremantle. The technology and detailed route planning would need to be the subject of master planning post 2020.

Fremantle to Cockburn Central via Cockburn Coast

This is likely to be a bus rapid transit facility in the period leading up to 2031, although a case for light rail may be made in the longer term.

Fremantle to Rockingham via Latitude 32 and Kwinana

A bus rapid transit facility is likely to be required in the period leading up to 2031 to provide enhanced access to major employment centres at Rockingham, Kwinana, Latitude 32 and Fremantle.

Other projects

As bus services are progressively developed along the proposed transitway network there will be a need for bus priority along a number of routes.

Routes that are likely to require bus priority by 2031 include:

- Shenton Park to QEII and UWA;
- Airport West and the consolidated airport terminal to Victoria Park via Belmont Forum;
- Scarborough to Stirling;
- Cannington to Curtin University via Manning Road;
- Completion of the Beaufort Street/Broun Avenue link to Morley;
- Mirrabooka Avenue from Reid Highway to Hepburn Avenue;
- Oats Street Station to Curtin University; and
- Completion of Canning Highway bus priority between Booragoon and the Causeway.

As well, three rapid transit services are likely to be warranted in the outer growth areas, being:

- Alkimos – Eglinton;
- Rockingham – Baldivis; and
- Keralup/Karnup – Mandurah.

The rate at which bus priority measures and enhanced services are introduced over time will depend on the rate of employment and population development and will need to be kept under review. It is possible and indeed likely that other bus priority measures will be required by 2031.



PROPOSED **STAGE 2** PROJECTS FOR RAPID TRANSIT INFRASTRUCTURE



RAPID TRANSIT SERVICES CONCEPT

Passenger travel on the future network will likely be more dependent on transfers between services. This is a normal transition that occurs when a city develops from a small to a medium sized city. Perth has already seen the first phase of this transition, with feeder buses linking to bus and train stations across the network, particularly on the Joondalup and Mandurah rail lines. This pattern will continue.

As the public transport network develops, the opportunity to connect between centres at suburban nodes improves. These improved connections contribute to greater coverage, more direct and shorter journeys and a more efficient public transport system.

A possible service network, as depicted in the figure below could be based around 15 to 20 core transit services across the metropolitan area.

This ultimate network is indicative and would be subject to the roll-out of the proposed transit network and detailed services planning.



VALUING PUBLIC TRANSPORT INVESTMENT

The Terms of Reference required that the Independent Panel identify the costs of capital investment proposals and to operate the system, and the benefits of the investment.

The investment required

The significant investment in public transport in Perth will require a funding plan to ensure certainty in delivery of the benefits. Underfunding or sporadic funding would result in the system not meeting demand and overcrowding of public transport infrastructure, including buses and trains.

The funding required for the public transport system can be broken down into three major components:

- Annual operating and maintenance costs
- Fleet expansion and associated depot and maintenance costs
- Infrastructure costs, including expansion of the rail network, development of light rail and bus rapid transit, bus priority measures, expansion and improvement of interchange facilities, park and ride facilities, and stations.

Annual operating costs

The current (2009/10) annual cost of providing the public transport system is \$499.1 million in operating costs and \$691.2 million in total costs (including capital and interest charges). Revenue comes from:

- Fares: \$141.7 million
- Perth Parking licence fee and other service contributions: \$11.9 million
- Joint ticketing for major events (eg. AFL): \$2.7 million

The remaining cost of \$534.9 million, representing 77% of total costs, is met by the State Government. This includes the additional subsidy requirements to provide reduced fares for concession users.

By 2031, it is estimated that the annual operating costs for the public transport system will have risen to \$820 million. The total cost in 2031 would be influenced by options to finance

infrastructure projects but, using a factor of 1.5:1 as the current ratio between total and operating costs (being the average for the past 5 years), total costs in 2031 would be in the order of \$1.2 billion per annum in 2010 dollars.

Fleet expansion

Annual investment in fleet expansion and replacement has averaged \$79 million per annum over the last 7 years. Over the next 21 years the total cost for fleet expansion is estimated to be \$1.2 billion in 2010 dollars. The major components of the cost are:

- Additional railcars – \$624 million (156 additional railcars at \$4 million each);
- Additional buses – \$482 million (900 additional standard size buses at \$535,000 each);
- New light rail vehicles – \$131 million (29 light rail vehicles at \$4.5 million each).

This does not include additional costs for replacement or refurbishment of the existing bus/railcar fleets.

Network infrastructure costs

Capital expenditure on public transport has averaged \$270 million per annum over the last 7 years. Over the next 21 years the estimated cost to construct the infrastructure recommended in the public transport plan is \$2.9 billion in 2010 dollars.

The major components of the proposed infrastructure expenditure are:

- Rail system expansion – \$1.2 billion;
- Light rail – \$1 billion;
- Bus rapid transit and bus priority infrastructure – \$343 million;
- Additional rail, bus and light rail depot and maintenance facilities – \$180 million;
- Transit interchanges, including park and ride – \$135 million.

Total estimated funding needs to 2031

The total estimated funding needs to implement the public transport network plan to 2031 are:

- Annual total cost: \$1.2 billion per annum in 2031;
- Fleet expansion \$1.2 billion; and
- Infrastructure capital expenditure: \$2.9 billion.

Valuing public transport investment with benefit-cost analysis

Investment in public transport creates value for the community over the life of the assets created. These benefits can be economic, social or environmental, covering the full range of triple-bottom-line outcomes.

Investment in transport systems is typically a continuing process, although with some peaks where major infrastructure is built. Infrastructure may have a life of 50 years or more before it needs to be substantially replaced. Trains have an operating life of up to 35 years before they need substantial refurbishment and buses 20 years before replacement.

Where benefits from investments accrue over a period of time and over different periods from the costs of the investments, social benefit-cost analysis (BCA) is a useful tool for assessing their economic value.

For a typical (15km) peak period work journey to the Perth CBD, the cost to the community is currently (2010) nearly \$30 per day. If this journey was made by public transport, most of these costs, except travel time, would be saved – a net saving of \$20 per commuter per day – although there would be some direct costs incurred to provide the necessary public transport services.

Commuter travel by car to other places and car trips for other purposes may not impose obvious car parking costs or such high levels of congestion cost, but even an off-peak journey over the same distance by car imposes costs on the community of around \$13.

By 2031, increases in traffic congestion and in the price of fuel for cars (even allowing for more efficient car engines) will increase the daily cost of this travel to nearly \$35 in today's values, of which \$25 could be saved by switching to public transport.

The benefits of getting more people to travel by public transport will be greatest:

- for peak period travel (where congestion is greatest and car parking is likely to have a substantial resource cost); and
- for new patrons who previously drove a car for the journey.

