



REGIONAL INTEGRATED TRANSPORT STRATEGY 2017 - 2021



Advancing Perth's Eastern Region 



EMRC



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Executive Summary

The Eastern Metropolitan Regional Council (EMRC) is a regional local government working on behalf of six member councils located in Perth's Eastern Region. The EMRC aims to be a responsive and innovative leader in assisting Perth's Eastern Region to be a great place to live, work, play and do business.

Perth's Eastern Region hosts Western Australia's major air, road and rail transport hub for movement of freight and passengers throughout Perth, intrastate, interstate and overseas. The region is considered the gateway to Greater Perth, made possible by people entering the region from the domestic and international airports or from the highways to the north and east.

Perth's Eastern Region has undergone rapid expansion and growth with major capital investments including intermodal freight terminal development, major airport and road redevelopment and education and health services investment. Increasingly, our region is becoming home to large national and international companies seeking office and commercial accommodation within close proximity of the CBD, key stakeholders and major transport routes. The major industrial areas of Malaga, Kewdale, Hazelmere, Forrestfield, Bayswater, Ashfield and Bassendean play key roles in transport, storage, manufacturing and logistics servicing the state's construction and resource sectors.

Perth's Eastern Region encompasses a variety of stakeholders with various responsibilities that contribute to the efficiency and effectiveness of the transport system. This *Regional Integrated Transport Strategy 2017-2021* acknowledges these stakeholder responsibilities and identifies opportunities for a collaborative approach to addressing the future transport needs of the residents and visitors of Perth's Eastern Region.

The vision for the *Regional Integrated Transport Strategy 2017-2021* is:

"To advocate and support the development of a safe, efficient and effective transport system that supports and enhances the region's economic, social and environmental wellbeing."

In order to achieve the vision of the *Regional Integrated Transport Strategy 2017-2021*, the strategy sets out six priority areas:

- **Priority Area 1:** Safety
- **Priority Area 2:** Efficiency
- **Priority Area 3:** Effective and Productive
- **Priority Area 4:** Resilient and Innovative
- **Priority Area 5:** Socially Responsible
- **Priority Area 6:** Environmentally Responsible

Each priority area identifies goals and objectives that will guide the EMRC to develop action plans for the next five years. The EMRC will undertake a central role for the delivery of this strategy and will coordinate collaboration amongst member councils and key stakeholders to achieve the objectives outlined in this strategy. These objectives include regional advocacy; research; education; information and engagement; regional programs; innovation; and collaboration.

Population **365,500**



growing to over **400,000**
by 2021



Area

2,100
km²

Approximately, **126,000** jobs in the region

Of which, approximately **85%**
of employees travel to work by car



Over **17,000** residents work in Perth City

1/3 of all
containers from
Fremantle Port
are delivered
to Kewdale
intermodal
terminal

- Gateway WA and Tonkin Highway Principal Shared Path (completed 2015)
- Midland Public and Private Hospital (completed 2015)
- New domestic and international terminals at Perth Airport (completed 2016)
- Midland Principal Shared Path (to Morrison road, completed 2016)
- Bayswater and Belmont Bicycle Boulevards (completed by 2017)
- Ellenbrook Bus Rapid Transit Way (completed by 2018)
- NorthLink WA (completed by 2019)
- Forrestfield-Airport Link (completed by 2020)
- Midland Curtin University (completed by 2021)

Context

2.1 Perth's Eastern Region

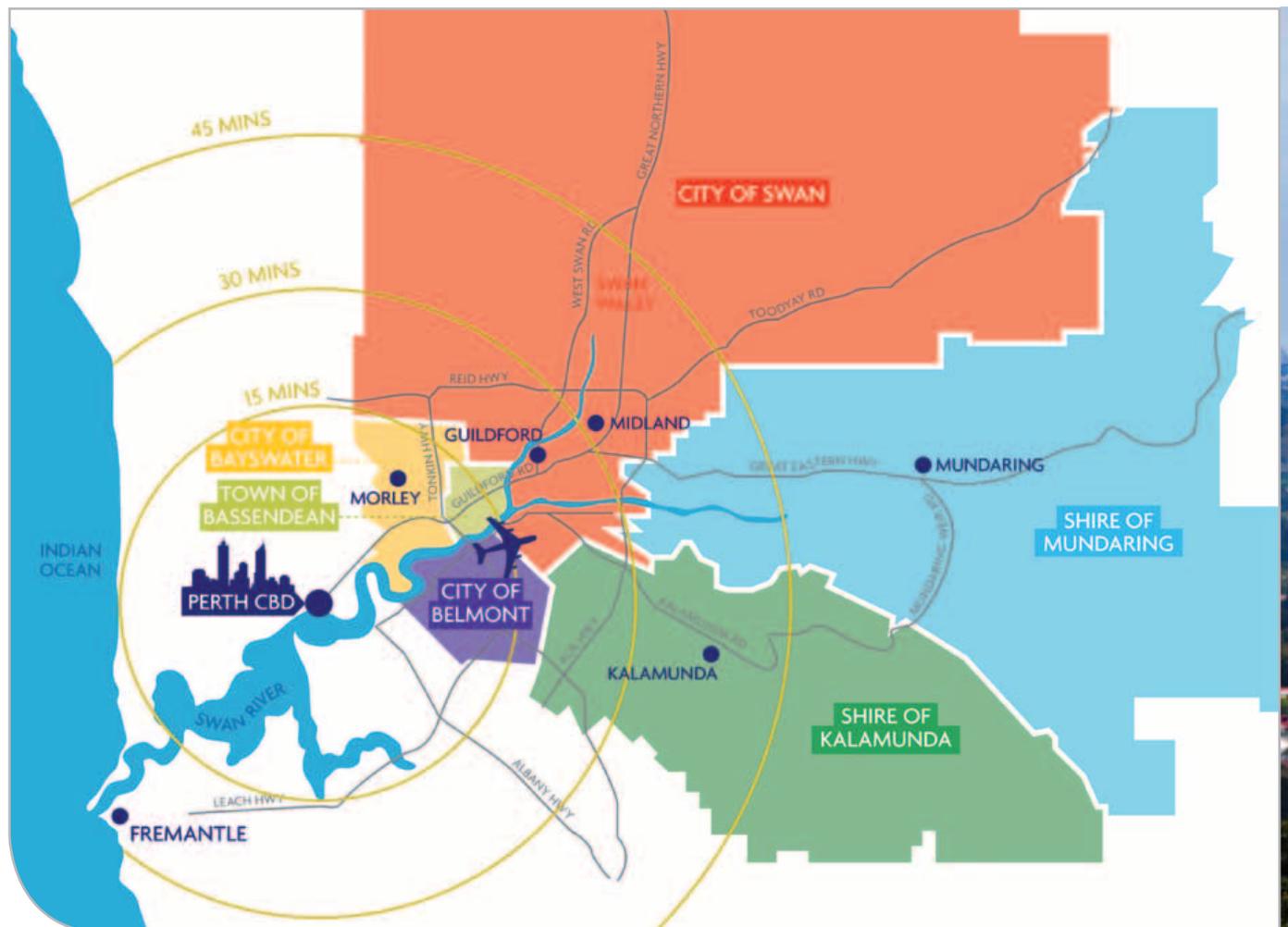
Perth's Eastern Region is an area of Perth defined by the boundaries of six local governments: Town of Bassendean, City of Bayswater, City of Belmont, Shire of Kalamunda, Shire of Mundaring and the City of Swan. The region constitutes around one-third of Perth's metropolitan area encompassing a land area of about 2,100 square kilometres and an estimated population of 365,500 people.

Perth's Eastern Region hosts Western Australia's major air, road and rail transport hub for movement of freight and passengers throughout Perth, intrastate, interstate and overseas. The region is considered the gateway to Greater Perth, made possible by people entering the region from the domestic and international airports or from the highways to the north and east.

Perth's Eastern Region has undergone rapid expansion and growth with major capital investments including intermodal freight terminal development, major airport and road redevelopment and education and health services investment. Increasingly, our region is becoming home to large national and international companies seeking office and commercial accommodation within close proximity of the CBD, key stakeholders and major transport routes. The major industrial areas of Malaga, Kewdale, Hazelmere, Forresterfield, Bayswater, Ashfield and Bassendean play key roles in transport, storage, manufacturing and logistics servicing the state's construction and resource sectors.

In addition to the specialist and industrial centres, a number of key activity centres in the region are identified for growth in the state's key planning framework *Directions 2031 and Beyond*. Morley and Midland are both identified as Strategic

Map of Perth's Eastern Region



Metropolitan Centres providing a mix of retail, office, community, entertainment, residential and employment activities. Morley represents the only Strategic Metropolitan Centre not connected by a rail network. Secondary centres identified are Belmont and Ellenbrook. These centres perform a key role in delivering a range of services to nearby communities and play a vital role for allocation of future infill population. Forrestfield, Kalamunda, Mundaring, Ashfield, Bassendean and Maylands have been identified as district centres that provide key local services, facilities and employment opportunities. The Perth Airport redevelopment, Midland Health Campus, Gateway WA and NorthLink WA in particular will provide new infrastructure to support future growth. The region's boundaries border both the Perth CBD and rural areas. Spanning inner urban areas to outer metropolitan and urban fringe developments, this is a growing vibrant region.

Perth's Eastern Region represents an attractive destination for visitors and provides a high quality of life for residents. The region is home to a number of core assets including: national parks; walking and cycling trails; numerous picturesque parks and reserves on the banks of the Swan River; an extensive range of heritage, culture and arts attractions including Guildford, which is one of the oldest settled areas in WA; the popular Swan Valley and boutique wineries in the Perth Hills. A range of community events and recreation facilities provide for community activity. Both the Swan Valley and Perth Hills have been identified as key attractors for the Greater Perth Metropolitan Area.

With a diverse regional economy, access to a skilled workforce and a range of leisure, lifestyle and living opportunities, Perth's Eastern Region is well positioned for continued growth and represents an attractive investment destination.





2.2 Eastern Metropolitan Regional Council

The Eastern Metropolitan Regional Council (EMRC) is a progressive and innovative regional local government working on behalf of the six councils located in Perth's Eastern Region.

The EMRC is an incorporated body established under the *Western Australian Local Government Act 1995*. The EMRC's operations are governed by its Council under an Establishment Agreement. In brief, the Establishment Agreement states that the EMRC will:

- Work in consultation with member councils to facilitate local government to enhance its service delivery to the community;
- Be efficient and effective in delivering quality services and facilities;
- Promote and market the role of local government in the community;
- Implement a strategic plan that is regularly reviewed; and
- Avoid providing any service or facility that adversely impacts on the services or facilities of any member council.

In line with this brief, the EMRC provides a broad range of services across the region including waste management and education, resource recovery, environmental management and regional development. Working in partnership with our member council's and other stakeholders, the EMRC delivers local and regional scale projects across each of these areas for the benefit of the region.

Working with our member councils, industry, government agencies and other stakeholders, the EMRC is a model of successful collaboration that delivers tangible benefits to the region. All projects and activities undertaken by the EMRC reflect the objectives within the *EMRC's 10 Year Strategic Plan 2017 to 2027*. The plan includes the Key Result Areas (KRA) of Environmental Sustainability, Economic Development and Good Governance.



OUR VISION

To be a responsive and innovative leader in assisting Perth's Eastern Region to be a great place to live, work, play and do business.



OUR VALUES

The values that govern the EMRC are:

EXCELLENCE – Striving for excellence through the development of quality and continuous improvement.

RECOGNITION – Valuing staff in a supportive environment that focuses on their wellbeing.

INNOVATION – Focus on innovative approaches in project and service delivery.

RESPONSIVENESS – Dynamic and flexible service delivery.

INTEGRITY – Accountability and consistency in all that we do.



