

Direction Zero

2015-2018

A Regional Road Safety Plan for Perth's Eastern Region



This Regional Road Safety Plan 2015-2018 was developed with guidance from the Regional Integrated Transport Strategy Implementation Advisory Group (RITS IAG) representing: City of Bayswater, Town of Bassendean, City of Belmont, Shire of Kalamunda, Shire of Mundaring, City of Swan, Main Roads WA, Department of Transport, Department of Planning, Public Transport Authority (PTA), West Australian Local Government Association (WALGA) and the Royal Automobile Club (RAC). They were assisted by Tim Selby of Opus International Consultants (Australia) Ltd Pty.

Executive Summary

A total of 1,495 crashes involving road users being either killed or seriously injured in Perth's Eastern Region (the Region) occurred between 2010 and 2014. This includes 100 fatal crashes (resulting in 107 deaths) representing an average of 20 fatal crashes per year on the Region's roads. In addition, 1,395 serious injury crashes were recorded (i.e. requiring a road user to receive hospital treatment). In comparison, 346 fatal crashes and 6,477 serious injury crashes were recorded in the Metropolitan area for the same time period. This equates to the Region recording approximately 29% of all fatal crashes and approximately 22% of all serious injury crashes in the Metropolitan area.

Based on the Region's fatal and serious injury crash types as well as *Towards Zero WA's Road Safety Strategy 2008-2020*, four key road safety issues have been identified. These involve:

- crashes at intersections;
- vehicles and motor cycles running-off the road;
- those involving vulnerable road users such as pedestrians, cyclists and motor cyclists; and
- road user behaviour relating to speed, inattention/driver distraction and/or driving under the influence of alcohol or drugs.

Eight of the State's top 10 most dangerous intersections (ranked by the social cost of crashes) were located within the Region. Whilst the majority of the intersections are State roads under the control of Main Roads WA and carry the majority of the traffic flow, nine locations were intersections of local roads under the control of member Councils.

The EMRC has developed a *Regional Road Safety Plan* (the Plan) following the "Safe System" approach to road safety. Accordingly, this process has focused on advocating for Safe Roads and Roadsides, Safe Speeds, Safe Road Use and Safe Vehicles in addition to general road safety planning and governance with respect to the implementation of the Safe System. This Plan follows both the State and Federal approach in that it accepts and acknowledges that road users will make mistakes, and that there is the need for a more forgiving system to accommodate such errors.

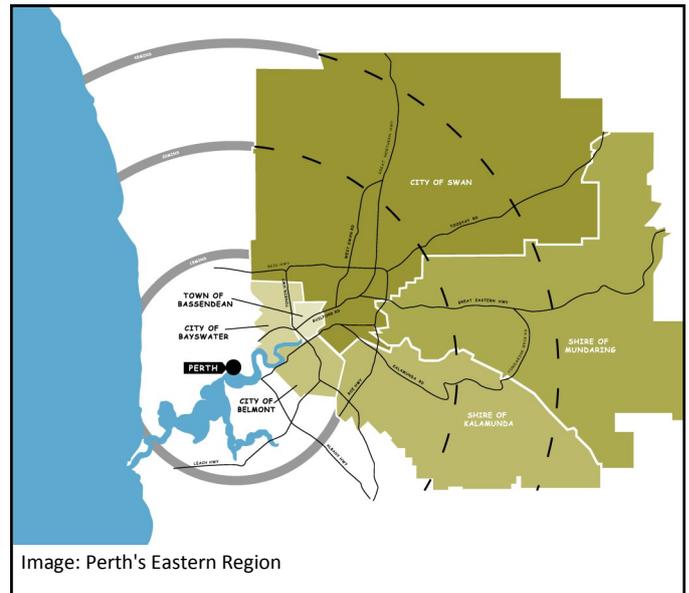
This Plan will support the EMRC's member Councils and stakeholders in regards to improving road safety within the Region, with an overarching aim of supporting the reduction of the amount of serious injuries and deaths on roads in the Region in line with the WA *Towards Zero WA's Road Safety Strategy 2008-2020*.

Table of Contents

Perth's Eastern Region	1
Local Government Areas	2
Strategic Context	4
Vision	5
Objectives	5
Timeframe	5
Outcomes	5
Key Performance Indicators	6
Stakeholders and Partners	6
Current Situation	7
Key Focus Areas	10
KFA1. Safe Roads and Roadsides	10
KFA2. Safe Speeds	12
KFA3. Safe Road Use	14
KFA4. Safe Vehicles	15
KFA5. Road Safety Planning and Governance	16
Implementation	17
Governance	17
Resources	17
Review	17
Projects	17
Monitoring and Communication	17
Appendices	19
Appendix A: Stakeholders and Partners	19
Appendix B: The Eastern Metropolitan Region's Road Safety Profile	22
References	28

Perth's Eastern Region

Perth's Eastern Region stretches from the edge of the Perth CBD, along the scenic Swan River, through urban, residential, commercial and industrial areas. The Region is home to approximately 349,793¹ people from diverse cultural backgrounds and constitutes around one third of the metropolitan area. Perth's Eastern Region is a vibrant, fast growing region encompassing about 2,100 square kilometres.