Additional journeys on public transport will incur some additional costs for the community. These costs (infrastructure capital, vehicle capital and bus and train operating costs) are both a pre-requisite for attracting new passengers (ie better, more frequent, faster, more reliable and more comfortable services) and a consequence of carrying those passengers (ie. operating more buses and trains).

Capital costs will be incurred over a period of time, not as a single up-front investment. Benefit-cost analysis deals with a stream of investment costs over a period of time in the same way as it does a stream of benefits. The vehicle capital costs include replacement of existing vehicles where the evaluation period is greater than the effective vehicle life. This evaluation is based on buses having an effective life of 20 years and trains having an effective life of 35 years, at which point a major refurbishment of each train is required at 75% of the replacement cost.

Comparing benefits and costs: discounting the future

The generation of benefits and costs at different times means that a way of converting these to a comparable basis is needed. This

is done by means of discounting values for future years at a 'discount rate' that reflects the community's preference for having things now rather than later.

In many cases, benefits are largely proportional to costs (eg. a certain number of additional public transport trips requires a given number of additional buses and generates a predictable level of operating costs) and the choice of discount rate might not make a very big difference. However, when the real cost of something systematically changes in future years, the discount rate does make a difference.

For example, the price of petrol and other oil/gas-based transport fuels is expected to continue to increase and the congestion impact of each car that can be removed from the traffic stream will increase faster than overall traffic levels.

Although both fuel and congestion costs will increase over time, they will do so at different rates and the discount rate used for evaluation will substantially affect the impacts of these two on the evaluation outcome. In all cases, however, the benefit from congestion reduction (ie. the benefit to those who continue to drive their cars) is greater than that from reduced car operating costs for those who transfer to public transport after 2031.

In this evaluation, the WA Treasury-specified discount rate of 7% and an alternate value of 4% for sensitivity testing have been used.

What is being evaluated/ compared?

In this evaluation, the 'preferred' scenario is compared with a 'business-as-usual' scenario. The costs and benefits are additional to those that would accrue with a 'business-as-usual' approach, which would not involve new or extended railways or infrastructure priority for road based transit. This 'business-as-usual' scenario would itself substantially increase the use of public transport simply as a result of population growth and the increasing price of motor vehicle fuel.

The 'preferred' scenario being evaluated is a 21-year program of investment in vehicles, road based rapid transit, railways and associated infrastructure.

The evaluation is based on improved bus and train services only. The evaluation has not included the light rail proposals for the Central Northern Corridor and other parts of the network, as this would require judgements and major assumptions about the relative efficiency or cost-effectiveness of light rail and other benefits in terms of urban development and economic activity or increases in patronage.

It is more appropriate to assess proposals for light rail in the Perth context at a detailed project level. This would allow for more accurate analysis of public transport demand, changes to road traffic congestion and other efficiency and effectiveness benefits compared to a bus-based alternative. If that analysis were to demonstrate that similar benefits as experienced in other jurisdictions could be achieved in Perth from light rail, the benefit-cost outcomes would be enhanced. To that extent, this (bus and train only based) evaluation should therefore be regarded as conservative.

Some assets will only be created towards the end of the 21-year program. Where an asset reaches the end of its effective life during the evaluation period, an additional cost has been added to allow for replacement. This only applies to buses in both the 30-year and 40-year evaluations, and to trains in the 40-year evaluation period.

The main estimate for the patronage impacts of the Plan are for 2031, at the end of the program.

Projects are typically evaluated over 25 to 30 year periods, including the period of construction or investment, sometimes with sensitivity assessment for shorter and longer periods. This is an unusual evaluation, in that the proposed investment is over a very long (21-year) period. Evaluation periods of 30 and 40 years have therefore been used, which is effectively 20 and 30 years, respectively, from the mid-point of the investment timeframe.

Benefits and costs of improved public transport

In a typical benefit-cost analysis, longer-term benefits usually do not have a major impact on the present value of benefits – benefits 30 years hence have only 13% of their nominal value in present value terms when discounted at 7% per year. In this analysis, however, longer-term benefits beyond 30 years are very substantial, even when discounted to the present day (Figure 1). This is because:

- Marginal congestion costs increase very rapidly as road traffic volume grows into the future;
- Related to congestion, public transport travel times become increasingly competitive with car, especially where traffic congestion is at its worst;
- The real price of petrol is increasing, even after vehicle engine efficiency improvements.

The costs, on the other hand, increase at a reducing rate with extension of the evaluation period (Figure 1), as the majority of the costs are road and rail track capital with an effective life of over 50 years.

Half of the benefits of the increased use of public transport accrue through lower levels of congestion (Figure 2), with substantial benefits also through:

- reduced CBD car parking costs – freeing up CBD land for more productive uses;
- savings in travel time, especially in the period after 2031; and
- reduced road trauma;
- reduced environmental impacts, including greenhouse gases and air, water and noise pollution.

FIGURE 1 Present value of benefits (left) and costs (right)

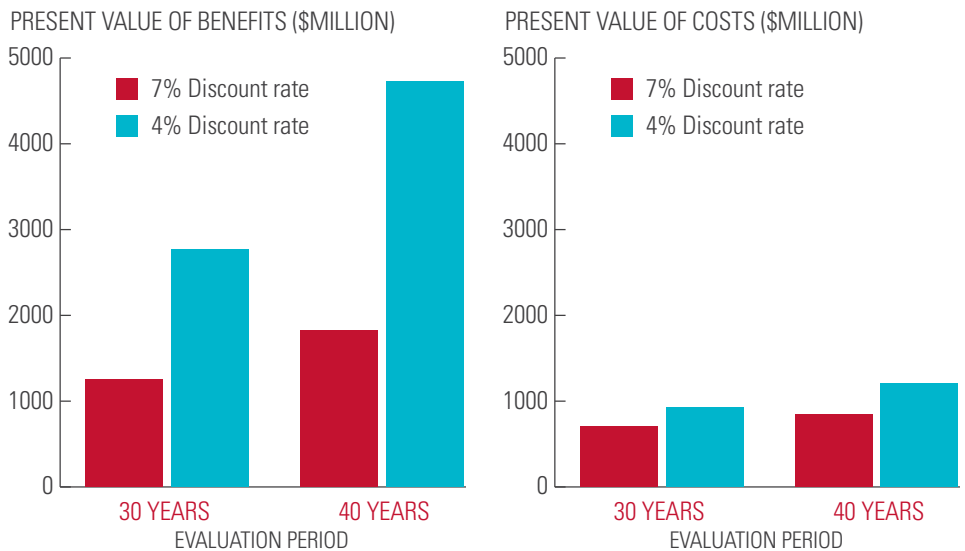
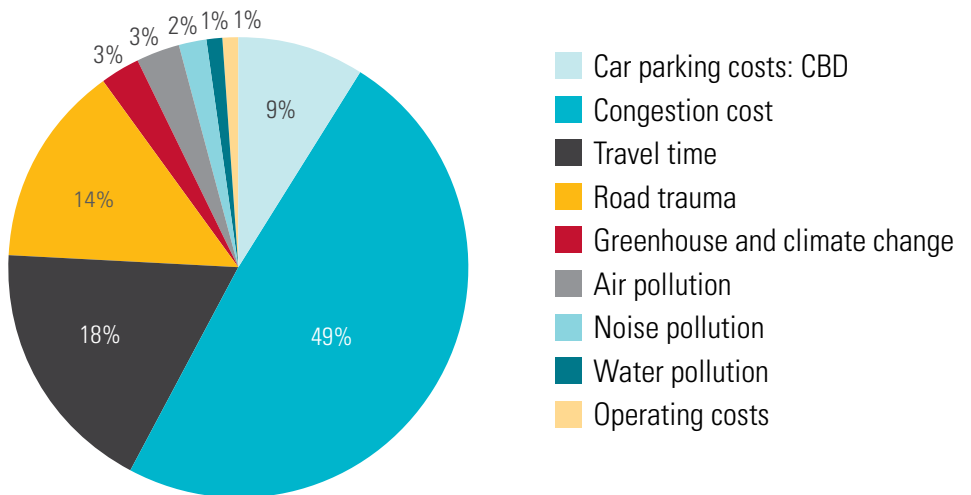