OUR MISSION

EMRC, by partnering with member councils (and other stakeholders), facilitates strategies and actions for the benefit and sustainability of Perth's Eastern Region.



2.3 Integrated Planning

Integrating land use and transport planning plays a key role in the development of an integrated transport network. By shaping the pattern of development and influencing the location, scale, density, design and mix of land uses, planning can help to facilitate an efficient transport and land use system. Through integrated and improved planning, greater outcomes can be achieved such as reducing the need to travel, reducing length of journeys, providing safer and easier access to jobs, schools and services, reducing the impact of transport on the community and the environment, improving freight access to key terminals and improving freight flows. In addition to this, integrated planning supports efficient land and infrastructure use, can assist in reducing greenhouse gas emissions and reliance on fossil fuels, provides for the efficient distribution of goods and services to local business and community and provides a choice of travel modes, ensuring flexibility to meet the demands of a changing economy and market environments.

This *Regional Integrated Transport Strategy 2017-2021* acknowledges the importance of integrated planning through its rigorous review of local, state and federal planning strategies and formed a stakeholder group that represents a wide range of agencies to ensure the best outcomes for Perth's Eastern Region.



Table 1. Major employment locations¹

Locations	Number of employees
Malaga	14,186
Belmont – Ascot – Redcliffe	10,769
Midland – Guildford (inc Bellevue)	9,908
Perth Airport	8,513
Kewdale Commercial	6,869
Bayswater – Embleton – Bedford	6,482
Morley	5,689
Forrestfield – Wattle Grove	5,521
Bassendean – Eden Hill – Ashfield	5,008

Table 2. Expected growth in the suburbs

Locations	New dwellings
Swan Urban Growth Corridor	12,500 ²
Forrestfield-Airport Link	11,750
Belmont (DA6)	6,500 ³
Forrestfield	5,250 ⁴
Midland	2,700 ^{5,6}

¹ Australian Bureau of Statistics (2011). Australian Census

² Western Australian Planning Commission (2009). Swan Urban Growth Corridor – Sub Regional Structure Plan.

³ Perth Airport Pty Ltd & City of Belmont (2014). Development Area 6.

⁴ Shire of Kalamunda (2016). Forrestfield North – District Structure Plan.

⁵ Metropolitan Redevelopment Authority (2015). Midland Master Plan.

⁶ City of Swan (2013). Midland Activity Centre Master Plan.



2.4 Western Australian Strategic Planning Context

Western Australia has a number of policies and strategies which guide the development of land use development transport networks in metropolitan Perth. The main policy and strategic documents that are associated with developing the transport network in Western Australia are:

- *State Planning Strategy 2050*
- *Metropolitan Regional Scheme*
- *Directions 2031 and Beyond*
- *State Planning Policy 4.2 – Activity Centres for Perth and Peel*
- Draft Perth and Peel @ 3.5 million
 - Draft Central sub-regional planning framework
 - Draft North-East sub-regional planning framework
- Draft Transport @ 3.5 million
 - Draft Public Transport Plan
 - Draft Road Network Plan
 - Draft Cycling Network Plan
 - Draft Freight Transport Network Plan
 - Draft Travel Demand Management Plan
- *Perth Airport Master Plan 2014*

The *State Planning Strategy 2050* is the overarching strategic document that informs all other state, regional and local planning strategies, policies and approvals. The *Metropolitan Regional Scheme* provides the primary statutory planning document which identifies and reserves corridors for regional transport infrastructure.

The state government has recognised the importance of Perth's Eastern Region as a transport and industry hub in its urban development framework for Perth and Peel regions: *Directions 2031 and Beyond*. The framework provides a high-level spatial strategic plan, which sets a vision for future growth to guide the implementation of housing, infrastructure and necessary services for a range of growth scenarios.

The draft Perth and Peel @ 3.5 million and the Central and North-East Sub-Regional Frameworks provide guidance in delivering the objectives of *Directions 2031 and Beyond*. They identify a strategic plan of actions, stakeholder responsibilities and timeframes for delivery. The framework sets a target to increase urban infill development to 47% and new dwellings in the Perth and Peel regions will be built in strategic infill locations (activity centres, public transport corridors, station precincts). This includes 215,000 dwellings in the Central Region (includes the Town of Bassendean and the Cities of Bayswater and Belmont) and 40,000 dwellings in the North East Region (City of Swan and the Shires of Kalamunda and Mundaring). In the North East Region, there will be a further 66,000 dwellings in greenfield and undeveloped urban areas.

The draft Transport @ 3.5 million provides a long-term plan for transport infrastructure and the efficient use of the network as the population approaches 3.5 million and beyond. The plan highlights several major pieces of infrastructure within Perth's Eastern Region that include rail to Morley and Ellenbrook; the extension of the Midland line to Bellevue; upgrades to the road network including the Perth-Adelaide National Highway; new green bridges over the Swan River and upgrades to the freight rail network. The plan also focuses on optimising the system using various methods such as public transport network optimisation, managed freeway tools and travel demand management strategies, highlighting that these will be combined with all new significant public transport infrastructure projects or services.

Major retail and commercial centres are largely defined by *State Planning Policy 4.2: Activity Centres for Perth and Peel*, which includes a hierarchy of such centres across the Greater Perth Metropolitan Area. The activity centre hierarchy defines the places which vary in scale, composition and character but in essence are commercial focal points which include a combination of activities such as offices, retail, higher-density housing, entertainment, civic / community, education and medical services.



Key locations identified within Perth’s Eastern Region (see table 3) include Perth Airport which has been identified as one of five strategic specialised centres in Western Australia, Kewdale / Welshpool as a key strategic industrial centre and Midland and Morley which are strategic metropolitan centres within the activity centres network. The smaller secondary centres of Belmont and Ellenbrook also perform an important role in the regional economy and provide an essential service to their catchment populations.

7 Western Australian Planning Commission (2010). State Planning Policy 4.2 - Activity Centres for Perth and Peel.

8 Western Australian Planning Commission (2010). Directions 2031 and Beyond.

Table 3. Activity Centre Hierarchy^{7, 8}



2.5 Why a Regional Integrated Transport Strategy?

Perth's Eastern Region is a major air, rail and road transport hub servicing both passenger and freight demands of the state. It encompasses a variety of stakeholders with various responsibilities that contribute to the efficiency and effectiveness of the transport system. This *Regional Integrated Transport Strategy 2017-2021* acknowledges these stakeholder responsibilities and identifies opportunities for a collaborative approach to addressing the future transport needs of the residents and visitors of Perth's Eastern Region.

2.6 Regional Integrated Transport Strategy Implementation Advisory Group

The Regional Integrated Transport Strategy Implementation Advisory Group was formed to provide advice and recommendations to the EMRC with the aim of advancing the implementation of the initiatives identified in the strategy.

The Regional Integrated Transport Strategy Implementation Advisory Group is to carry out the following functions:

- Conduct an initial review of the management, monitoring and implementation of the *Regional Integrated Transport Strategy 2017-2021* and action plans (including regional road safety) and to provide advice and recommendations on action to progress implementation of the strategy and action plans and to manage that progression.
- Liaise with state government representatives on funding to implement the *Regional Integrated Transport Strategy 2017-2021* and action plans.
- Co-ordinate the implementation of both the local government initiatives in the *Regional Integrated Transport Strategy 2017-2021* and action plans.
- Identify, and make recommendations on, technical investigations and promotional and lobbying activities needed to progress the *Regional Integrated Transport Strategy 2017-2021* and action plans.

- Monitor progress on all aspects of the implementation of the *Regional Integrated Transport Strategy 2017-2021* and action plans.
- Undertake an annual review of the *Regional Integrated Transport Strategy 2017-2021* and action plans and progress toward implementation. Such review is to be linked to state and local government budgeting processes and to result in recommendations on any adjustments to strategies that are considered necessary and on actions for ongoing implementation of the *Regional Integrated Transport Strategy 2017-2021*.

The Regional Integrated Transport Strategy Implementation Advisory Group is made up of at least one officer representative (with appropriate expertise and seniority) appointed by each of the following agencies:

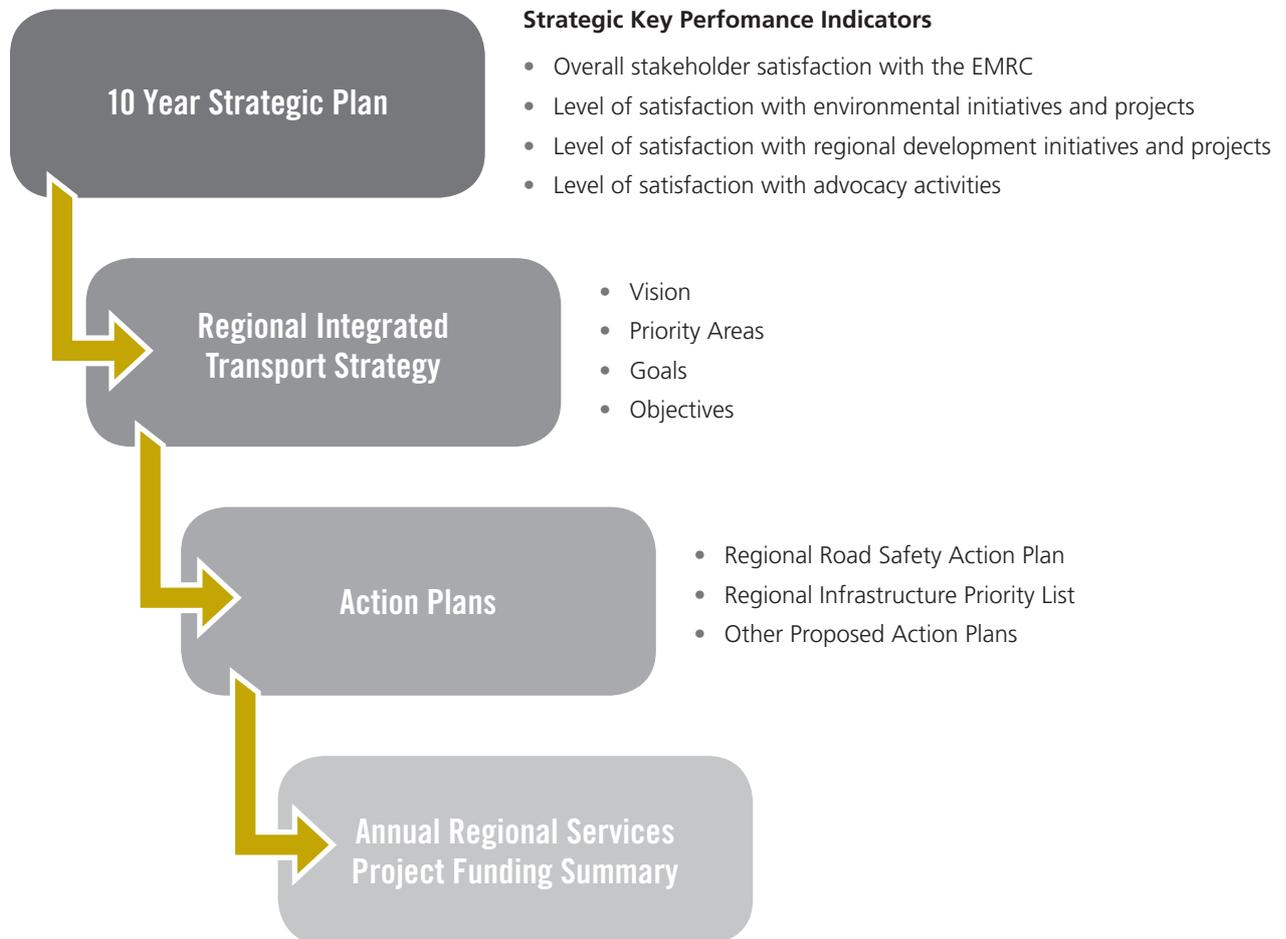
- Each constituent local government member of the EMRC:
 - Town of Bassendean;
 - City of Bayswater;
 - City of Belmont;
 - Shire of Kalamunda;
 - Shire of Mundaring; and
 - City of Swan.
- EMRC.
- Department of Transport.
- Main Roads Western Australia.
- Public Transport Authority.
- Department of Planning.
- Perth Airport.
- Western Australian Road Transport Association.
- Road Safety Commission.
- RAC.
- Western Australian Police.
- Western Australian Local Government Association.