Perth's Eastern Region (the Region) is home to significant transport infrastructure along with major industrial, commercial and retail locations. These locations are high trip generators and as such access to these locations is important for the efficient movement of people, goods, services and freight. The Region is home to arguably one of Western Australia's most important pieces of infrastructure, Perth Airport, comprising of approximately 2,105 hectares which make up the airport estate. The Airport is the premier international, domestic and regional gateway to Western Australia² and has experienced significant growth in passenger movements in the past decade, increasing to 13.6 million passengers in 2012/2013³.

The Region includes the Kewdale Intermodal Terminal, an important strategic component of the freight network in Western Australia due to its accessibility by road and rail, its proximity to industrial areas and proximity to Perth Airport. This enables the transportation and distribution of goods to local, intrastate, interstate and international destinations.

The Region has a major industrial presence, with the areas of Malaga, Welshpool, Kewdale, Hazelmere, Forrestfield, Bayswater and Bassendean playing key roles in transport, storage, manufacturing and logistics for the State's construction, industrial and resources sectors. As a significant transport and industrial hub, the Region is a major generator of economic output producing an estimated \$54.7 billion or 16.2% of the overall output of

the Greater Perth Area⁴ as at January 2015.

The State government has recognised the importance of the Region as a transport and industry hub in its urban development framework for the Perth and Peel regions - *Directions 2031 and Beyond*⁵. Key locations identified within the Region include Perth Airport which has been identified as one of three strategic specialised centres, Kewdale/Welshpool as a key strategic industrial centre, while Midland and Morley 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.

These transport concentrations provide both opportunities and issues for the Region. Maintaining and improving regional transport infrastructure is essential for facilitating economic development, supporting sustainable residential development and community service delivery and addressing traffic management issues, particularly those that impact on traffic and pedestrian safety. Correspondingly, there are a number of high traffic major roads in and around these centres as well as major rail and road networks linking Perth with the rest of Western Australia and with the east coast of Australia.

There has been an estimated \$5.147billion spent on infrastructure projects that have been completed or are

¹Estimated Resident population February 2015 – Profile.Id

²Perth Airport Masterplan 2014

³Perth Airport Statistics(<http://www.perthairport.com.au/AboutUs/CorporateInformation/AirportStatistics.aspx>)

⁴REMPLAN Compelling Economics Data accessed April 2015

⁵Directions 2031 and Beyond; Metropolitan Planning Beyond the Horizon - Western Australian Planning Commission (2010)

currently being developed in the Region, with a further \$3.565 billion on infrastructure projects still to come⁶. Significant road projects that have recently been completed, currently under development or scheduled in the near future include: GatewayWA, NorthlinkWA, Great Eastern Highway upgrade, Malaga Drive - Reid Highway Interchange and Great Eastern Highway - Roe Highway Interchange.

The Eastern Metropolitan Regional Council (EMRC) and its member Councils are committed to the creation of a regional transport network that is efficient, safe and integrates all modes of transport. The *Regional Road Safety Plan* (the Plan) will provide direction and guidance to enable this commitment to become a reality.

Local Government Areas

The Region comprises six local government areas: City of Bayswater, City of Belmont, City of Swan, Shire of Kalamunda, Shire of Mundaring and Town of Bassendean. Throughout the Region there is a range of commercial, industrial and residential localities within each of the local government areas with the levels of prosperity, vibrancy, infrastructure and construction development varying considerably. Some localities have been identified as being activity centres of State strategic significance and there are developments of various scales underway that are expected to re-invigorate or transform those areas. Overall, the Region has one of the highest employment self-sufficiency (ESS) ratios in terms of living and working locally with an ESS of 78%. Given the amount of internal travel that can be expected to occur within the Region, road crashes can be expected to involve a high proportion of local residents and/or employees as well as those from outside the Region.

Town of Bassendean

The Town of Bassendean is located approximately 10 kilometres north-east of Perth and a five minute drive from the Swan Valley vineyards. The Town has an Estimated Residential Population (ERP) of 16,288⁷, comprises a total area of 11 square kilometres and is bounded by the Swan River, the City of Swan and the City of Bayswater. The Town has a unique sense of place and aspires to be a village within a city. It has a rich heritage including historic buildings and streetscapes. The seven kilometres of river frontage is a major natural asset and attractor. Bassendean is also a growing centre of cultural and artistic activity.

The Town of Bassendean's transport network is served by the primary distributor of Guilford Road, three train stations on the Midland Rail Line and bus services. The Town is set for future development of bus rapid transit connections as identified in the *Public Transport for Perth 2031*.

City of Bayswater

The City of Bayswater is a predominantly residential locality that is renowned for its beautifully maintained area, located approximately eight kilometres north-east of Perth. The City also contains commercial, industrial and residential areas. The City comprises 33 square kilometres with 10 kilometres of Swan River foreshore. The City's ERP is 70,656 people and half of all residents are employed, however most residents work outside of the City. Statistics reveal only 18,000 people work in the City and this includes many who are not local residents⁷.

The Retail Sector accounts for around 18% of all employment in the City of Bayswater which is home to the Centro Galleria Shopping Centre at Morley. Morley is a large activity centre that attracts significant numbers of people. Transport access to Morley is currently a key issue, however the area has been identified for future bus rapid transit connections as outlined in the *Public Transport for Perth 2031*.