FIGURE 2 Composition of benefits (percent of present value; 30 years @7%)



90% of the net benefits are derived from lower congestion costs (49%), improved travel time for users (18%), reduced road trauma costs (14%) and savings in car parking costs (9%).

Reduced carbon emissions is a relevantly small benefit (3% at \$75 per tonne of carbon dioxide) so the value of carbon does not critically impact the evaluation.

Benefit-cost outcomes

Benefit-Cost Ratio (BCR) is the relativity between the present value of benefits and the present value of costs. BCR can be interpreted as the value for money to the community of the proposed investment. The BCR from the evaluation is 1.8 (for 30 years) and 2.2 (for 40 years). This compares favourably with Infrastructure Australia’s minimum BCR of 1.5 and a target BCR of 2.0.

The BCR and Net Present Value clearly demonstrate that investment in public transport is an investment in the long-term future of Perth. For every case except the shortest time period with the higher discount rate, benefits exceed costs and the extent of the difference increases with alternatives that are based on a greater concern with sustainability and the future (Figure 3).

Internal rate of return

The higher a project’s internal rate of return, the more desirable it is to undertake the project. For this evaluation, the internal rate of return increases with the longer evaluation period, reinforcing the conclusion that investment in improved public transport should be viewed as a long-term project for the future rather than a ‘quick fix’ for transport problems (Figure 4).

FIGURE 3 Benefit-cost outcomes

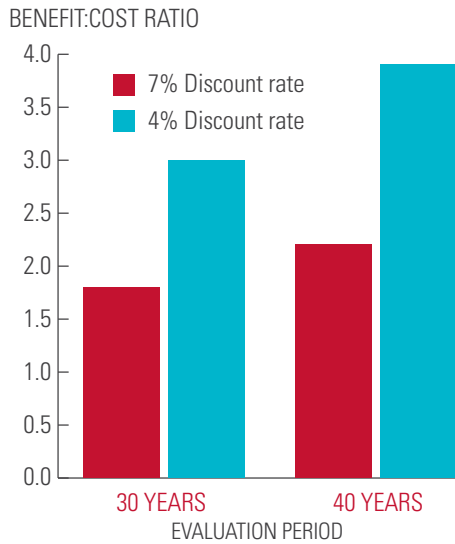
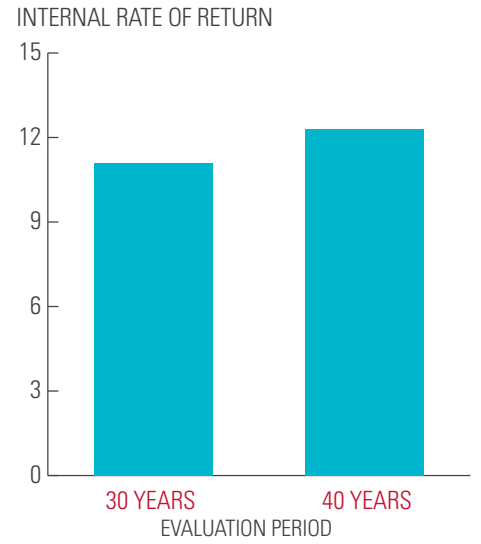


FIGURE 4 Internal rate of return



Benefit Cost Analysis at the strategic level inevitably has to average, or take typical values for, some outcomes. Where there are heavy concentrations, for example of road traffic and congestion, evaluation of individual projects is able to reflect the specific circumstances, including the more severe costs of road traffic congestion in heavy traffic locations.

Because some benefits of public transport are excluded and others can be better assessed for individual projects, the benefit-cost analysis presented here must be regarded as conservative. The full benefit-cost outcomes of all projects combined will therefore be better than the outcomes quantified in this evaluation.



FUNDING OPTIONS

The Terms of Reference required that the Independent Panel consider a range of public and private funding mechanisms.

Funding principles

Traditionally, public transport in Perth and other Australian cities has been funded in the main by State governments and public transport users. In the future, the range of public transport funding options should be expanded to be more aligned with the beneficiaries of an improved public transport system.

There are a number of beneficiaries of an efficient public transport system, including new and existing public transport users, other road users, land developers and the population at large, who benefit from reduced congestion and improved accessibility to jobs, education and other essential services and activities.

The Independent Panel has developed the policy principles below for funding of the public transport plan.

Funding plan

A detailed funding plan and strategy needs to be prepared by the Department of Transport and the Public Transport Authority in consultation with the Department of Treasury and Finance for consideration by the Government. The Independent Panel recommends that a number of new funding sources be examined for inclusion in the funding plan and that these be the subject of consultation with key stakeholders.

The opportunities to adopt alternative or additional funding sources will change over time. For that reason, a short term (5 year) funding plan and a longer term funding plan will need to be prepared.

Short term funding plan

In the short term, the State Government and public transport users are likely to remain

the predominant funders for public transport. However, within that overall framework, the following should be considered as part of a detailed funding plan:

Major capital projects

These projects should be developed utilising a public partnership approach in the first instance with potential opportunities for private funding. The project master plans should demonstrate how they contribute to an overall public transport network in accordance with Infrastructure Australia's requirements and should involve local authorities and major institutions such as universities in the development of the master plan, with a view to negotiating funding contributions. The primary contributors to funding major capital projects in the short term will be the State and Commonwealth Governments, but contributions from other stakeholders should also be a key consideration.