2.7 Framework Approach

The EMRC's 10-year Strategic Plan 2017 to 2027 sets the direction of the organisation, of which this *Regional Integrated Transport Strategy 2017-2021* sits under key result area two (Economic Development).

Therefore, this strategy will provide the overarching strategic direction for transport planning decisions and through identifying goals and objectives, will inform future updates to the EMRC's action plans and advocacy priorities.







3. Priority Areas

In order to achieve the vision of the *Regional Integrated Transport Strategy 2017-2021*, six priority areas are identified:

1. Safety

Goal: That the region's transport network is safe and transport users are not exposed to harm or perceived safety risks when utilising or interacting with the network.

2. Efficiency

Goal: That the capacity of the region's transport network is maximised and used optimally.

3. Effective and Productive

Goal: That the region's transport network provides effective access and movement for employment, health, education, commercial, social, leisure and freight purposes.

4. Resilient and Innovative

Goal: That the region's transport network is flexible to address the region's changing needs and advances in technology.

5. Socially Responsible

Goal: That the region's transport network is equitable, accessible and affordable to all populations and protects heritage and culturally significant sites.

6. Environmentally Responsible

Goal: That the region's transport network minimises the environmental impact on the region's natural assets.



VISION

To advocate and support the development of a safe, efficient and effective transport system that supports and enhances the region's economic, social and environmental wellbeing.

Priority Area 1.

Safety

Goal: That the region's transport network is safe and transport users are not exposed to harm or perceived safety risks when utilising or interacting with the network.

A safe transport network is one where all road, public transport and active transport users feel safe and are not exposed to harm when utilising or interacting with the network. The effect of road trauma costs the community considerably, both socially and financially. Between 2011 and 2015, there were 107 fatalities on the roads within the region and thousands more people who were hospitalised or required medical treatment.

Road Safety

Road safety is a shared responsibility across various state and local government agencies. The state's *Towards Zero Road Safety Strategy 2008-2020*⁹ is guided by the safe systems approach adopted by all Australian jurisdictions. Aligning with this strategy, the EMRC's Regional Road Safety Plan, *Direction Zero 2015-2018*,¹⁰ supports, assists and advocates for the development of a fatality and serious injury free road network in Perth's Eastern Region. The plan seeks to collect road safety data and undertake audits to identify safety risks for action either through awareness raising, advocating for improvements to roads and roadsides or supporting local government submissions to the state and federal Government's Black Spot Programs.

The Road Safety Commission, formed in 2015, uses community education campaigns to raise awareness of the risks associated with unsafe road behaviours and encourage safe behaviours¹¹. Based on the four safe system cornerstones (safe road use; safe roads and roadsides; safe speeds; and safe vehicles), the Commission delivered a variety of initiatives in 2015/2016 to address road safety, including speeding, drink driving and a suite of bicycle safety campaigns. The Commission also assumed responsibility of the legislative amendment to remove age restrictions for cycling on footpaths. As such, the Commission should be used as a platform to ensure that agencies work collaboratively to reduce road trauma.

Various state and local government agencies are responsible for the construction and maintenance of roads in Western Australia. While local governments are responsible for local roads, Main Roads WA, the state's road authority, is responsible for maintaining the state's major roads, bridges, verges and reserves. Major roads are designed to attract high volumes of traffic including both private and freight vehicles, and there is a responsibility to ensure that roads are designed, maintained and enhanced to reduce the risk of crashes occurring and the severity of injury if a crash does occur. In particular, safety issues are often present when two modes of transport are required to operate in the same space and can include infrastructure such as pedestrian and rail crossings. Vulnerable road users, such as pedestrians, cyclists and motorcyclists, represent almost 40% of fatalities in the region and are overrepresented when compared with other road users. Efforts to reduce the risk of fatal and serious injury crashes by these road users are required.



Between 2011 and
2015, there were
107 fatalities
on roads within
the region.

The Western Australian Police also contributes to two of the four cornerstones of the safe systems framework (safe speeds and safe road use). Whilst the Western Australian Police's *Road Policing Strategy 2011-2014*¹² has expired, the importance of enforcement still plays a vital role in the overall safety on the road network as police are given responsibility for enforcing road user behaviour by apprehending those breaking the law and deterring others from engaging in dangerous behaviour. Furthermore, many of the priorities targeted in this strategy were also identified as issues in the EMRC's Transport Community Engagement Survey¹³, including driver distraction, speeding and anti-social driver behaviour (hoon).

Ongoing review of infrastructure upgrades to improve road safety black spots, changes in speed limits in areas of risk or areas requiring road behaviours enforcement is necessary to ensure that the region's road network remains safe for all transport users.

Infrastructure Design

Whilst transport safety is often considered in terms of the number of road crashes and fatalities, other safety factors have an effect on how the community interacts with the network and the method of transport chosen. Perceptions of safety are influenced by a range of personal, social and built environment factors. Attributes of the built environment that promote visibility and natural surveillance, such as lighting and surveillance on public transport services, stations¹⁴ and pedestrian underpasses, have well-documented associations with feeling safe. These key design principles are known to influence active transport and public transport usage and are identified in guidelines to design liveable neighbourhoods¹⁵ that reduce crime¹⁶.

The design of our networks and vehicles we choose to use can impact the community's health through such factors as air pollution, noise pollution and sun exposure. Motor vehicles are a major source of air pollution and non-combustion pollutants such as road dust that contributes to cardiovascular and respiratory disease¹⁷. While air pollution is often an invisible risk factor, it is important to reduce the community's exposure where possible, especially for those who choose active forms of transport. Noise pollution not only decreases amenity and liveability, but also impacts on health and wellbeing¹⁸. Methods to reduce or remove exposure to noise by air, road and rail transport should meet the community's expectation of what is an acceptable level of noise. Sun exposure is especially important for active transport modes, therefore shade is also an important design consideration for streets and footpaths. Implementing urban forest strategies to significantly increase tree canopy has the potential to reduce the risks of the urban heat island effect and sun exposure, improve comfort and amenity and encourage greater use of active transport modes¹⁹.

To ensure that Perth's Eastern Region transport system is safe, the following objectives have been identified:



Objectives

- 1.1 Identify and advocate for the removal or treatment of road safety black spots including the removal or grade separation of high-risk level crossings and intersections.
- 1.2 Identify and support information, communication and education initiatives that encourage safe transport behaviours and inform of potential risk factors.
- 1.3 Advocate for roads and roadsides to be well maintained and continuously improved to reduce crash risk.
- 1.4 Identify areas of the transport network where enforcement and surveillance activities will improve the safe use of the transport network and advocate for their implementation.
- 1.5 Advocate for transport infrastructure that uses 'designing out crime' principles to improve safety and amenity of transport-related public spaces.
- 1.6 Advocate for transport infrastructure that limits the harmful impact of air pollution, noise pollution, the urban heat island effect and sun exposure on human health.

- 9 Office of Road Safety (2009). *Towards Zero - Road Safety Strategy 2008-2020*.
- 10 EMRC (2015). *Direction Zero 2015-2018 - A Regional Road Safety Plan for Perth's Eastern Region*
- 11 Road Safety Commission (2016). *2015-16 Annual Report*
- 12 WA Police, (2011). *Road Policing Strategy 2011-2014*.
- 13 EMRC (2016). *Transport Community Engagement Survey*.
- 14 Public Transport Authority, <http://www.pta.wa.gov.au/portals/0/annualreports/2013/community/safety-and-security.asp> accessed 1 October 2016
- 15 Western Australian Planning Commission (2015). *Liveable Neighbourhoods (draft)*.
- 16 Western Australian Planning Commission (2006). *Designing Out Crime Planning Guidelines*.
- 17 Bureau of Transport and Regional Economics (2005). *Health Impacts of Transport Emissions in Australia: Economic Costs*
- 18 Western Australian Planning Commission, (2009). *State Planning Policy 5.4 - Road and Rail Transport Noise and Freight Considerations in Land Use Planning*.
- 19 Western Australian Planning Commission (2015). *Liveable Neighbourhoods (draft)*.

Priority Area 2.

Efficiency

Goal: That the capacity of the region's transport network is maximised and used optimally.

An efficient transport network is vital for the region's economic and social prosperity. The Bureau of Infrastructure, Transport and Regional Economics estimated that avoidable congestion (i.e. the deadweight loss of actual congestion levels, relative to economically optimal traffic levels) cost the Greater Perth Metropolitan Area \$2 billion in 2015 and is expected to rise to \$5.7 billion by 2030²⁰. With high car dependence, continued urban sprawl, strong population forecasts and an economy dependent on road and rail freight in Perth's Eastern Region, it is vital to ensure that congestion is minimised.

Congestion

The draft Perth and Peel @ 3.5 million Central Sub-Regional Framework²¹ identifies that congestion is increasing on the regional road network, particularly during the morning peak period. This mainly affects the roads that connect the outer areas of the sub-region to the Central sub-region, including Lord Street, Great Northern Highway, Roe Highway, Reid Highway and Gnangara Road to the North-West sub-region. The identification and control of congestion hotspots on the road and freight networks at key intersections and rail crossings, whether through grade separation or through improvements in traffic management tools such as signalling and signage, will be required to ensure efficient movement of freight and traffic through key corridors. There is also a need to continue smart integration of land use and transport planning through transit oriented developments and through marketing and behaviour change programs, such as 'Your Move', to ensure future congestion and capacity constraints are minimised and the benefits to the region and its residents maximised.

Infrastructure Improvements

Grade separation treatments of the road and rail freight network are an effective way to improve efficiency and safety of existing infrastructure. With the expected increase in freight activity in the Kewdale, Forresterfield and Hazelmere industrial areas²², key intersection upgrades and the removal of traffic bottlenecks along the network of highways surrounding these areas, such as Roe and Great Eastern Highways, will assist the efficient movement of freight and traffic through these key corridors. For example, recently completed road widening projects on Great Eastern Highway and Abernethy Road have left bottlenecks that reduce the effectiveness of these upgrades. In addition, the gap between the Gateway WA and Northlink WA projects will also result in traffic bottlenecks if Redcliffe Bridge and the over-rail bridge are not also upgraded in a timely manner.



Avoidable congestion
cost the Greater Perth
Metropolitan Area
\$2 billion in 2015
and is expected to rise to
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At-grade rail crossings, for both freight and passenger rail, can cause significant delays and safety issues to other transport modes that can be alleviated by grade separation treatments. Between 2009 and 2015, the level crossings at Daddow Road, Kewdale and Lloyd Street, Midland were grade separated to improve freight efficiency to the surrounding industrial areas. Further grade separation priorities on the freight rail line through Midland and Middle Swan and at high-risk crossings on the Perth to Midland passenger rail line have been identified in the draft Perth Freight Transport Network Plan²³ and the draft Public Transport Plan²⁴ and will improve the safety and efficiency of these networks.

Infrastructure improvements that provide for higher capacity vehicles to operate have the potential to maximise the productivity of existing assets and have applications for both public transport and freight. Extending the length of train station platforms will allow longer trains to operate on the Midland line. Adaptations to road and rail infrastructure can allow larger rail and road freight vehicles to operate achieving economies of scale and cost reductions for freight transport.