City of Belmont

The City of Belmont is located about six kilometres north-east of Perth and comprises an area of 40 square kilometres with 11 kilometres of Swan River foreshore. The ERP comprises 40,968 people⁷ and is growing steadily, with many immigrants from diverse backgrounds moving into the City.

Perth Airport occupies about one third of the City of Belmont's land area. Other notable features are the Ascot Racecourse with adjacent stables zone, the Kewdale Freight Terminal and various major road connections. The Transport and Storage Sector is the largest employer with other key employment sectors including Manufacturing, Retail, Equine Industry and Tourism. The City is an employment generator with more employees than residents.

⁶Data collected from Main Roads WA and member Council websites, 2015.

⁷Population estimates retrieved from Remplan: <http://www.remplanlogin.com.au/Economy/>

Shire of Kalamunda

The Shire of Kalamunda comprises an area of 324 square kilometres and is situated 24 kilometres east of Perth along the Darling Scarp. It has three district areas: the Foothills, the Escarpment and the Eastern Rural District which include residential, rural and some industrial areas, as well as significant areas of national parks, regional open space, state forest and water catchment. Approximately 60,743 people⁷ currently call Kalamunda home and this number is projected to grow as Kalamunda becomes part of Perth's population boom.

The area is serviced by Tonkin Highway and Roe Highway running inside the western boundary of the Shire and Kalamunda Road, Canning Road and Welshpool Road East servicing the inner suburban, rural and industrial areas. The area is also planned to be serviced by the newly proposed Airport to Forrestfield rail link and transit orientated development.

Shire of Mundaring

The Shire of Mundaring is a large and predominantly rural shire in the east of the Region, located approximately 35 kilometres from Perth. Its area is around 645 square kilometres, of which almost half is national park. The ERP comprises 40,046 persons⁷, spread throughout the townships, villages and rural localities.

Great Eastern Highway is a major strategic freight corridor connecting to the Wheatbelt region, remote areas of WA including the Goldfields, the remainder of Australia and passes through the Shire.

City of Swan

The City of Swan is the largest local government area in metropolitan Perth and covers over 1,000 square kilometres. The City is located 21 kilometres north-east of Perth. It contains diverse localities, ranging from the major strategic commercial and activity centre of Midland through to the picturesque wine region of the Swan Valley, national parks and rural areas. The population comprises of 130,013 persons⁷ and continues to grow strongly.

As a strategic metropolitan centre, Midland's expansion requires significant infrastructure to facilitate this growth. Key projects, either planned or under construction within the City include the NorthLink WA, the Lloyd Street Extension, relocation of the Midland Train Station, St John of Gods Private and Public Hospital,

the GP Super Clinic, Midland Gate redevelopment, Midland Oval redevelopment, the Midland railway workshops redevelopment, the newly announced Medical University and the Midland Freight Rail Realignment. The centre of Ellenbrook has been identified to receive future rapid transit infrastructure and has recently been voted the best master-planned community in the world by the International Real Estate Federation⁸. Perth Airport also occupies a portion of the City's land mass.

The EMRC

The EMRC covers exactly the land area within the six local government authorities adjoining boundaries and provides a broad range of services across the Region including waste management and education, resource recovery, environmental services and economic development. Working in partnership with its member Council's and other stakeholders, the EMRC delivers projects across each of these areas for the benefit of the Region.

⁸<http://www.housing.wa.gov.au/News/Pages/Ellenbrook-on-top-of-the-world.aspx>

Strategic Context

The development of the *Regional Road Safety Plan* is an identified action in the *Regional Integrated Transport Strategy 2014-2016; Key Focus Area 5 - Infrastructure*. Whilst having a focus on road safety, the Plan has been developed to be consistent with the *EMRC 2022 10 Year Strategic Plan*.

Regional Integrated Transport Strategy (RITS) 2014-2016

The RITS highlights and advocates for all modes of transport and helps ensure that a collaborative approach is used in developing an integrated, safe, efficient, accessible, and sustainable transport network. The RITS has five Key Focus Areas namely; Integrated Planning, TravelSmart, Public Transport, Active Transport and Infrastructure. The RITS has been developed to be consistent with the *EMRC 2022 10 Year Strategic Plan* and supports the EMRC's key result areas; Environmental Sustainability, Social Opportunities, Economic Development and Good Governance.

Main Roads WA - Road Safety Strategy 2011-2015: The Road Towards Zero

In order to fulfill its responsibilities as a system operator, Main Roads WA has produced its own *Road Safety Strategy 2011-2015: The Road Towards Zero*. The vision of this strategy is "to eliminate death and serious injury on the Western Australian Road Network" with a lasting legacy of "a safe road system for our children, grandchildren and the community".

The Main Roads WA Strategy focuses on governance, safe system procedures, practices and programs, research and knowledge sharing as well as capability and skills.

Towards Zero WA's Road Safety Strategy 2008-2020

The WA State government's *Towards Zero WA's Road Safety Strategy 2008-2020 (Towards Zero)* has a long term vision of "a road system where crashes resulting in death or serious injury are virtually eliminated". *Towards Zero* follows a 'safe system' approach focused on safe road use, safe roads and roadsides, safe speeds and safe vehicles. The State government strategy has a target to reduce the number of people being killed or seriously injured by 40% between 2008 and 2020 based on the average annual number of people killed and seriously injured between 2005 and 2007. Annual performance

indicators include:

- the number of killed or seriously injured casualties and crashes;
- the social cost to the community for crashes involving death or serious injury; and
- the number of people admitted to hospital, requiring medical attention or injured but requiring medical attention as a result of a road crash.