General principle

There should be a clear link between attributable benefit and the level of funds provided by any group or source.

Specific principles

1. The operating cost of the public transport system should be met by users and key beneficiaries.
2. The proportion of fare revenue to system operating costs should be relative to the externality benefits derived from public transport.
3. User charges should be considered among a range of options to help manage demand for travel during peak periods.
4. The subsidy provided for the elderly and other concession holders should be treated by Government as a "community services obligation" policy and be factored into the cost recovery model.
5. The allocation of capital funding should be based on an integrated transport funding model, assessing all costs and benefits to both users and non users and savings in external costs associated with road trauma, congestion and impacts on the environment.
6. The prioritisation of projects should include the contribution of major stakeholders to sustainable city development in terms of co-funding, transit and planning outcomes.
7. All levels of Government should participate in funding public transport capital projects as a means of reducing congestion, reducing environmental impacts, improving public health, reducing social disadvantage and contributing to city building.



Other public transport funding

The Independent Panel makes the following recommendations for consideration in the short term funding plan:

1. A re-allocation of funding within the State's transport portfolio budget to increase the funding share for public transport, reflecting its role in meeting the transport needs of Perth's growing population.
2. Cash-in-lieu or parking levies in strategic centres with the net revenue dedicated to public transport to assist in reducing car travel and increasing public transport.
3. An independent pricing mechanism be established to provide recommendations to Government on the setting of fares. The objectives should be to improve transparency and undertake benchmarking to establish whether changes to fares are justified over time. This mechanism should consider issues such as:
 - Differential charging for peak and non-peak travel, based on the higher cost to run the system during peak periods;

- The proportion of overall revenue obtained from users over time;
- The level of concession subsidy that should apply to different users and whether this subsidy should be funded as a Community Service Obligation.
- The charges that apply to park and ride users.

Longer term funding options

In the longer term, there are a number of funding options that should be considered to contribute to the higher cost and broader role of public transport in Perth. A number of these options will include an increased contribution from different levels of government and other stakeholders, all of which should be involved in development of a long term funding plan for public transport.

The need for greater funding for public transport is not unique to Perth. It applies equally to every capital city in Australia and growing cities overseas. As such it is recommended that the State Government

raise this in discussions with other State Governments and the Commonwealth Government through the Council of Australian Governments (COAG) with a view to having COAG consider a national strategy for funding both capital and operating costs of public transport.

Some options that should be considered in the longer term are:

- A congestion charge with a specific proportion of revenue dedicated to public transport improvements.
- Developer charges in areas where improved public transport can facilitate significantly higher density in key precincts and major centres and provide more efficient and more equitable public transport options.

The Independent Panel recognises that these are complex and challenging issues that will require extensive involvement and discussion between Government and key stakeholders.



ACTIVATING AND INTEGRATING

The Terms of Reference required that the Independent Panel identify how the public transport network can influence, or be influenced by, future urban planning and development.

Connectivity and accessibility

A successful public transport plan should result in a major improvement in accessibility to, and connectivity between, centres. To assess this, the public transport network identified in this Plan has been analysed using the Spatial Network Analysis for Multinodal Urban Transport Systems (SNAMUTS) developed by Curtis and Scheurer¹. The key findings were:

- The proposed network improvements will roughly double the overall efficiency of the system whilst only requiring additional operational improvements (eg. service frequencies) in the order of 60%.
- The basic structure of the existing network does not alter significantly, with the exception of the Perth Airport rail link and to a lesser degree the Central Northern Corridor rapid transit service.
- The ease of movement between centres/nodes across the network is significantly enhanced, even though the need to transfer remains at similar levels in 2031 as in 2010.
- The average proportion of residents within 45-minutes travel time of strategic centres across the network improves significantly, primarily due to more efficient transfers, network extensions and improved travel speeds on existing routes.
- The speed competitiveness of public transport over road travel improves in 2031 over 2010, primarily from less time-consuming and more efficient transfers between routes.

- The analysis confirms the ongoing importance of the Perth CBD, Stirling, Murdoch, Joondalup, Cannington, Rockingham and Fremantle as the strategic centre public transport hubs in 2031. It also highlights the potential of Canning Bridge, Bull Creek, Warwick, Whitfords and Bayswater stations to fulfil similar roles.

Whilst the public transport network analysed performs well, particularly in respect of connectivity to/between strategic centres, it should be noted that the SNAMUTS analysis was based on a bus-based rapid transit

network only. The network proposed by this Plan has since been revised to include light rail, which will further improve accessibility and connectivity. It will also result in further improvements to the speed competitiveness of public transport.

Principles to support integration of public transport and land use planning

The six principles below should be reflected in all land use planning documents to support land use and transport integration.

Concentrate development in centres particularly designated strategic centres

- 1 Develop concentrated centres containing the highest appropriate density housing, employment, services, retail and public facilities within an acceptable walking distance (400 – 1,000 metres) from major public transport nodes such as railway stations and high frequency bus routes with at least a 15 minute frequency at peak times.

Align centres within corridors

- 2 Concentrate high density mixed use, accessible centres along major public transport corridors within urban areas.

Connect streets

- 3 Provide street networks with multiple connections to public transport services and efficient access for road based public transport.

Improve access

- 4 Provide walkable environments and give priority to pedestrians including people with disabilities. Ensure that pedestrian access to public transport is direct and pleasant with good lighting and natural surveillance from adjacent uses.

Manage parking supply

- 5 Use the location, availability and supply of parking to discourage car use.

Improve road management

- 6 Improve transport choice and promote an integrated transport approach by managing road traffic flow and protect and promote priority public transport routes.

¹ Curtis, C. and Scheurer, J (2009 unpublished) Directions 2031 – Perth's 20 year public transport plan Spatial Network Analysis for Multimodal Urban Transport Systems (SNAMUTS)

Strategic integration

At the highest level of integration it is essential that there is a strong link between strategic land use plans and the public transport plans. This helps to ensure that public transport supports future growth areas and provides connections to areas of strategic importance. This Plan has been developed in close liaison with the Western Australian Planning Commission (WAPC) and the Department of Planning. The Plan reinforces the importance of connections to strategic centres and areas of future growth, as identified in *Directions 2031 and Beyond*.

However, this alone will not generate effective integration between land use and public transport. The level of synergy between this Plan and *Directions 2031 and Beyond* also needs to be replicated at all levels of planning and be expanded to consider the urban movement network as a whole.

Well-designed and located public transport can act as a catalyst for revitalisation, redevelopment and intensification of land use. This will only occur where there are land use policies that support more intensive use around key transport nodes and routes.