Congestion Management and Intelligent Transport Systems

Intelligent transport systems, such as electronic message signs allowing variable speed limits, advanced warnings of delays or hazards, lane control and ramp signalling will play an increasingly important role in the management of the transport network. Main Roads WA, through its Traffic Congestion Management Program²⁵ seeks to improve the existing road network through the use of intelligent transport systems and traditional infrastructure enhancements. This has resulted in several projects across the Greater Perth Metropolitan Area including the new merge lines on the Kwinana and Mitchell Freeways, pedestrian countdown timers, traffic signal timing improvement projects and trial projects such as yellow box junctions, flashing yellow turning traffic and right turn filtering. Consideration of these improvements may provide low-cost solutions to the region's congestion hotspots.

20 Bureau of Infrastructure, Transport and Regional Economics (2015). Traffic and congestion cost trends for Australian capital cities.

21 Western Australian Planning Commission (2015). Perth and Peel @ 3.5 million - Central Sub-Regional Framework (draft).

22 Department of Transport (2016). Perth Freight Network Plan - Transport at 3.5 million (draft).

23 Department of Transport (2016). Perth Freight Transport Network Plan - Transport @ 3.5 million (draft).

24 Department of Transport (2016). Public Transport Plan - Transport @ 3.5 million (draft).

25 MainRoads WA, <https://project.mainroads.wa.gov.au/tcmp/Pages/About.aspx> dated accessed 10 October 2016

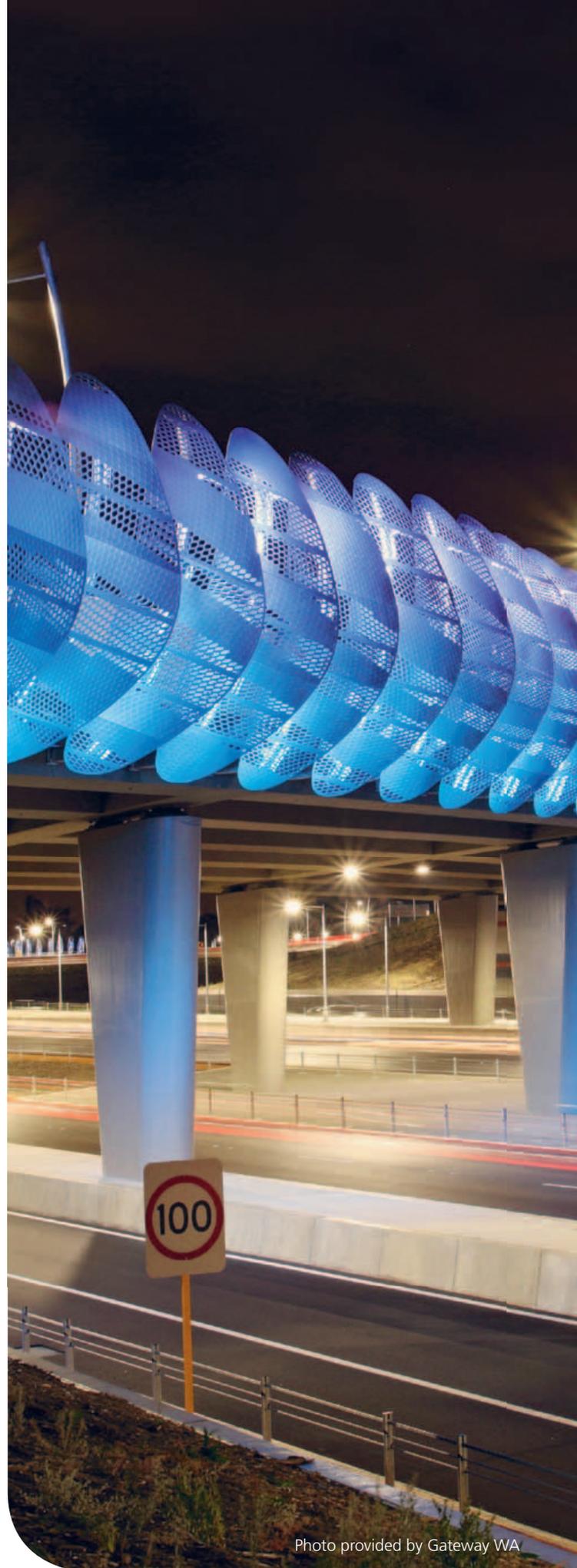


Photo provided by Gateway WA

Travel Demand Management and Route Optimisation

Large infrastructure projects such as Gateway WA, the Great Eastern Highway upgrades and grade separations of key intersections and crossings on key freight and traffic routes have allowed greater capacity and efficiency of vehicle movements in Perth's Eastern Region. However, these supply-side approaches to improve efficiency can be expensive and require the availability of significant parcels of land. There is merit in policies that promote the efficient operation and use of the existing network to delay or minimise additional road or public transport infrastructure upgrades, maximise the investment spent on infrastructure and minimise the negative effects of an inefficient transport network. These approaches can include integrating transport and land use planning; improving information and communication services; introducing travel behaviour change programs; and prioritising more space to cost efficient modes of transport such as walking, cycling and public transport.

Table 4. Perth's Eastern Region employee travel behaviour²⁶

Number of Employees	126,599
Car, as driver	80.3%
Car, as passenger	5.9%
Public Transport	3.7%
Walked only	2.0%
Bicycle only	0.8%
Worked from home	4.1%
Other	3.2%

Behaviour Change Programs

TravelSmart is a suite of travel behaviour programs aimed at households, communities, schools and workplaces with the objective of promoting and increasing the use of walking, cycling and public transport. Since the delivery of the individualised marketing pilot program in 1997, the program has shown significant changes in travel behaviour. Now under the 'Your Move' brand, the program has successfully incorporated the promotion of sport and recreation opportunities in recent years in household programs in the Cities of Cockburn and Wanneroo. The draft Transport @ 3.5 million plan²⁷ has identified that travel behaviour programs will be combined with all new significant cycling and public transport infrastructure projects to maximise the use of new infrastructure. With the delivery of the Forresterfield-Airport Link and the Ellenbrook Bus Rapid Transit Way, behaviour change programs such as 'Your Move' will be beneficial to the surrounding communities.

Self-sufficiency and Decentralisation

In the coming years, the Greater Perth Metropolitan Area is expected to support considerably more residents and jobs located outside of the Perth CBD. Ongoing population growth in Perth's Eastern Region will lead to additional pressure on the existing radial-style transport networks to meet the demand and will lead to greater congestion in the peak direction. As activity centres play an increasing role in providing housing and employment opportunities outside of the Perth CBD, this will help to distribute commuter traffic by allowing contra-flow transport use, improving cost efficiency of infrastructure^{28,29}. Increased employment self-sufficiency and decentralisation, with supporting orbital public transport routes, have the potential to achieve the aim for '30-minute cities' outlined in the federal government's Smart Cities Plan³⁰, as greater opportunities for people to work closer to where they live will be provided, reducing commute times.

To ensure that Perth's Eastern Region minimises congestion and has an efficient transport system, the following objectives have been identified:

Objectives

- 2.1 Identify and advocate for the removal or control of congestion hotspots.
- 2.2 Identify and advocate for the removal or grade separation of key level rail crossings and road intersections on the freight network.
- 2.3 Identify and advocate for opportunities in the freight and public transport network where infrastructure improvements will accommodate higher capacity vehicles.
- 2.4 Identify and advocate for opportunities where intelligent transport systems and traditional infrastructure enhancements could be used to maximise road and rail network efficiency.
- 2.5 Advocate for and support information, communication, education and behaviour change initiatives that encourage greater use of walking, cycling and public transport.
- 2.6 Advocate for and support initiatives that improve employment self-sufficiency to reduce commuter travel demand.





Self-sufficiency

Number of Jobs
 _____ = **78%**
Total Labour Force

in Perth's Eastern Region

Self-containment

53% of people live and
 work in Perth's Eastern Region

- 26 Australian Bureau of Statistics (2011). Australian Census
- 27 Department of Transport (2016). Public Transport Plan - Transport @ 3.5 million (draft).
- 28 Western Australian Planning Commission (2015). Perth and Peel @ 3.5 million (draft).
- 29 Western Australian Planning Commission (2010). State Planning Policy 4.2 - Activity Centres for Perth and Peel.
- 30 Department of the Prime Minister and Cabinet (2016). Smart Cities Plan.

Priority Area 3.

Effective & Productive

Goal: That the region's transport network provides effective access and movement for employment, health, education, commercial, social, leisure and freight purposes.

The transport network is tasked with the challenge of catering for the movement needs of people of all ages and abilities as well as goods and freight across a range of different purposes. To support the continued growth of the future population of Perth's Eastern Region and the expansion of freight movements, new transport networks that expand capacity require investment and early identification of the land required for new infrastructure. Perth is generally considered a sprawling city and many people in Perth's Eastern Region rely heavily on the road network due to lack of alternatives. As infill targets and transit-oriented developments progress, more people will live closer to essential services and their place of employment, providing a higher demand for alternative modes such as walking, cycling and public transport.



The Forrestfield-Airport Link will provide a net economic benefit of \$670 million and improve commuter times between the eastern suburbs and the Perth CBD

Active Transport

Walking and cycling are low cost, non-polluting and healthy forms of transport. Western Australia's warm climate combined with the region's low pollution and picturesque landscapes, encourage people to use active forms of transport for some of their trips. The EMRC's *Regional Cycle Network Master Plan*³¹ identified a 20-year schedule of works and advocacy priorities for active transport infrastructure in the region. The master plan also identified the barriers to cycling in the region and proposed infrastructure required to overcome these, for example, 'green bridges' (walking, cycling and bus-only bridges) over the Swan River to facilitate transport and recreation opportunities. Travel distance remains one of the strongest and most consistent predictors of active travel³². Analysis of the 2011 census revealed that many people who work in the region travelled great distances to work, there were also some areas where improved infrastructure and services may encourage more people to walk, cycle and / or catch public transport to work, in particular Malaga, Midland and Morley³³. In addition, increasing shade and tree canopy along active transport routes increase comfort and amenity and may encourage pedestrian and cyclist use³⁴. The introduction of the Belmont, Bayswater and Bassendean 'bicycle boulevards' will help provide more opportunities for short to medium length trips on bikes to schools, train stations or shops in the region.

As result of the EMRC's *Regional Cycle Network Master Plan*, many of EMRC's member councils have developed local bicycle plans to guide their commitment to cycling infrastructure. Future advocacy priorities may focus on the integration of these local plans and development of the state-owned network³⁵ to ensure that walking and cycling is attractive, convenient, permeable and continuous across the region.



Over 17,000 residents work in Perth City

Public Transport

The Forrestfield-Airport Link, expected to be completed by 2020, consists of constructing a new mainly tunnelled 8.5km rail spur from Bayswater, under the Swan River and the airport, to Forrestfield. The project will include a new station at Airport Central and also bus-rail interchanges at the new Belmont and Forrestfield stations. Infrastructure Australia forecasts that this project will provide a net economic benefit of \$670 million, improving commuter times between the eastern suburbs and the Perth CBD and reducing congestion³⁶. The Forrestfield-Airport Link is the first major extension of the rail network in Perth since the opening of the Mandurah Line in 2007. Other areas where high frequency public transport services will provide greater access and support the growth in the region's activity centres and key development opportunities need to be explored. Morley is the only Strategic Metropolitan Centre that is not serviced by heavy rail and the Swan Urban Growth Corridor and Ellenbrook are some of the fastest growth areas in Australia, with an estimated 50,000 more residents in the next 20 years³⁷. Whilst the proposed Ellenbrook Bus Rapid Transit Way will deliver quicker, more predictable journey times between the Ellenbrook Town Centre and Marshall Road, additional high-frequency, high-capacity public transport connections and feeder services to the region's activity centres, such as Morley, Midland, Ellenbrook, and other major employment centres and industrial areas is required and will relieve the major constraint to the attraction of businesses, residents and employees^{38,39}. These areas have a working population who are highly dependent on commuting by private vehicle, many of whom travel considerable distances, resulting in people who may be vulnerable to economic shifts such as changes in petrol price^{40,41}.