National Road Safety Strategy 2011-2020

The *National Road Safety Strategy 2011-2020* is based on the 'safe system' approach to road safety. The safe system approach accepts and acknowledges that road users will make mistakes with the need for a more forgiving system in order to accommodate such errors. The national strategy focuses on roads, speed, vehicles and road user behaviour. The 10 year plan seeks to reduce the annual number of deaths and serious injuries in road crashes by at least 30% by 2020. The national strategy not only promotes a shared responsibility between Federal, State and Local government in road safety, it specifically notes the need for corporate responsibility.

The national strategy has high level outcome measures in terms of deaths/serious casualties and crashes. In addition, it has a number of specific on-going progress measures relating to each of the identified actions as well as the number of deaths involving particular crash types/behaviours.

To implement the National Road Safety Strategy the *National Road Safety Action Plan 2015-2017* builds on measures identified by the strategy and focuses on actions with safe system impacts.

Vision

As we seek to reduce the number of crashes involving people being killed and/or seriously injured⁹ towards zero, the EMRC will:

Support, assist and advocate for the development of a fatality and serious injury free road network in Perth's Eastern Region.

The EMRC will support and advocate for initiatives, research and projects that strive to achieve a safer road network for all road users. This will be achieved in partnership with the six member Councils, the Regional Integrated Transport Strategy (RITS) Implementation Advisory Group (IAG) and other key stakeholders.

Objectives

In order to support the vision of the *Regional Road Safety Plan* the following key objectives have been developed.

1. Advocacy and support

Provide advocacy and support to member Council's, stakeholders and partners in the development of a safer road network for all users.

2. Integration

Collaborate with regional stakeholders, including member Councils and key agencies to develop a network that fully integrates all modes of transport in a safe and sustainable way and in a manner that also supports the regional infrastructure priorities outlined in the RITS 2014-2016.

3. Towards Zero

Assist in the reduction of the number of serious injuries and deaths on roads in the Region through research and advocacy for safe road infrastructure, continued and ongoing awareness of inappropriate behaviours and enhanced community and road user education that promotes an improved road safety culture.

Timeframe

Time Frame	Actions to be completed
Immediate	2015-2016
Short term	2016-2017
Medium term	2017-2018
Ongoing	Throughout the implementation of the Plan

Priority	Level of importance
High	Of high importance, needs a strong proactive approach, opportunities should be created.
Medium	Of medium importance, opportunities should be sought out.
Low	Of low importance, opportunities should be undertaken as they arise.

Outcomes

Primary Outcomes

- A reduction in the number of fatal and seriously injured people involved in road crashes.
- Strive to meet the reduction as referenced in the *WA Towards Zero WA's Road Safety Strategy 2008-2020* which sets a target of a 40% reduction in the number of people killed or seriously injured by 2020 from a 2005-2007 baseline.

Secondary Outcomes

- A reduction in the overall number of crashes in which someone is killed or seriously injured.
- A reduction in the number and percentage of crashes involving vulnerable road users that are killed or seriously injured.
- A reduction in the number of fatal or serious injury crashes occurring at intersections.
- A reduction in the number of fatal or serious injury crashes involving vehicles running off the road.

⁹Defined as a person admitted to hospital as an in-patient and who does not die within 30 days of the crash as a result of the injuries sustained in the crash.

Key Performance Indicators

The following Key Performance Indicators will be measured by comparing the fatal and seriously injured crash and casualty statistics obtained from the Main Roads WA Crash Analysis Reporting System for the previous five years' as well as data from member Council's own reporting systems.

Safe Road Use

- the number and percentage of fatal and serious injury crashes according to vehicle type/road user.

Safe Roads and Roadsides

- the number of fatal or serious injury crashes according to crash type.
- the number of fatal or serious injury crashes according to crash location (intersection/mid-block).
- the number of safe system infrastructure improvements implemented in the Region¹⁰.
- the number of member Council's with road safety audit policies in place.
- the number and dollar value of annual blackspot submissions made and successfully receiving funding.

Safe Speed

- the number and percentage of pedestrians and cyclists killed or seriously injured.

Safe Vehicles

- the number of member Council's with Safe Vehicle Fleet policies and 100% of their commercial light and passenger fleet vehicles with a five star ANCAP rating.

Planning and Governance

- Regional Road Safety Plan reviewed annually and progress against actions reported back on.

Stakeholders and Partners

The Plan identifies various stakeholders and partners to assist in the delivery of the identified outcomes. Primary stakeholders include; the RITS IAG and member Councils. Beneficiaries of the Plan comprise all key stakeholders, the local community and all road network users within the Region.

The Plan also includes numerous direct and indirect partners. Direct partners include; Main Roads WA, Road Safety Commission, the West Australian Police, the Department of Transport, the Department of Planning, the Public Transport Authority, the West Australian Local Government Association (WALGA) and the Royal Automobile Club (RAC). Indirect partners include Road User Group Representatives, Department of Education and Training, Department of Health and the Insurance Commission of Western Australia.