Without this level of integration, opportunities to maximise the usage of public transport will be lost. However, it is important that investment is targeted and opportunities that have the greatest chance of success become the real focus for 'integration'.

Current policy framework

All of the WAPCs high level planning policies for the Perth and Peel Region stress the importance of public transport.

The State Planning Policy Urban Growth and Settlement (SPP 3.0) emphasises the importance of good public transport connections. It outlines the following key requirements for sustainable communities:

- sufficient and suitable serviced land in the right locations for housing, employment, commercial, recreational and other purposes, coordinated with the efficient and economic provision of transport, essential infrastructure and human services;
- directing urban expansion into designated growth areas which are, or will be, well serviced by employment and public transport;

- supporting higher residential densities in the most accessible locations, such as, in and around town and neighbourhood centres, high frequency public transport nodes and interchanges, major tertiary institutions and hospitals, and adjacent to high amenity areas such as foreshores and parks;
- clustering retail, employment, recreational and other activities which attract large numbers of people in existing and proposed activity centres at major public transport nodes, so as to reduce the need to travel, encourage non-car modes and create attractive, high amenity mixed use urban centres; and
- access for all to employment, health, education, shops, leisure and community facilities by locating new development so as to be accessible by foot, bicycle or public transport rather than having to depend on access by car (whilst recognising the convenience of car travel for some trips and the limited potential to provide alternatives in rural and remote locations).

The Draft State Planning Policy on Activity Centres for Perth and Peel reinforces the importance of public transport in centres.

"Activity centres should be conveniently accessible by various transport modes, including walking, cycling, cars and freight vehicles, and particularly by public transport.

High trip-generating activities should be located so as to maximise opportunities to use public transport and to reduce the overall need for travel between places of residence, employment and recreation. The primary entrance to such activities in an activity centre of a district level and above should be within 400m of a high-frequency public transport service.

Where agreed by the Public Transport Authority, contributions towards the provision or improvement of capital works for public transport facilities may be provided in lieu of a proportion of the car parking bays that would otherwise be required by the development.²"



² WAPC (2009) Draft State Planning Policy Activity Centres for Perth and Peel (p 7-8)

In addition, the Development Control Policy Planning to Support Transit Use and Transit Oriented Development (DC 1.6) provides strategic direction for transit oriented development in the Perth metropolitan area. It identifies a multitude of potential transit oriented precincts and corridors based on 800m radial catchments for rail stations, transit interchanges or major bus terminals and 400m catchments on bus routes with multiple bus services and 15 minute frequencies. There is an interdepartmental committee to support the implementation of TODs.

Application

The current planning system has a range of planning and policy tools to support and reinforce the importance of public transport. The level of integration between this Plan and these planning tools is relatively high, given the predominance of *Directions 2031 and Beyond* and its influence on the location of future greenfields and infill developments. As a consequence, four of the six principles mentioned on page 37 are strongly supported by the current framework. The fifth and six principles – managing parking supply and improving road management are not clearly articulated within the planning system and are areas that require further policy work (see the Policy Issues section).

In spite of the number of supporting policies, there are fewer examples of effective TODs in the Perth and Peel regions, though a number of strategic centres such as Stirling, Midland, Murdoch and Rockingham are in advanced planning stages and have significant potential.

Subi Centro is frequently held up as an example of how TODs can work in the Perth context. Subiaco is successful because of a number of coexisting conditions. There was a significant area of under-utilised inner city land that was undervalued because of its industrial nature and the fact that it was separated from the rest of the Subiaco area by the railway. The decision to underground the station and the railway was the catalyst for the revival of this area and for its full

integration with Subiaco's central area. The importance of the Government's involvement in this project, particularly through the use of a redevelopment authority model and associated planning controls, cannot be overestimated.

The lack of TODs throughout the metropolitan area may be related to:

- Lack of suitable available land at a price where developers will take a risk with returns;
- Lack of appropriate development powers and controls at a local level;
- A general unwillingness of residents to accept higher density development regardless of the overall benefits that can be gained for the community as a whole; and
- No mandated minimum density requirements for land in transit oriented development precincts.

An example of some development guidelines that could be used to facilitate development in public transport catchment areas are outlined on page 40.

Opportunities

Three future development projects have the potential to demonstrate a fully integrated system. Each has a different set of land use characteristics, governance structure and constraints.

The Perth City Link

The Perth City Link project has a number of characteristics that are similar to the Subiaco situation. It relies on undergrounding the rail lines and the Wellington Street Bus Station, which currently act as barrier between the Perth CBD and Northbridge. This will create significant development opportunities (housing, retail and commercial) above the rail line and bus station for private developers and provide the opportunity to create north-south connections and revitalise the cultural precinct.

This project uses the redevelopment authority model as the basis for coordinating development.

Stirling Alliance

This project is focused on development around the Stirling Strategic Centre with a view to revitalising this area, creating significant employment opportunities with 25,000 jobs within 1,000 metres of the train station. In addition there will be a focus on residential development within this catchment.

The Alliance model represents a different governance structure. It is a temporary project organisation that is committed to develop and implement an agreed City Centre Structure Plan that realises the vision of the community. It is made up of the WAPC, the Department of Planning, the Department of Transport, Main Roads WA, the City of Stirling, the Public Transport Authority, LandCorp and industry and community representatives.

Midland

The town centre of Midland, including the former Midland Railway Workshops and key adjacent areas are identified as a strategic centre in *Directions 2031 and Beyond*. These areas have benefited from a recent increase in development intensity and are shaping as an important centre of population and workforce growth, with a potential town centre population capacity of 24,000 by 2031.

A TOD will be integrated with the approved new 450 bed Midland Health Campus and other commercial activity and Government facilities. Investigations into proposed redevelopment of Midland Station and development of a potential separate new park and ride facility for Hills transit users are also underway. The Redevelopment Authority model applied in Midland, like that used in Subiaco, East Perth and as part of the current Perth City Link project, has been effective in focussing resources on strategic urban renewal and economic expansion, developing an area served by an existing rail corridor.

Strategic planning

Two draft urban growth management strategies are currently being developed by the WAPC – the Outer Metropolitan Perth and Peel Sub-Regional Strategy and the Central Metropolitan Perth Sub-Regional Strategy. There is an important opportunity to work closely with the WAPC and the Department of Planning in the finalisation of these strategies to ensure that the level of integration that has occurred with *Directions 2031 and Beyond* is continued.

It is essential that the Department of Transport continues its involvement in the development of a parking policy framework for major centres. This will reinforce the importance of Principle 5, outlined on page 37.

The development of an integrated transport plan for the Perth Metropolitan Area provides the ideal opportunity to ensure that the last principle of integrated planning is addressed and opportunities for collaboration between planning and transport on this task should be supported.