For investment in active and public transport infrastructure to be viable, an appropriate mix and balance of land uses is required to maximise the opportunities. The location of the existing Midland Station, at the western boundary of the Activity Centre, is relatively distant from the local residential and business catchments. This reduces its effectiveness as

a transport node and tends to promote a high reliance on 'park 'n' ride' adjacent to the station, even for residents living nearby. Relocating the Midland Station approximately 1km to the east, towards the City Centre core, the new Midland Health Campus and the Midland Workshops will increase the catchment of residents and businesses and help promote alternative transport modes. Extending the Midland line to Bellevue with a large 'park 'n' ride' facility that will further reduce the adverse impacts of parking and congestion within the Midland Activity Centre.

As public transport patronage is closely linked to the quality and frequency of the service provided⁴², ensuring that appropriate land use mix and densities in station precincts and activities centres will provide the foundations for public transport services to operate at an acceptable service level^{43,44}.

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- 31 EMRC (2011). Regional Cycle Network Masterplan.
 - 32 Victorian Department of Transport (2009). Walking and Cycling International Literature Review.
 - 33 EMRC (2016). Travel Demand in Perth's Eastern Region - An Analysis of the 2011 Australian Census.
 - 34 Western Australian Planning Commission (2015). Liveable Neighbourhoods (draft).
 - 35 Department of Transport (2016). Cycling Network Plan - Transport @ 3.5 million (draft).
 - 36 Infrastructure Australia (2016). Project Business Case Evaluation, Forrestfield-Airport Link.
 - 37 Forecast.id (2015). City of Swan Population Forecasts.
 - 38 EMRC (2015). Industry Cluster Analysis Research Paper.
 - 39 RAC (2016). Transport Accessibility of Perth's Activity Centres.
 - 40 EMRC (2016). Travel Demand in Perth's Eastern Region - An Analysis of the 2011 Australian Census.
 - 41 Dodson, J. & Sipe, N. (2008). Unsettling Suburbia: The New Landscape of Oil and Mortgage Vulnerability in Australian Cities.
 - 42 Western Australian Planning Commission (2006). Development Control Policy 1.6 - Planning to Support Transit Use and Transit Oriented Development.
 - 43 Western Australian Planning Commission (2010). State Planning Policy 4.2 - Activity Centres for Perth and Peel.
 - 44 Department of Transport (2016). Public Transport Plan - Transport at 3.5 million (draft).

Transit-oriented Developments

Transit-oriented developments around station precincts are good examples of land use and transport planning working together to achieve efficient and effective transport, residential and commercial developments. The Forrestfield-Airport Link provides the opportunity for investment to accommodate new developments in close proximity to stations, including higher residential and commercial densities to achieve infill targets and facilitate a less car-dependent community.

Over the last decade, Perth has moved towards higher resident population growth within established areas and key transport precincts with a shift towards apartment living. This has been driven by a combination of demographics, affordability and government policy. Balancing community expectations of public transport services and surrounding residential densities required to support these services around stations should be addressed. The EMRC's *Rapid Transport Development Study*⁴⁵ revealed that community awareness about the relationship between public transport and urban densities could be improved as the community demanded high levels of public transport service, large car parking facilities and were reluctant to accept increased housing densities around stations. Therefore, there is a need to consider the balance of transit-oriented developments and 'park 'n' ride' facilities to ensure that community expectations are satisfied.

Perth Airport

Perth Airport is Australia's fourth busiest airport and is a nationally significant asset. Forecasted growth in passenger numbers will more than double from 13.7 million in 2013 to 28.5 million in 2034. To match this growth, Perth Airport has proposed a third runway, a new terminal and improvements to its surface transport plan into the future⁴⁶. With this expected growth, on top of facilitating a mix of industrial, commercial, warehouse, logistics and distribution facility developments on the Perth Airport estate, ongoing review of the access to and from Perth Airport by visitors and by the local workforce is required.



Passenger numbers at the Perth Airport will more than double from 13.7 million in 2013 to 28.5 million in 2034.



Kewdale intermodal terminal ⁴⁷

one third

- Around **one third** of all containers unloaded from Fremantle Port are delivered to the Kewdale intermodal terminal for distribution between Western Australia and the eastern states.

- The Kewdale intermodal terminal is predicted to

double operations by 3.5 million

- Freight rail volumes are expected to increase by more than

75% by 3.5 million

Freight

Perth's Eastern Region is home to some of Western Australia's key freight infrastructure and related industrial areas. The Kewdale, Forrestfield, Hazelmere, Perth Airport, and neighbouring Welshpool industrial and commercial precincts are significant freight distribution hubs and rely heavily on the surrounding network of highways to operate. Around one third of all containers unloaded from Fremantle Port are delivered to the Kewdale intermodal terminal for distribution between Western Australia and the eastern states. Combined with the expected growth of operations and freight volumes, major upgrades to the road and rail freight network will be required to support this growth.

While there has already been considerable investment in the road network surrounding these areas in recent years including the Gateway WA and Northlink WA (currently under construction) that will allow some growth in freight operations, others parts of the freight network require improvements. For example, the Perth-Adelaide National Highway, first identified by the *Eastern Corridor Major Roads Study* as a priority in 1986⁴⁸ and later by the Australian Government in 2007⁴⁹ is now earmarked for completion "by 3.5 million"⁵⁰. Upgrading this connection to the existing highway network would alleviate safety concerns expressed by the community on Toodyay Road⁵¹ and improve efficiency and capacity of rural and interstate freight movements, especially on the Greenmount Hill entrance to the Perth Metropolitan Area. As the Red Hill Waste Management Facility is located on Toodyay Road, the development of the Perth-Adelaide National Highway must also ensure that safe and efficient access to the facility is provided⁵².



To ensure that Perth's Eastern Region remains effective and productive, the following objectives have been identified:

Objectives

- 3.1 Identify and advocate for infrastructure improvements that will make walking and cycling attractive, convenient, permeable, continuous and prioritised.
- 3.2 Identify and advocate for opportunities to improve public transport infrastructure and level of service to improve convenience and time and cost competitiveness.
- 3.3 Advocate for and support appropriately designed transit-oriented developments and 'park 'n' ride' facilities along key transport corridors and station precincts that support high-frequency public transport.
- 3.4 Advocate for appropriate transport options that provide efficient and convenient access to and from Perth Airport.
- 3.5 Advocate for and support improvements in the transport networks in and around the region's activity centres.
- 3.6 Identify and advocate for road and rail infrastructure that supports the future expansion of the freight industry.



45 EMRC (2014). Rapid Transport Development Study.

46 Perth Airport Pty Ltd. (2014). Perth Airport Master Plan.

47 Department of Transport (2016). Perth Freight Transport Network Plan (draft)

48 Travers Morgan Pty. Ltd. for State Planning Commission, Main Roads Department, Shire of Mundaring and Shire of Swan (1986). Eastern Corridor Major Roads Study : Preliminary Report.

49 Australian Government (2007). Perth - Adelaide Corridor Strategy.

50 Department of Transport (2016). Perth Transport Plan @ 3.5 million (draft).

51 EMRC (2014). Transport Community Engagement Exercise.

52 EMRC (2013). Hills Spine Road – Roland Road to Perth – Adelaide National Highway

Priority Area 4.

Resilient & Innovative

Goal: That the region's transport network is flexible to address the region's changing needs and future advances in transport technology.

There are many influencing factors to take into consideration to ensure the transport network remains effective to meet the changing needs of the region. Infrastructure Australia summarises that travel and freight are influenced by where people live and work and the convenience and user cost of transport options such as walking, car, or public transport⁵³. With technology advances in the energy sector and vehicle automation, as well as changing social and population trends, a proactive approach is required to ensure the transport network remains efficient and effective and that emerging trends are fully investigated.

Monitoring Travel Demand

Data monitoring is an important aspect determining the efficiency and effectiveness of transport networks as many variables affect travel behaviour such as population, destination, demographics, social trends, new technologies and other economic activities. There are many factors that can influence travel behaviour, travel demand and therefore productivity and there are also many data sources and methods used to monitor and determine the effectiveness of transport networks. Statistics from the Australian Census, patronage numbers utilising SmartRider data, traffic and bicycle counters and travel behaviour surveys such as the *Perth and Regions Travel Survey*⁵⁴, are all methods that can be used measure travel demand and travel behaviour.

As technology improves, there may be new opportunities to obtain in-depth and cost-efficient data analysis on key indicators of transport effectiveness and travel behaviour, in particular using GPS-enabled data monitoring. Creating platforms for private sector solutions and by allowing more data to be open and shared, has the potential to stimulate new markets and innovations and improve decision making. In line with the federal government's *Smart Cities Plan*⁵⁵, ongoing monitoring of travel behaviour, with a focus on smart data analysis and data sharing between organisations, will ensure that opportunities and issues in the region are identified and new innovative solutions are promoted.

Changing Travel Needs

As the population grows, these increases will present new challenges to ensure that transport networks remain effective for all of the region's residents. Not only will the number of residents increase, but there will also be changes in demographics, whereby different transport solutions may be required.



The past decade has seen the fluctuation of average unleaded fuel prices rapidly increase to

\$1.57/Lt in 2008

the fall to

\$1.10-\$1.20/Lt

in 2016.

As the population ages, transport needs will change and may result in a greater reliance on public transport services during non-peak hours. Currently, the region's population is ageing on par with trends across the Greater Perth Metropolitan Area; however, there are arrays of local differences including young families that are being attracted to the growing urban areas in the City of Swan. There is also a growing trend across Australia where younger people are less likely to have a driver's licence and more likely to defer learning to drive as walking, cycling and public transport have become more socially acceptable and are driving greater demand for alternative forms of transport⁵⁶.

Resilience

The past decade has also seen the fluctuation of average unleaded fuel prices which rose to \$1.57/ltr in 2008 then fell to hover around \$1.10-\$1.20/ltr in 2016 as result of new energy technologies and discoveries causing a dramatic fall in global crude oil prices⁵⁷. This fall in price may have also slowed the demand for fuel and energy efficient vehicles. However, as past oil crises have shown heavy reliance on oil can be debilitating to an economy. Providing a diverse mix of alternative transport methods and using diverse energy sources, can ensure resilience in unpredictable economic climates. This could include not only providing for energy efficient transport methods such as walking, cycling and public transport, but also electric vehicles, electric bicycles and the development of other synthetic (bio) fuels.

New Technologies and Trends

The revolution in electric and autonomous vehicle technology will have a dramatic impact on the function of the existing network. Electric and autonomous vehicles have the potential to improve safety, decrease the environmental and health impacts of road transport and provide mobility options for those unable to drive⁵⁸. However, it is unclear at this stage what the impact of such technologies will be, or how soon this change will achieve a critical mass. Solutions to changing infrastructure needs, such as battery charging locations and communication infrastructure for connected vehicles⁵⁹ will need to be addressed and ongoing monitoring of new technologies that can be applied in the region will need to be continued.

On-demand transport, car-sharing schemes and 'mobility as a service' business models may influence travel mode choice and vehicle ownership. This also has the potential to disrupt public transport services as users are enticed to new methods of transport⁶⁰. The uptake of autonomous bus transport, such as that trialled by RAC⁶¹ may maximise the benefits of this technology without resulting in additional capacity impacts. Similarly, the changing nature of how we work and flexible working arrangements could see the demand for transport networks change. With advances in technology and the rollout of the National Broadband Network, working from home or from co-working spaces may become more viable and more popular, reducing the demand for long commutes during typical peak hour periods.