Further information on the stakeholders and partners roles and responsibilities in the context of road safety can be found in Appendix A.

¹⁰Treatments specifically designed to avoid severe casualty outcomes by minimising impact forces, for instance by making collisions unlikely or at low speed (e.g. by reducing speeds on the approach and through intersections, having none or frangible roadside objects and/or separating pedestrians and/or cyclists from road traffic etc).

Current Situation

A total of 1,495¹¹ crashes involving killed or seriously injured road users were recorded in the Region between 2010 and 2014. The average number of fatal crashes for the Region was 20 per year. Over this period, 107 people were killed on our roads and 1,616 road users were seriously injured requiring hospitalisation. A further 6,619 people required medical treatment or sustained injuries to a lesser extent in road crashes over this same period of time. Of all fatal crashes in the Perth Metropolitan area, 29% occurred in Perth's Eastern Region; this compares with 22% of crashes resulting in a road user being seriously injured.

Priority Crash Types

Due to the nature and mix of the road network and surrounding environment throughout the Region, different road safety concerns and issues exist for the different member Councils. However, based on the regional killed and seriously injured crash data and information set out in *Towards Zero WA's Road Safety Strategy*, the following four key road safety issues and/or road user groups have been identified for the Region (see Appendix B for a breakdown of the fatal and serious crashes occurring in the Region):

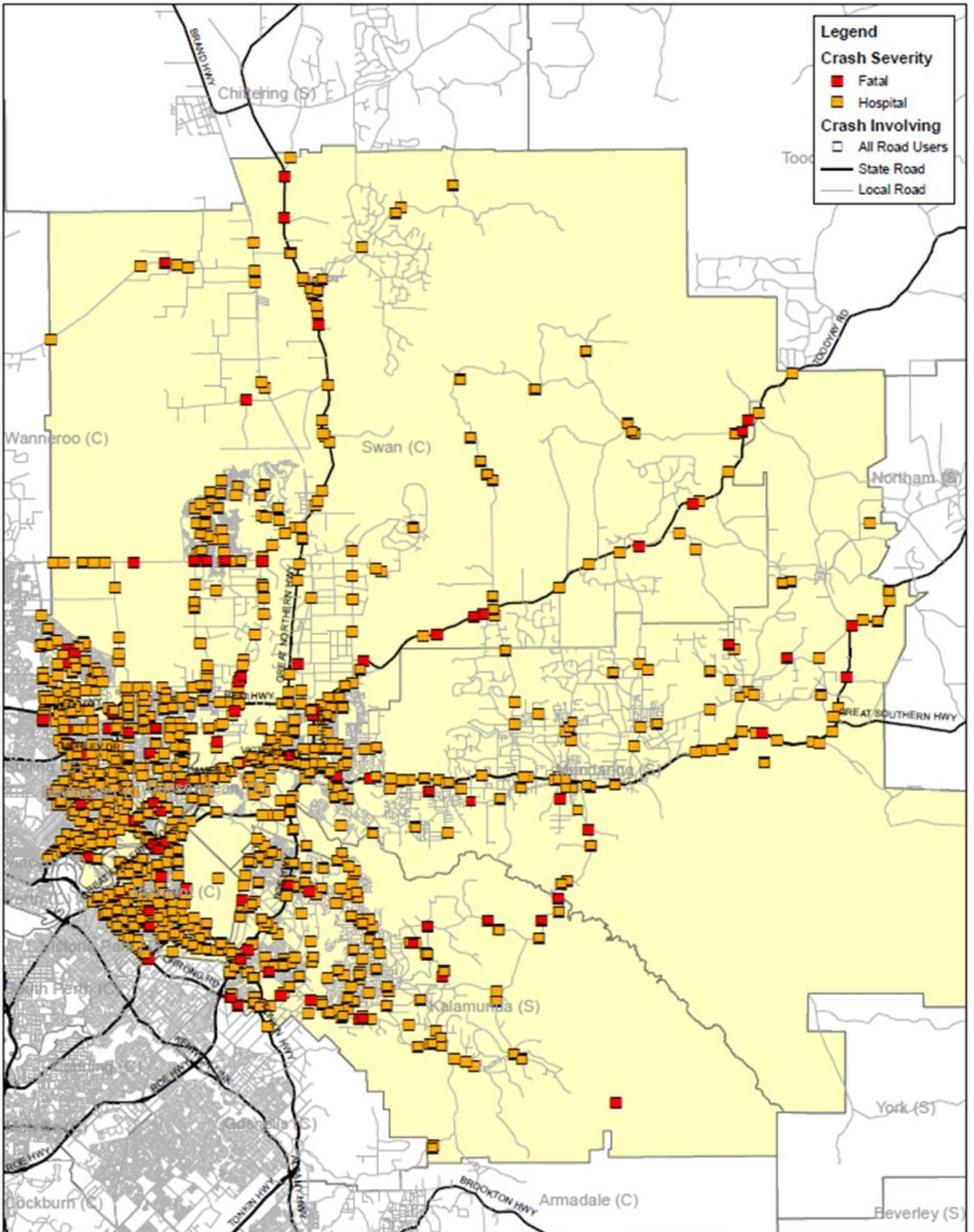
- Intersection crashes:
 - ⇒ Failure to give way
 - ⇒ Rear end collisions
- Mid-Block run-off road crashes:
 - ⇒ Hitting roadside objects
 - ⇒ Travelling too fast for conditions/environment
- Vulnerable road users:
 - ⇒ Motorcyclists
 - ⇒ Pedestrians
 - ⇒ Cyclists
- Road user behaviour:
 - ⇒ Speed
 - ⇒ Inattention/distraction
 - ⇒ Drink/drug driving

It should be noted that these issues are often inter-related, for instance motorcyclists travelling too fast and running off the road hitting a roadside object; or a driver not paying attention colliding with the rear of a vehicle in front at an intersection.