Example

Improving Transport Choice – Guidelines and criterion for planning and development

1 Location/land use factor

1.1 Strategic planning

New residential development should be substantially within 5km of an existing or planned rail station (or equivalent rapid transit node) served at least every 15 minutes in the peak hour.

1.2 Implementation

Every household should be within 1,000m total walking distance of an existing or planned rail station (or equivalent rapid transit node) served at least every 15 minutes, or within 400m walking distance of a bus route (accessing such a node) served at least every 30 minutes.

2 Public transport network factor

2.1 Strategic planning

New residential development should be assessed in terms of the area's trip generation and impact on the performance of the existing subregional transport network and service in the area. The strategy for future land releases should also take into account the commitments in the State Government's transport infrastructure plans. New residential development should be serviced or have the potential to be serviced by an existing or planned network of cross-regional transport routes rather than necessitating the provision of an addition to existing networks.

2.2 Implementation

New residential development should be based on the type of interconnected street network that (a) minimises the travel distance between two points and (b) in its design facilitates walking, cycling and going by bus.

3 Catchment factor

3.1 Strategic planning

New residential development should accommodate the highest feasible density, in terms of land capability and market, and either form on its own, or as part of a larger area, a public transport TOD catchment of 6,000 residents.

3.2 Implementation

Development should be staged in a contiguous manner and with adequate roads to make the early provision of bus services feasible. Councils should work closely with Transperth to provide services as early as possible after the first residents move in.

POLICY ISSUES

The development of this Plan has identified a number of important policy issues that relate to either the development and operation of public transport or to the broader urban transport system. These policy issues need to be addressed to ensure that the urban transport system can continue to support a fast growing city with an expanding rapid transit public transport system.

Public transport policy issues

Demand management (peak period travel)

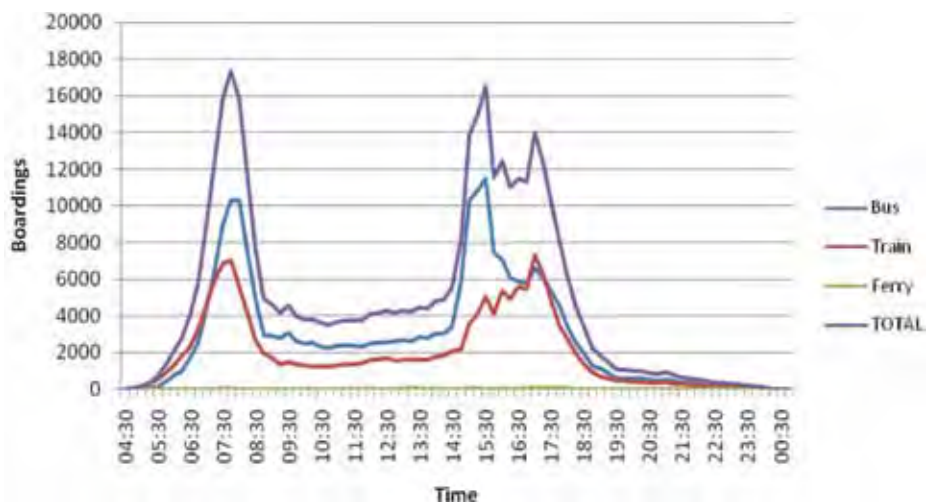
Public transport in major cities, including Perth, has to service a very significant peak period in the morning and afternoon. This has a significant impact on the cost of developing and operating the system, particularly for the rail network. The graph to the right highlights the concentration of activity in the peak periods in Perth.

Managing this demand is a complex and sensitive policy issue and one that most jurisdictions have struggled to deal with. At the heart of the matter is the fact that most commuters and students, who account for two thirds of all trips, need to arrive at work or their school/university within a narrow window of time.

In some overseas cities such as London, a fares surcharge has been implemented in the peak period for travel on the rail network in central city zones. In Melbourne, free travel was introduced several years ago for trips completed before 7.00am. There is some merit in further assessing pricing options to manage peak period travel in Perth, but this would need to consider the impact on patronage, the capacity for passengers to pay and the options to offer discount fares in the peak 'shoulder' periods.

There are also other non-transport policy solutions to deal with peak period travel such as changes to retail shopping hours and core business hours for major CBD workforces, and the start times for university students. These would perhaps have a more significant effect,

TYPICAL WEEKDAY PUBLIC TRANSPORT PATRONAGE PROFILE



and helped to spread demand more evenly, thereby making the public transport network more efficient.

Public transport fares

The level of cost recovery, being the ratio of fares to the total cost of the Transperth system, is low in Perth at 22.5%. This compares with a ratio of 28.5% in Sydney. The level of cost recovery is impacted by decisions about the cost of fares, Government concessions policy and cost pressures on the Transperth system. Many of these cost pressures reflect the significant community expectations for safe travel on public transport, for flexibility to be able to drive to public transport stations and for services to operate throughout the day to service a range of users. The nature of urban development in Perth also has a critical bearing on the cost of developing and operating the network and this, in-turn, has reflected the aspirations of the community for a unique suburban lifestyle.

Importantly, the fares policy and cost recovery target should ideally be based on a robust economic framework that recognises the significant benefits of public transport to the development of the city, to the community and to other road users (ie. by reduced congestion).

There is merit in fares being set by an independent tribunal. This would establish an agreed and consistent basis to assess the value of benefits to non users (externalities) and users; to assess the cost of the system (including operating costs, capital costs and a return on capital); to provide a clear basis for comparison with other jurisdictions and to provide a long term strategy for fares.

Powers to establish transitways and transit priority

Many of the rapid transit services will operate on local roads that are the responsibility of local government authorities. The proposed network of priority infrastructure also passes through a number of local government areas.



Given the need to further develop public transport services into rapid transit, it is important that whole-of-network public transport infrastructure can be constructed.

Current arrangements for the development of public transport priority infrastructure requires negotiation and cooperation between state agencies and local governments. A particular issue is the current lack of power for the state transport agencies to influence local governments where regional services and infrastructure networks are involved. Main Roads WA (MRWA) does not have the powers to direct the construction of public transport priority infrastructure on local roads.

Provisions for the State to have an appropriate level of authority are needed where local opposition or reluctance could jeopardise the development of a regional transit project. This could be in the form of MRWA having the ability to direct local governments to build and maintain particular items, allowing MRWA to construct infrastructure and hand over to local government for maintenance, or for MRWA to assume responsibility for roads or lanes as main roads and have them under their care and control.

Similar provisions have been introduced in New South Wales. The Transport Administration Act allows the Roads and Transport Authority (RTA) to direct local authorities to undertake particular works on local roads, including public transport works. The Transport Administration Act prevails over the Local Government Act and includes provisions for Supreme Court proceedings if necessary. The Act allowed the RTA and the State Transit Authority to construct the T-Way network in Sydney.