As more people walk, cycle, use public transport and technology in electric vehicles and battery storage improves, there is a great opportunity to minimise transport's impact on greenhouse gas emissions by supporting these methods and others. Whilst it is generally accepted that technology will play a greater role in the transport networks of the future, the introduction of these game-changing technologies need to be strategically implemented and monitored to ensure the transport network remains effective.

To ensure that Perth's Eastern Region remains resilient to major changes in transport needs, the following objectives have been identified:

Objectives

- 4.1 Advocate for and support initiatives that allow the collection and use of open and shared transport and travel behaviour data to facilitate new innovative solutions.
- 4.2 Identify new and innovative solutions and funding sources to address the region's changing transport needs.
- 4.3 Advocate for the provision of a diverse network of transport options to ensure resilience to unexpected changes in fuel and energy prices.
- 4.4 Support the adoption of new transport energy sources as opportunities arise.
- 4.5 Support the adoption of on-demand transport initiatives as opportunities arise.
- 4.6 Advocate for and support initiatives that encourage flexible working arrangements and working from co-working spaces.

53 Infrastructure Australia (2013). Urban Transport Strategy.

54 Data Analysis Australia, Perth and Regions Travel Survey, <http://www.daa.com.au/case-studies/parts/> accessed 10 October 2016

55 Department of the Prime Minister and Cabinet (2016). Smart Cities Plan.

56 RACV (2015). Young Adult Licensing Trends and Travel Modes.

57 Department of Commerce, Fuel Watch WA Historical Price Search, <http://www.fuelwatch.wa.gov.au/fuelwatch/pages/public/historicalPriceSearch.jsp> accessed 11 October 2016

58 Main Roads WA (2015). Automated Vehicles: Are We Ready?

59 Main Roads WA (2015). Connected Vehicles, Are We Ready?

60 National Transport Commission (2016). Land Transport Regulation 2040 – Technology, trends and other factors of change.

61 RAC, Intellibus Trial, <http://intellibus.rac.com.au>, accessed 11 October 2016

Priority Area 5.

Socially Responsible

Goal: That the region's transport network is equitable, accessible and affordable to all populations and protects heritage and culturally significant sites.

Transport networks and services have the ability, to improve social amenity and provide vital connections to services for the community and support local business. However, poorly planned transport networks can negatively affect the community creating social isolation, transport disadvantage and impact safety. Congestion relief is often a key driver to improve efficiency and effectiveness of the transport network and improve cost efficiencies. However, a holistic approach is required to ensure social disparities are not created and take into account the needs of all users such as the elderly, youth and those with disabilities and mobility impairments.

Vulnerable Populations

In 2011, there were 20,354 households in the region that earned less than \$600/week⁶² and were considered low income households. Transportation costs represent a large proportion of household expenditure, especially in low income households. Those who may benefit the most from low-cost transportation, are the young, the elderly and the economically disadvantaged, and those who are less likely to own or afford a car. Transport disadvantage, particularly in outer-urban areas is the result of a range of intersecting factors including poor public transport infrastructure, a higher proportion of low-income households and the need to travel further distances in order to get to places of employment, education, services and social and recreational activities⁶³.

Young people are also regular public transport users, with many young people relying on public transport to access education, training, employment, entertainment and services. The EMRC's *Regional Youth Futures Report*⁶⁴ identified particular public transport issues that young people face in the region, including the frequency, proximity, connectivity and security on services particularly in the Shire of Mundaring, Shire of Kalamunda and outlying areas of the City of Swan.

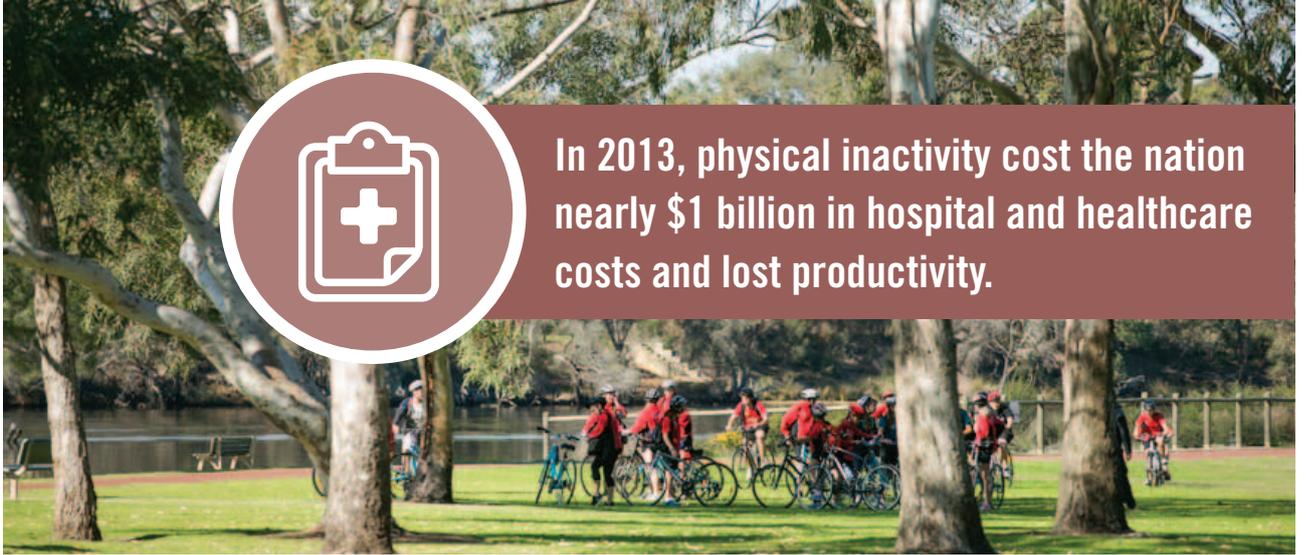
To prevent social exclusion and financial stress, efforts are required that to ensure that those with the greatest need have access to affordable and reliable forms of transport. This may be through monitoring public transport fares, ensuring that active forms of transport are readily available or ensuring that affordable housing is located near activity centres, employment centres and transport hubs.



There are over
20,000
low income households
in the region.



One in four West Australians are likely to
have a disability by 2028.



In 2013, physical inactivity cost the nation nearly \$1 billion in hospital and healthcare costs and lost productivity.

Mobility and Disability

Transport, including public transport, can also be difficult for people with a disability. Factors such as accessibility, communication about changes or cancelled services and malfunctioning equipment can all contribute to disadvantage for people with a disability. The Disability Services Commission estimated that one in four West Australians are likely to have a disability by 2028, many of whom will live in or near the poverty line⁶⁵. Therefore, it is vital that public transport services are affordable, accessible and reliable and that train stations and bus stops continue to receive accessibility upgrades⁶⁶.

Protecting Heritage Sites

Perth's Eastern Region has a rich and culturally diverse history encompassing both Aboriginal and European settlement. The abundant evidence of history in the built environment and the landscape of the region demonstrates the strong commitment by the community of saving places of heritage value for future generations. In particular, the Swan and Helena Rivers are not only a spiritual place for Aboriginal people, but also played an important role during European settlement⁶⁷. As transport infrastructure can require large amounts of land, disruption of heritage sites in the region should be avoided or minimised and liaison with the appropriate consultation group⁶⁸ must be sought.

62 Australian Bureau of Statistics, 2011 Census - Household Income and Expenditure, TableBuilder viewed 10 October 2016

63 Communities and Families Clearinghouse Australia (2011). The Relationship Between Transport and Disadvantage in Australia.

64 EMRC (2012). Regional Youth Futures Report.

65 Disability Services Commission (2013). Count Me In.

66 Public Transport Authority, <http://www.pta.wa.gov.au/projects/current-projects/bus-stop-accessibility-works-program> accessed 10 October 2016

67 EMRC (2009). Swan and Helena Rivers Management Framework - Heritage Audit and Statement of Significance.

68 EMRC (2013). Regional Aboriginal Consultation Guidelines.

69 Australian Bureau of Statistics (2015), National Health Survey: First Results, 2014-15

70 Department of the Environment and Heritage (2006). The Impact of Urban Form on Public Health.

71 Ding, D., Lawson, K.D., Kolbe-Alexander, T.L., Finkelstein, E.A., Katzmarzyk, P.T., van Mechelen, W., & Pratt, M. (2016). The Economic Burden of Physical Inactivity: A Global Analysis of Major non-Communicable Diseases.

Health

In Australia, only 55.5% of 18-64 year olds participate in sufficient levels of physical activity⁶⁹ and there is strong evidence that the built environment affects the transport-mode choices of both adults and children. Neighbourhoods characterised by low-density, poorly connected street networks and poor access to shops and services are associated with low levels of active transport rates and higher rates of obesity⁷⁰. In 2013, physical inactivity cost the nation nearly \$1 billion in hospital and healthcare costs and lost productivity⁷¹. Improving our neighbourhoods to ensure sufficient and suitable access to active forms of transport such as walking, cycling and to a lesser extent, public transport, have the potential to reduce the impacts of physical inactivity and sedentary behaviours.

To ensure that Perth's Eastern Region has an equitable and accessible transport network, the following objectives have been identified:

Objectives

- 5.1 Advocate for appropriate public transport service provision that caters for the needs of those who are dependent on public transport.
- 5.2 Advocate for transport pricing to remain fair and equitable for all populations.
- 5.3 Identify and advocate for infrastructure that require improvements to ensure accessibility by those with limited mobility and those with mobility aides.
- 5.4 Advocate for a greater number of public transport services that operate at high 'turn-up-and-go' frequencies throughout the day.
- 5.5 Advocate for the protection of sites of cultural or heritage significance and avoid or minimise negative impacts.
- 5.6 Support initiatives that promote the positive impacts of active forms of transport on human health.

Priority Area 6.

Environmentally Responsible

Goal: That the region's transport network minimises the environmental impact on the region's natural assets.

Perth's Eastern Region is home to the Swan and Helena Rivers, threatened ecological communities and large areas of state forest. As the population grows, the region's natural assets face increasing pressure from competing uses; from the development of areas for economic benefit to environmental protection for habitat and clean water, to health and social welfare through public access. A focus on protecting natural resources, reducing waste generation and resource consumption and addressing climate change, pollution and planning issues is fundamental to the environmental, social and economic wellbeing of the region. In conjunction with an increasing recognition of the effects of transport use and transport-related development on the environment, there is growing concern about the effects of environmental change on natural assets and the urban landscape.

Waste Generation and Resource Consumption

Transport infrastructure and vehicles generate problematic wastes such as tyres, used motor oil and their containers, batteries and inert rubble. Despite these problematic wastes being candidates for product stewardship or extended producer responsibility schemes, the Western Australian Auditor General found that formal schemes either do not exist, or where they do exist, such as Tyre Stewardship Australia, they have had limited success⁷². As a result of the costs and limited local options of disposal of these waste products, illegal dumping has been raised as a concern for many local governments⁷³.

Whilst the emergence of electric vehicles will be welcomed from many aspects, the large storage batteries required for these vehicles will enter the waste stream and pose waste management challenges in the future. Lead acid batteries are already subject to an effective recycling process, however the growth of lithium-ion batteries will become a management issue in the next 10 years as Australia currently has no specific lithium-ion battery collection or transfer infrastructure and only one facility providing partial processing and recycling (in Melbourne)⁷⁴. Development of processing and recycling infrastructure for current and future problematic waste is required.