Where do crashes occur?

Maps showing the location of all killed and serious injury crashes in the Region as well as for those involving vulnerable road users are provided overleaf. In addition, Appendix B contains a list of the top 50 intersections in the Region ranked by social costs (all crash types and severities) over the last five year period. Of particular note is that eight out of the top 10 worst intersections in the State are located in the Region. Whilst the majority of the intersections out of the top 50 are State roads under the control of Main Roads WA and carry the majority of the traffic flow, nine locations were intersections of local roads under the control of member Councils.

¹¹When considered as separate member Council's in the Main Roads WA Crash Analysis Reporting System (CARS), 1,496 killed or serious injured crashes are reported due to a duplication of one fatal crash on the boundary of two member Councils.



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**Eastern Metropolitan Regional Council
 Crashes Involving all Road Users
 Resulting in Death or Serious Injury
 2010 - 2014**

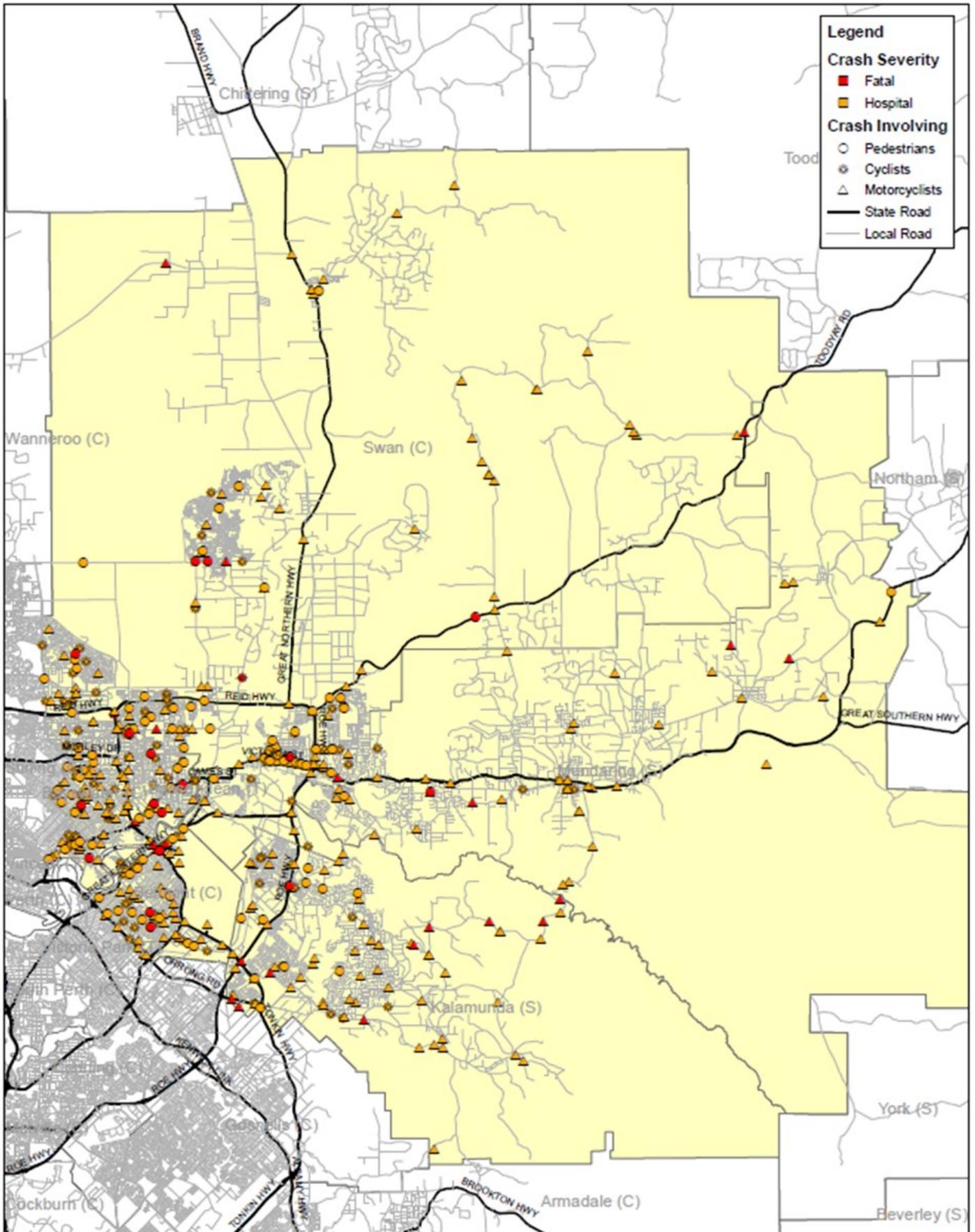


Project No: WP1923.00

Projection: Transverse Mercator
 Datum: Geocentric Datum of Australia 1994
 Grid: Map Grid of Australia Zone 50