Transformational projects

Light rail transit networks and systems in most jurisdictions have typically been introduced partly as a measure to address urban accessibility and mobility, but also as a catalyst for urban consolidation and renewal. In this respect, the feasibility of many of these projects has been assisted by financial contributions from the private sector, which has recognised the increased value for property development from the light rail project.

Similarly, the fast tracking of the extension of the Northern Suburbs Railway to Yanchep provides a real opportunity to lock in this

extension as a transformational project. There is the potential for private sector financial contributions from the small number of land owners in the corridor and to secure significantly greater urban densities and town centre models than has typically been evident in Perth.

These transformational projects ought to be conditional on specific criteria, including:

- A contribution to the capital cost of the projects by the private sector, based on value transfer from increased property value;
- Alignment of support from local authorities to achieve a practical network across local boundaries;
- Minimum density outcomes being secured.

For light rail, project proposals would need to demonstrate how they are consistent with, and can be effectively expanded into, a broader network, would need to ensure a consistent use of technology to maximise operational flexibility and synergies across the network and would need to be subject to detailed master planning and a business case.

Broader transport policy issues

Implications of public transport priority on other road users

The allocation of road space to public transport vehicles opens up a broader debate about how the urban transport task will be managed.

This includes the impact of on-road priority for public transport on other road users, including light commercial vehicles and heavy vehicle freight, and whether the dedication of road space should also be available to other road users where appropriate.

A broader metropolitan network plan and strategy is needed to more fully explore this challenge and define appropriate use of the network. However, a number of observations and preliminary conclusions have been drawn from this project:

- General Car Travel – this project has clearly concluded that it is not practical or achievable to meet the ‘moving people’ demand for a growing city, especially in the Central sector, by building more roads to provide for an unmitigated use of private cars. In practical terms, motorists will face significantly worsening congestion, constraints on the availability of parking in major centres and higher costs of travel. Road space must be based on the number of people that can be moved rather than the number of vehicles, and transit clearly has the strongest case for priority use of road space in high volume corridors.
- High Occupancy Passenger Vehicles – as a general rule, high occupancy vehicles should only be defined as carrying 3 or more people and should only be allowed to operate in lower volume bus priority lanes if the decision is supported by a strong enforcement regime and a pricing mechanism to regulate the intensity of traffic in peak periods.

- Light Commercial Vehicles (LCVs) – the need for dedicated priority for road based public transport has been based on the case for rapid transit in the peak period in the morning and the afternoon. In the main, LCV’s do not need to meet a demand in the peak period and have a whole-of-day opportunity for delivery of goods or tradesmen can access work sites and suppliers outside of the peak period. As such it is proposed that LCV’s not be specially provided for as part of the allocation of road space for public transport vehicles.
- Heavy Vehicle Freight – the Public Transport Network Plan has identified specific road routes for public transport priority that are mainly local roads and hence do not overlap or impact on the strategic metropolitan freight network.

Parking in strategic centres – supply, allocation and pricing

There is a growing recognition and direct action by a number of major local authorities and institutional land owners (ie. hospitals and universities) that unconstrained car access to strategic centres is unsustainable and expensive. The response has been to introduce various measures such as restricting the supply and allocation of parking, introducing charges and levies for parking and to broaden the traditional cash-in-lieu model so that funds can be applied to measures that will support facilities and infrastructure for public transport.

The Department of Planning and the Department of Transport have been working on an over arching parking policy framework to ensure some consistency is given to how these measures are applied and to define the role of the State Government.





DRAFT PUBLIC TRANSPORT FOR PERTH IN 2031**CITY OF JOONDALUP SUBMISSION*****Intent of the Plan***

The City of Joondalup supports the development of a long-term plan for the increased capacity and expansion of the Perth Metropolitan public transport network and thanks the Independent Panel and Department of Transport for its efforts in instigating and completing the planning document: *Draft Public Transport for Perth in 2031 (DPTP)*.

It is evident that considerable work has gone into the development of the DPTP across a range of government stakeholders, and a conscious effort has been made to align proposed land use planning under *Directions 2031 and Beyond* with future transport services and infrastructure needs. Additionally, it is noted that short, medium and long term priorities for the expansion and upgrade of the network have been developed that will provide direction and certainty with regard to Metropolitan transport and land development opportunities in the future. In this respect, the intentions of the document are appreciated and supported by the City.

It is also noted that the DPTP is not intended to act as a detailed concept plan for the delivery and implementation of transport network developments and as such, the City anticipates more localised and detailed planning to become available in the future; (as well as complementary plans such as the *Moving People Plan*, *Road Network Plan* and *Bike Plan*). In light of this, the City has considered the DPTP within the context of being a working document that aims to “instigate a community conversation” about how the State should plan for the development of its Metropolitan public transport network in a sustainable manner and facilitate Perth in becoming a larger and more functional and integrated Capital City.

Assumptions and Modeling

The City notes that the DPTP has been developed on the basis of STEM modeling and demographic and socio-economic data from *Directions 2031 and Beyond*. It is appreciated that this data will be most relevant and reliable at the time of collation; however, the City is aware that under-estimated residential growth is being experienced within the northwest corridor at present, which if sustained, could significantly impact on the assumptions of travel demand and patterns utilised within the DPTP and *Directions 2031* in the short and medium terms.

In addition, the City would also support broadening the modeling data to include more socio-economic trends; particularly those already identified within regional tourism and economic development strategies. This would facilitate increased public transport connectivity to identified tourism locations (e.g. along the coast), where demand for access is increasing and opportunities for providing additional parking are reducing. The creation of a new marina at Ocean Reef will also see considerably higher coastal visitation numbers in the future and as such, the coastline from Fremantle to Yanchep could benefit from a north-south rapid coastal transit link in the long term.

Also, the focus on commuter movements seems to limit the consideration of public transport linkages to strategic employment centres only, and not to the movement of

large numbers of people to social, cultural or sporting events. A relevant example within the City of Joondalup is the possible introduction of a special events station at Joondalup Arena to accommodate concert events that attract crowds of up to 40,000 people. Areas such as this have not been identified within the DPTP as requiring improved public transport accessibility.

Recommendation 1:

- Broader consideration is given to socio-economic trends and planned economic development and tourism attraction strategies to improve transport connectivity to affected locations.

Recommendation 2:

- The DPTP includes scheduled reviews at an appropriate frequency to ensure that identified “triggers” (such as unforecasted residential growth, significant road congestion increases and transport behavioural changes), act as catalysts for infrastructure projects to be amended or reprioritised. The review process and potential triggers should also be transparently available to provide opportunity for local governments and other stakeholders to monitor potential changes within their locality.