Opportunities to use recycled and recovered products in transport infrastructure to reduce consumption of new resources should also be explored. The EMRC has been successful in achieving Main Roads WA Specification 501 for its ferricrete gravel that is excavated during landfill construction⁷⁵. However, the Western Australian Auditor General found that these specifications do not encourage the use of recycled products in the construction of roads and pavements⁷⁶. With the low rates of recycling in Western Australia, especially for construction and demolition materials, changes to these specifications could help divert a variety of waste sources.



17% of total
**greenhouse
emissions** in
Australia is attributed to
the transport sector

Urban Expansion

A considerable amount of land is required to deliver transport infrastructure and therefore its provision must take into consideration the impacts on the surrounding environment. To address some of these impacts, the draft Perth and Peel Green Growth Plan for 3.5 million⁷⁷ identifies several policy measures to limit urban expansion, prioritise expansion on mostly cleared land, to consider co-location of infrastructure and corridors and to implement infrastructure design that avoids environmental degradation. Ensuring that local biodiversity strategies, such as the City of Swan's⁷⁸, are supported and integrated into land use planning is essential in order to ensure that environmental impacts are minimised, particularly in river foreshore precincts, critical vegetation complexes and other environmentally and culturally sensitive areas.

Climate Change

Transport contributes to climate change, with 17% of total greenhouse gas emissions in Australia being attributed to the transport sector⁷⁹. Between 1989/1990 and 2013/2014, emissions grew in the transport sector by around two percent annually, mainly due to increased transport activity from both private passenger vehicles and freight vehicles. As technology in electric vehicles and battery storage improves, there is a great opportunity to minimise transport impact on greenhouse gas emissions through these methods and others.

The effect of climate change on the region presents a challenge for local government with possible impacts including infrastructure failure, damage and loss of ecosystems and watercourses, loss or migration of biodiversity, reduction in environmental health and increased intensity and frequency of fire, emergency and natural disaster events⁸⁰. With higher temperatures and increased intensity and frequency of storm and fire events leading to higher maintenance requirements and more frequent transport network stoppages, future transport infrastructure design will need to take climate change into consideration.

72 Office of the Auditor General Western Australia (2016). Western Australian Auditor General's Report - Western Australian Waste Strategy: Rethinking Waste.

73 WALGA (2016). Problematic Materials for Local Government – Background Paper.

74 Department of Environment (2016). Waste Lithium-ion Battery Projections.

75 EMRC, Ferricrete Gravel - <http://www.emrc.org.au/emrc-ferricrete.html> accessed 2 November 2016

76 Office of the Auditor General Western Australia (2016). Western Australian Auditor General's Report - Western Australian Waste Strategy: Rethinking Waste.

77 Department of Premier and Cabinet (2015). Perth and Peel Green Growth Plan for 3.5million (draft).

78 City of Swan (2016). Local Biodiversity Strategy.

79 Department of Environment (2015). Australia's Emissions Projections 2014-15.

80 EMRC (2013). Regional Climate Change Adaptation Action Plan, 2013-2016.



Roadside Litter

Litter along roadsides and car parks contributes to Western Australia's estimated yearly litter clean-up bill of between \$20-30 million⁸¹ and continues to be an issue in Perth's Eastern Region. This litter not only results in the loss of visual amenity but also impacts the environment when this litter enters waterways, stormwater drains and natural areas. Ongoing initiatives and awareness campaigns to prevent littering behaviours along roadsides are required to ensure the protection of the region's natural assets. In addition, stormwater infrastructure measures can be implemented to prevent litter from entering waterways.

Stormwater Management

Roads, roofs, pathways, parking areas and other hard surfaces reduce the ability for stormwater to infiltrate into the ground naturally. As a result, in most established urban areas, stormwater runoff enters waterways or groundwater without treatment. Contaminants in stormwater runoff can have a lasting effect on water quality values held within creek lines, rivers, wetlands, shallow aquifers and other sections of the environment.

Hydrocarbons are one kind of contaminant that has been detected in sediment within pools at drainage outfalls of the Bellevue industrial area, impacting the Helena River⁸². Hydrocarbon can come from fuel, oil and greases, vehicle exhaust pollution and asphalt road surfaces that after a rainfall event are mobilised into the drainage network and into waterways. Applying stormwater management and water sensitive urban design principles to transport-related infrastructure, such as the retrofitting of the roads and carparks identified in the City of Swan's *Water Efficiency Action Plan 2016-2021*, will help to address these negative effects and in some cases, it may be appropriate that polluted stormwater be treated through structural measures such as oil-water separators, swales, traps and basins to collect contaminants and litter before it enters the waterways⁸³.



Roadside litter campaign on Toodyay Road



Litter along roadsides and car parks contributes to Western Australia's estimated yearly litter clean-up bill of between \$20-30 million.



Wildlife

Interactions between transport users and wildlife not only have the potential to be a road safety risk to the community, with collisions between large animals presenting a risk of disastrous outcomes, but also have a negative impact on native wildlife. These risks are particularly evident in the parts of the region that are surrounded by state forest. As part of its fauna awareness strategy, the Shire of Mundaring's Green Spot Program⁸⁴ implemented a signage education program for motorists to slow down in areas where wildlife cross roads in the Shire. For high-risk areas, infrastructure-based mitigation measures may be appropriate to deal with the issues of habitat fragmentation and wildlife collisions⁸⁵.

To ensure that the transport network does not negatively impact Perth's Eastern Region's natural assets, the following objectives have been identified:

Objectives

- 6.1 Advocate for and support initiatives that avoid or minimise the negative impacts on the region's natural assets as a result of expanding transport networks.
- 6.2 Advocate for and support initiatives that reduce waste generated by transport-related activities.
- 6.3 Advocate for and support initiatives that increase the use of recycled and recovered resources in transport infrastructure.
- 6.4 Advocate for and support initiatives that reduce transport's contribution to climate change.
- 6.5 Advocate for and support initiatives and awareness campaigns that reduce littering behaviour.
- 6.6 Identify opportunities for transport infrastructure improvements that are designed to minimise stormwater contaminants and wildlife conflicts.

81 Keep Australia Beautiful Council WA (2015). A Litter Prevention Strategy for Western Australia, 2015-2020

82 EMRC (2015). Helping the Helena - Establishing a Baseline of Water Quality Pollutants for Linkages in Fish and Mussel Decline.

83 Department of Environment (2004). Stormwater Management Manual for Western Australia, 2004

84 Shire of Mundaring, Green Spot Program. http://www.mundaring.wa.gov.au/ResidentServices/Environment/Pages/Programs_GreenSpotProgram.aspx accessed 1 October 2016

85 Department of the Environment and Heritage (2008). Review of the Mitigation Measures to Deal with the Issues of Habitat Fragmentation.

Implementation

The EMRC will implement this strategy in accordance with the principles set out below. Projects, programs and initiatives will be required to be consistent with the vision of this strategy, the role of the EMRC and be best suited to advocate for a safe, efficient and effective transport system in the region.

4.1 EMRC's 10 Year Strategic Plan 2017 to 2027

All projects and activities undertaken by the EMRC must reflect the objectives within the EMRC's 10 Year Strategic Plan 2017 to 2027.

Key Result Area 1 - Environmental Sustainability

Our aim is to deliver a range of environmental services that enable the region and member councils to meet their responsibilities and community expectations for sustainable and adaptive environmental initiatives, and to maintain and enhance the natural assets of the region.

1.5 To contribute towards improved regional air, water and land quality and regional biodiversity conservation and address climate change

Key Result Area 2 - Economic Development

Our aim is to facilitate and advocate for the sustainable economic and social development of the region.

2.1 To facilitate and advocate for increased investment in regional infrastructure

2.2 To facilitate and advocate for regional economic development activities

2.3 To facilitate regional cultural and recreational activities.

Key Result Area 3 - Good Governance

Our aim is ensure that EMRC is a responsive, progressive and responsible organisation.

3.1 To provide advice and advocacy on issues affecting Perth's Eastern Region

3.2 To manage partnerships and relationships with stakeholders

3.3 To provide responsible and accountable governance and management of the EMRC.

4.2 EMRC's Service Delivery Model

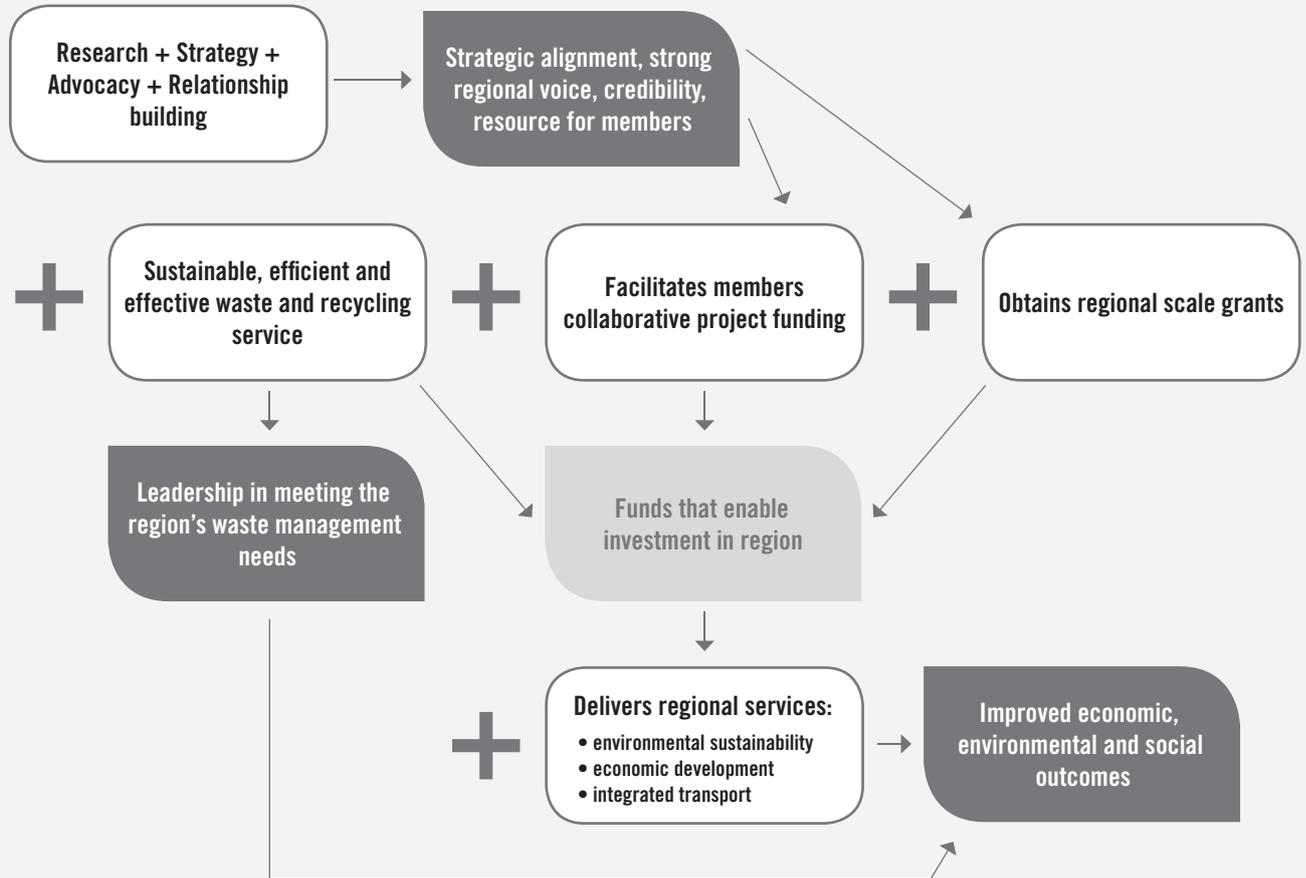
The EMRC's Establishment Agreement enables the EMRC to undertake a range of projects and services and provides a means for member councils to share resources and facilities. The cooperative, political and executive framework of the EMRC enables the member councils individually and collectively to promote and advocate on issues for the benefit of local government and to better serve the community.