Note:

Scale	
0 1 2 4 6 8 Kilometers	
1:250,000 @A4	
Map No	Date
1	01/07/2015
Revision	Revision Date
2	26/07/2015



Legend

Crash Severity

- Fatal
- Hospital

Crash Involving

- Pedestrians
- ⊗ Cyclists
- △ Motorcyclists

— State Road
— Local Road

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**Eastern Metropolitan Regional Council
Crashes Involving Pedestrians,
Cyclists and Motorcyclists
Resulting in Death or Serious Injury
2010 - 2014**



Project No: WP1903.00

Projection: Transverse Mercator
Datum: Geocentric Datum of Australia 1994
Grid: Map Grid of Australia Zone 50

Note:

Scale	0 1 2 4 6 8
	Kilometers
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Map No.	2
Revision	2
Date	01/07/2015
Revision Date	26/07/2015

Key Focus Areas

KFA 1. Safe Roads and Roadsides

The fatal and serious injury crash data for the Region highlights that high severity collisions typically involve run-off road types of crashes at mid-block¹² locations and/or specific road user movements/crash types at intersections. As indicated in *Towards Zero*, whilst the Region's roads were typically designed to the standard in place at the time of their construction, opportunities exist to upgrade and improve the road safety performance of our road network through making our roadsides more forgiving, reducing the chances of drivers losing control of their vehicle and/or giving them greater opportunities to regain control.

Occupants of vehicles running off the road are more likely to suffer serious and fatal injuries if the vehicle or motorcycle hits a solid (non-frangible) road side object. The use of roadside barriers and/or the removal of roadside objects within the road side clear zone width adjacent to the road will not stop crashes from occurring, however, such measures can assist with reducing the severity of any incident involving the vehicle leaving the road. Research has shown that the risk of a vehicle occupant dying in the crash significantly increases when a vehicle impacts with a hard object such as a tree or pole at a speed above 40km/h to 50km/h (depending upon a

head on or side impact)¹³. Delineation and guidance treatments can also be installed along our roads to help reduce the potential for vehicles to actually run-off the road, particular on rural roads and/or those with higher operating speeds.

Appropriate intersection controls and designs will also assist with improving safety at such locations. Research has shown that the risk of a vehicle occupant dying in the crash significantly increases when side impact speeds exceed 50km/h, for instance as may occur with right angled collisions at intersections¹⁴.

It is also imperative to provide appropriate infrastructure to ensure the safe movement of vulnerable road users, particularly for pedestrians and cyclists in built-up areas where such activity can be expected to be higher than in rural areas. Recent specific guidance¹⁵ on how to design, construct and maintain roads to be motorcycle friendly exists and can be utilised by member Councils.

Based on *Towards Zero WA's Road Safety Strategy* and the identified road safety issues in the Region, providing safe roads and roadsides can be expected to have the following impacts:

	Impact		
Intersections			
Run-off road			
Motorcyclists			
Pedestrians			
Cyclists			
Speeding			
Inattention/distraction			
Drink or drug driving			
	Some/indirect benefit	Moderate benefit	Substantial benefit

¹²A section of road in-between intersections

¹³Towards Zero – WA Road Safety Strategy

¹⁴Wramborg, P. (2005). A New Approach to a Safe and Sustainable Road Structure and Street Design for Urban Areas. Paper presented at Road Safety on Four Continents Conference, Warsaw Poland.

¹⁵WALGA. Making roads motorcycle friendly – A guide for road design, construction and maintenance

Given the number of fatal and serious injury run-off road crashes, which will tend to be spread along a route or length of road, future crash reduction (black-spot) funding applications should consider seeking treatments for road sections. This approach should take account of vehicle numbers (i.e. personal risk crash rates based on killed and seriously injured crashes per 100 million vehicle kilometres travelled) as well as the collective risk based on fatal and serious crashes per kilometre. Locations with both high personal risk and collective risk should be treated as a matter of urgency.

To support safer roads and roadsides, the Shire of Kalamunda's *Corporate Business Plan 2013-2017* notes the need to undertake State and Federal Blackspot Projects as well as to undertake road safety audits at key locations in order to improve road safety. Activities identified in the Shire of Mundaring's *Corporate Business Plan 2014-2018* include the construction, renewal and maintenance of roads, bridges and bus shelters to a safe standard. With regards to road safety in the City of Swan, one of the objectives set out in *City's Transport Strategy* is to identify measures to enhance the regional and local road network in order to facilitate the safe and efficient movement of vehicles, manage freight movements as well as address congestion issues.

The provision of safe roads and roadside infrastructure is supported by the Region's member Councils strategic documents. For instance, the Town of Bassendean's *Vision 2030 Community Plan* notes the aim to have a built environment that is attractive, safe and pedestrian friendly by 2030. The City of Bayswater's *Community Plan 2013-2023* specifically identifies the need to facilitate initiatives that maintain and improve road safety. Outcomes and strategies to deliver the Vision of connecting and creating safe and welcoming places with respect to the built environment include developing streetscapes that allow for safe pedestrian and vehicle movement, advocating for safe and accessible public transport as well as providing cycling/walking connections. The City of Belmont's *Strategic Community Plan 2012-2032* also has an objective of achieving a planned City that is safe and meets the needs of the community as well as providing and maintaining safe and efficient transport infrastructure.