Broader Transport Outcomes

It is noted that transport movements within the northern Metropolitan area only focus on north-south traffic and in doing so, encourage greater centralisation within the Perth CBD. The City believes there could be significant benefit in broadening transport outcomes within the DPTP to take advantage of more east-west linkages within the northern Metropolitan area, assisting to increase the future employment catchment of the Joondalup City Centre. Rapid transport links from Ellenbrook to Joondalup could provide greater accessibility through the City of Swan and East Wanneroo, encouraging the growth of Joondalup as a Primary Centre in line with the vision of *Directions 2031*. This will also reduce congested movement into the Perth CBD and reliance on Midland to provide the bulk of employment opportunities in the east.

If these public transport linkages are not acknowledged or provided in the medium-long term, the City’s future position in relation to the provision of commuter parking within its CBD will be impacted. Whilst the City does not currently have a formal position or philosophy on commuter parking, it does acknowledge that some parking is necessary to cater for people who work outside of the region and wish to use the train to commute. Commuter parking becomes more necessary if the east-west public transport linkages into the City are not well catered for and parking is required in the City Centre to improve regional self-sufficiency targets under *Directions 2031*.

Additionally, there is mention within the DPTP of a new “educational arc” to link education centres within the Central CBD through an integrated public transport network. The Joondalup City Centre is currently home to a large educational precinct that incorporates ECU, West Coast Institute of Training, WA Police Academy and the new tertiary expansion of the Joondalup Health Campus. New facilities such as the Motor Industry Training Association and the National Electrical and Communications Association are also increasing the City’s educational diversity, which could benefit from improved public transport linkages under the “educational arc” philosophy.

Recommendation 3:

- Medium-long term consideration of east-west linkages through the northern corridor within the DPTP to acknowledge potential employment catchments for the Joondalup City Centre.

Recommendation 4:

- Acknowledgement of northern educational precincts within the DPTP and the consideration of improved linkages to these locations and transport integration across campuses.

Regional Impacts

The City fully supports the extension of the northern suburbs railway line to Yanchep within the timeframes proposed in the DPTP, as short-medium term extensions will only benefit the economic development and growth of the Joondalup City Centre. This is particularly relevant in light of the rapidly increasing catchment and critical mass to the north of the City that has little supporting infrastructure and commercial capacity at present.

Notwithstanding the above, as a regional partner in the coordination and management of economic development and infrastructure planning within the northwest corridor, the City also acknowledges and supports the concerns raised by the City of Wanneroo in its submission on the DPTP, including:

- The need to provide greater focus on outer metropolitan sub-regions, rather than the central sub-region;
- A request to have regard to the population forecasts for the northwest sub-region, as prepared by the City of Wanneroo to ensure the under-estimated residential growth in the area is supported by appropriate infrastructure; and
- The need for consistency and coordination between the DPTP and WAPC-endorsed District Structure Plans within the northwest sub-region.

Of particular concern is the ability of the northwest corridor to achieve its employment self-sufficiency target in excess of 60% within 20 years, (as stated within *Directions 2031 and Beyond*), if assumptions in the DPTP heavily promote development projects within 15kms of the Perth CBD. Focussing transport infrastructure diversity and integration throughout this radius will directly impact on the City's ability to promote commercial investment in its City Centre, as the DPTP currently provides a catalyst for investment within the Stirling City Centre. This is concerning given the *Stirling City Centre Structure Plan* is yet to be considered and endorsed by the WAPC and questions about the viability of its plan and proposed targets for job creation are already being raised.

Recommendation 5:

- If the *Stirling City Centre Structure Plan* is significantly amended by the WAPC, proposed plans for the introduction of light-rail infrastructure within the DPTP are amended to reflect a reduction in commercial activity within this location.

Local Impacts

Given the City of Joondalup already has an established train network with high utilisation during peak periods in and out of the Perth CBD, there is little need for the consideration of other primary transport systems within our specific locality. It is also acknowledged that pre-planning in the development of the Joondalup CBD has resulted in high integration between the train station and City Centre, encouraging transit-oriented development without the need for major upgrades or refurbishments. However, with regard to complementary transport options, the City is unsure how current congestion on major arterial roads will be alleviated in the short-term if the DPTP promotes increased park and ride facilities at northern train stations. Again, the City acknowledges that future complementary plans such as the *Moving People Plan* and *Bike Plan* may expand on proposed alternative commuting options to primary public transport nodes, but the City does wish to highlight that it does not support increased reliance on train station parking for commuters in the medium-long term. It is also questioned why these complementary plans are being developed separately to the DPTP, given their obvious reliance on one another.

With regard to the provision of rapid transit infrastructure through Hillarys and Whitfords, the City supports this proposal in its current form, with a long-term implementation projection. This is in light of the City's medium-term focus to promote the Joondalup City Centre as a destination and centre for employment growth within its *Draft Local Commercial Strategy*. Focussing transport networks to the Joondalup City Centre over other centres in the medium-term will assist in achieving this vision.

Recommendation 6:

- The DPTP does not promote the use of park and ride facilities at northern train stations as medium-long term solutions for access to primary transport nodes.

General Comments

A comment has been noted within the DPTP on the development of an overarching parking policy framework for Strategic Centres within the Perth Metropolitan Region. The City would appreciate early consultation with regard to the development of this policy framework, given its current status as a Strategic Centre and the significance its paid parking regime has for the long-term sustainability of the Centre.

With regard to the effective progress of transformational projects, the City acknowledges the Department's recommendation to provide Main Roads WA with sufficient powers to direct the construction of public transport infrastructure on local roads; as unnecessary and unwarranted delays to major transformational projects would not be in the overall interests of the State. However, the DPTP should better reflect the intentions of the proposed powers, namely, that they would only be used in circumstances in which significant negotiations between parties have failed to result in an agreed outcome and failure of the project to go ahead would be detrimental to the overall public transport network.

In terms of recommending Main Roads WA to have the power to hand over maintenance requirements to local governments and assume responsibilities of local roads and lanes, the City would again request that the DPTP provides more context as to the circumstances in which these powers are likely to be exercised. It is assumed that significant negotiations between stakeholders would occur before the powers were used (noting that the City supports increased cooperation and dialogue

between authorities to see through the effective implementation of major public transport projects). However, if the negotiation process was poorly established or executed, the City would have major concerns with the proposed powers of Main Roads WA under the DPTP.

Recommendation 7:

- The City is consulted on the development of a Parking Policy Framework for Strategic Centres.

Recommendation 8:

- More detail is provided within the DPTP as to the intentions behind increasing the direction powers of Main Roads WA and providing context as to the circumstances in which these powers would be exercised.