The EMRC represents a model of successful collaboration, and for 30 plus years, has initiated and led projects for its member councils that deliver real benefits to the region in the areas of waste management and resource recovery, environmental sustainability and regional economic development. These services enable member councils to enhance outcomes for their communities and for Perth's Eastern Region as a whole.



The EMRC represents a model of successful collaboration and, for 30 plus years, has initiated and led projects for its member councils that deliver real benefits to the region in the areas of waste management and resource recovery, environmental, sustainability and regional economic development.

EMRC SERVICE DELIVERY MODEL



4.3 Priority Determinants

The EMRC will undertake a central role for the delivery of this strategy and will coordinate collaboration amongst member councils and key stakeholders to achieve the objectives outlined in this *Regional Integrated Transport Strategy 2017-2021*.

For an initiative to be progressed it is recommended that it should strongly display at least three of the following seven categories and not negatively affect any category.

- 4.3.1 Regional Significance:** Relevance across local government boundaries, or to unique cross boundary assets, projects with significant regional influence, or addressing regional, state or federal priorities.
- 4.3.2 Identified Priorities:** Contributes towards an identified priority.
- 4.3.3 Economies of Scale:** Likely to be significantly cheaper or more efficient on a regional scale. Likely to have enhanced collective benefits on a regional scale.
- 4.3.3 Emerging Issue / Opportunity:** New, innovative or pilot activity that could be expanded to other member councils or take advantage of newly emerged opportunities, such as funding, or address newly emerged threats to mitigate further issues.
- 4.3.4 Investment Ready:** Seed projects or those likely to attract significant income or investment through grants or sponsorship.
- 4.3.5 Profile:** Raising awareness of the region, the EMRC and / or member councils as leaders and innovators.
- 4.3.6 Collaboration:** Requires collaboration or partnership between member councils and / or other key stakeholders, such as researchers or industry.

4.4 Monitoring and Review

Effective implementation also requires regular reporting. All member councils and the EMRC Council will be kept up to date with progress towards the *Regional Integrated Transport Strategy 2017-2021*. This will occur regularly through the Regional Integrated Transport Strategy Implementation Advisory Group and an annual review by the EMRC. It is important to note that the actions under each objective are not exhaustive and, given the rapid pace of change in the sector, these need to be reviewed annually and updated to reflect new advances or threats and emerging opportunities and trends. Where appropriate, the community will be informed of significant progress developments through the EMRC website, media releases and newsletter. An annual review of progress will allow the *Regional Integrated Transport Strategy 2017-2021* to act as a living document, evolving over time as issues confronting the region change and actions are completed.

As per the EMRC's *10 Year Strategic Plan 2017 to 2027*, the Strategic Key Performance Indicators are:

- Overall stakeholder satisfaction with the EMRC.
- Percentage of waste diverted from landfill.
- Level of satisfaction with waste management services.
- Level of satisfaction with waste education activities.
- Level of satisfaction with environmental initiatives and projects.
- Level of satisfaction with regional development initiatives and projects.
- Level of satisfaction with advocacy activities.
- Financial sustainability of the organisation.





Appendix 1: Regional Integrated Transport Strategy Framework

Priority Areas	Goal	Objectives
1. Safety	That the region's transport network is safe and transport users are not exposed to harm or perceived safety risks when utilising or interacting with the network.	1.1 Identify and advocate for the removal or treatment of road safety black spots including the removal or grade separation of high-risk level crossings and intersections.
		1.2 Identify and support information, communication and education initiatives that encourage safe transport behaviours and inform of potential risk factors.
		1.3 Advocate for roads and roadsides to be well maintained and continuously improved to reduce crash risk.
		1.4 Identify areas of the transport network where enforcement and surveillance activities will improve the safe use of the transport network and advocate for their implementation.
		1.5 Advocate for transport infrastructure that uses 'designing out crime' principles to improve safety and amenity of transport-related public spaces.
		1.6 Advocate for transport infrastructure that limits the harmful impact of air pollution, noise pollution, the urban heat island effect and sun exposure on human health.
2. Efficiency	That the capacity of the region's transport network is maximised and used optimally.	2.1 Identify and advocate for the removal or control of congestion hotspots.
		2.2 Identify and advocate for the removal or grade separation of key level rail crossings and road intersections on the freight network.
		2.3 Identify and advocate for opportunities in the freight and public transport network where infrastructure improvements will accommodate higher capacity vehicles.
		2.4 Identify and advocate for opportunities where intelligent transport systems and traditional infrastructure enhancements could be used to maximise road and rail network efficiency.
		2.5 Advocate for and support information, communication, education and behaviour change initiatives that encourage greater use of walking, cycling and public transport.
		2.6 Advocate for and support initiatives that improve employment self-sufficiency to reduce commuter travel demand.
3. Effective and Productive	That the region's transport network provides effective access and movement for employment, health, education, commercial, social, leisure and freight purposes.	3.1 Identify and advocate for infrastructure improvements that will make walking and cycling attractive, convenient, permeable, continuous and prioritised.
		3.2 Identify and advocate for opportunities to improve public transport infrastructure and level of service to improve convenience and time and cost competitiveness.
		3.3 Advocate and support appropriately designed transit-oriented developments and 'park 'n' ride' facilities along key transport corridors and station precincts that support high-frequency public transport.
		3.4 Advocate for appropriate transport options that provide efficient and convenient access to and from Perth Airport.
		3.5 Advocate for and support improvements in the transport networks in and around the region's activity centres.
		3.6 Identify and advocate for road and rail infrastructure that supports the future expansion of the freight industry.

Priority Areas	Goal	Objectives
4. Resilient and Innovative	That the region's transport network is flexible to address the region's changing needs and future advances in transport technology.	4.1 Advocate for and support initiatives that allow the collection and use of open and shared transport and travel behaviour data to facilitate new innovative solutions.
		4.2 Identify new and innovative solutions and funding sources to address the region's changing transport needs.
		4.3 Advocate for the provision of a diverse network of transport options to ensure resilience to unexpected changes in fuel and energy prices.
		4.4 Support the adoption of new transport energy sources as opportunities arise.
		4.5 Support the adoption of on-demand transport initiatives as opportunities arise.
		4.6 Advocate for and support initiatives that encourage flexible working arrangements and working from co-working spaces.
5. Socially Responsible	That the region's transport network is equitable, accessible and affordable to all populations and protects heritage and culturally significant sites.	5.1 Advocate for appropriate public transport service provision that caters for the needs of those who are dependent on public transport.
		5.2 Advocate for transport pricing to remain fair and equitable for all populations.
		5.3 Identify and advocate for infrastructure that require improvements to ensure accessibility by those with limited mobility and those with mobility aides.
		5.4 Advocate for a greater number of public transport services that operate at high 'turn-up-and-go' frequencies throughout the day.
		5.5 Advocate for the protection of sites of cultural or heritage significance and avoid or minimise negative impacts.
		5.6 Support initiatives that promote the positive impacts of active forms of transport on human health.
6. Environmentally Responsible	That the region's transport network minimises the environmental impact on the region's natural assets.	6.1 Advocate for and support initiatives that avoid or minimise the negative impacts on the region's natural assets as a result of expanding transport networks.
		6.2 Advocate for and support initiatives that reduce waste generated by transport-related activities.
		6.3 Advocate for and support initiatives that increase the use of recycled and recovered resources in transport infrastructure.
		6.4 Advocate for and support initiatives that reduce transport's contribution to climate change.
		6.5 Advocate for and support initiatives and awareness campaigns that reduce littering behaviour.
		6.6 Identify opportunities for transport infrastructure improvements that are designed to minimise stormwater contaminants and wildlife conflicts.



Appendix 2: Priority Actions 2017–2021

Review and advocate for the infrastructure improvements identified in the Regional Infrastructure Priority List.

Review, implement and advocate for the priorities identified in the Regional Road Safety Action Plan 2015-2018.

Develop, advocate and implement identified priorities of a Regional Congestion Management Action Plan that include actions that encourage schools and workplaces to engage in the 'Your Move' program.

Develop and implement the identified actions of a Regional Smart Cities Action Plan to facilitate the adoption of new technologies.

Advocate for the implementation of targeted 'Your Move' campaigns in conjunction with the delivery of major infrastructure projects including the Ellenbrook Bus Rapid Transit Way and the Forrestfield-Airport Link.

Undertake Regional Public Transport Needs Assessments and advocate for public transport service improvements.

Undertake Regional Public Transport Accessibility Assessments and advocate for identified public transport accessibility improvements.

Undertake Regional Transport Community Engagement activities and incorporate identified priorities.

Support the transport related initiatives identified in the *Regional Advocacy Strategy 2016-2020*.

Support the transport related initiatives identified in the *Regional Environment Strategy 2016-2020* e.g. such as urban forest strategies.

Support the transport related initiatives identified in the *Regional Economic Development Strategy 2017-2021*.

Appendix 3: Regional Infrastructure Priority List

Roads	
Abernethy Road railway bridge and dual carriageway.	
Daviot Road extension between Benara Road and Lord Street.	
Great Eastern Highway between Tonkin Highway and the Great Eastern Highway bypass.	
Grade separation of Roe Highway / Kalamunda Road and Roe Highway / Great Eastern Highway bypass.	
Helena River bridge to complete connection of Lloyd Street through to Abernethy Road and the Great Eastern Highway bypass.	
Lord Street between Morley Drive and Guildford Road including Lord Street Railway Bridge.	
Proposed Perth-Adelaide National Highway.	
Reid Highway between West Swan Road and Altone Road.	
Tonkin Highway "Gap Project" between Gateway WA and Northlink WA.	
Public Transport	
Bayswater train station upgrade.	
Ellenbrook rail (rapid transit connection).	
Midland train station relocation.	
Morley heavy rail.	
Cycling Network	
Great Eastern Highway and Victoria Street to Midland CBD.	
Great Northern Highway (Roe Highway to Midland CBD).	
Johnson Street, Guildford.	
Midland Principal Shared Path (Midland Station to Roe Highway Principal Shared Path).	
Midland Principal Shared Path (Morrison Road to Midland Station).	
Midland to Morley Strategic Connection.	
Reid Highway (Great Northern Highway to Tonkin Highway).	
Roe Highway (Berkshire Road to Kalamunda Road).	
Roe Highway (Kalamunda Road to Great Eastern Highway Bypass).	
Roe Highway (Great Eastern Highway Bypass to Great Northern Highway).	
Tonkin Highway (Welshpool Road East to Kelvin Road).	
Tonkin Highway Gap (Victoria Street, Redcliffe to Railway Parade, Bayswater).	
Welshpool Road East (Roe Highway to Tonkin Highway).	
Whitfield Street Bicycle Boulevard.	
Cycling Network - Intersections and Rail Crossings	Cycling Network - River Crossings
Across Alexander Drive (multiple).	Ascot to Ashfield.
Across Orrong Road (multiple).	Belmont to Maylands.
Collier Road / Grey Street & Jackson Street.	Heirisson Island Shared Path Upgrade (access to Perth CBD).
Collier Road / Midland Train Line.	Maylands to Belmont Park.
Guildford Road / Railway Parade, Ashfield Rail Crossing.	Midland Principal Shared Path (Bassendean to Guildford).
Hardey Road / Great Eastern Highway.	
Kalamunda Road / Freight Rail Crossing.	
Meltham Station Crossing.	
Railway Underpass East of Bassendean Station.	
Roe Highway / Great Eastern Highway Bypass.	
Roe Highway / Maida Vale Road.	



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