KFA 1. Safe Roads and Roads Sides

	Actions	Timeframe	Priority
1.1	Undertake and assist member Councils to carry out walking and cycling audits to identify infrastructural issues, taking particular account of safety elements associated with these road users.	Ongoing	Medium
1.2	Assist member Councils to identify routes with high numbers/rates of motorcycle killed and serious injured crashes and carry out audits against the motorcycle guidelines.	Medium	High
1.3	Advocate and support member Councils with annual blackspot and black route applications focussed on fatal and serious crashes.	Ongoing	High
1.4	Monitor and review the priority infrastructure list as set out in the RITS with respect to the number of crashes over the past five years and emerging crash trends.	Ongoing	Medium
1.5	Advocate for infrastructure initiatives that have demonstrated road safety benefits in the Region including safety improvement upgrades, for example on Great Eastern Highway (Greenmount to Mundaring).	Ongoing	High
1.6	Assist member Councils to develop Road Safety Audit policies with regards to new road designs and construction.	Ongoing	Medium

KFA 2. Safe Speeds

Lower speeds result in fewer crashes along with less severe injuries in the event that a crash does occur. Whilst acknowledging the controversial nature of addressing inappropriate and excessive speeding as well as the community's views on speed limit reductions, speeds need to be managed and enforced to reflect the standard of the road and types of road users.

Pedestrians, cyclists and motorcyclists are particularly vulnerable to higher vehicle speeds given the lack of protection for such road users in the event of a collision. As indicated for safe roads and roadsides, pedestrian and cycle activity tends to be higher in urban areas. Research¹⁴ indicates that vehicle impact speeds above 30km/h with a pedestrian results in the risk of death to the pedestrian increasing significantly. Physical treatments are therefore required to ensure lower speeds in such areas, for example through the use of appropriate traffic calming techniques and self-enforcing or self-explaining roads.

Excessive and/or inappropriate speeds are often a factor in crashes involving drivers losing control of their vehicles and running off the road, potentially colliding with roadside objects.

As part of the City of Belmont's *Strategic Community Plan 2012-2032*, performance indicators include the 'percentage of serious crashes' and 85th percentile¹⁶

operating speeds in 50km/h shopping precincts as well as operating speeds on specific roads with a 60km/h speed limit. Furthermore, the City of Bayswater and City of Swan have recently set about developing a series of Local Area Traffic Management studies for their local road networks focussing on specific suburban areas and precincts. The Shire of Kalamunda's *Corporate Business Plan 2013-2017* also has priority actions to prepare and implement Local Area Traffic Management programs specifically to improve road safety.

The above Local Area Traffic Management studies involve the identification and recommendation of traffic calming treatments to help reduce vehicle speeds and/or discourage non-local traffic, thereby reducing the exposure to risk of road users.

The role of the West Australian Police in enforcing speed limits and providing a visible presence to discourage speeding, for instance in locations where physical treatments can't be installed, are recognised and supported. The need to raise public awareness of the impact of inappropriate and excessive speeds is acknowledged along with the need to encourage road users to travel at speeds appropriate to the road environment and conditions.

Based on *Towards Zero WA's Road Safety Strategy*, safer speeds can have the following impact on the identified regional road safety issues:

	Impact		
Intersections			
Run-off road			
Motorcyclists			
Pedestrians			
Cyclists			
Speeding			
Inattention/distraction			
Drink or drug driving			
	Some/indirect benefit	Moderate benefit	Substantial benefit

¹⁶ The speed at/below which 85 percent of vehicles travel at.

KFA2: Safe Speeds

	Actions	Timeframe	Priority
2.1	Support cycle and road safety education awareness campaigns which incorporate road safety messages.	Ongoing	Low
2.2	Advocate and support member Council's requesting lower speed limits with Main Roads WA in response to changing land uses and traffic.	Ongoing	Medium
2.3	Support member Councils wishing to create low speed environments (for instance through Local Area traffic Management) and/or seeking reduced speed limits in areas of high pedestrian activity with supporting infrastructure.	Ongoing	Medium
2.4	Support member Council's requests to the West Australian Police to carry out risk targeted speed enforcement based on crash and/or speed related evidence.	Ongoing	High
2.5	Advocate and support member Council's carrying out local/regional speed awareness campaigns.	Ongoing	High
2.6	Advocate for member Council's to identify high risk speed locations based on crash and traffic speed survey data.	Ongoing	High



KFA 3. Safe Road Use

The provision of safer roads and vehicles and safe speeds all contribute to reducing the risk to road users. However there is also a need for road users to behave and act in an appropriate way that allows the other components of the Safe System to work to maximum effect.

Risk taking such as deliberate speeding or drinking and driving as well as road users making genuine mistakes, for instance through a lack of experience, errors of judgement (such as travelling too close to the vehicle in front) or inattention all contribute to the reasons for our current fatal and serious injury crash record.

Safe Road Use activities include education, awareness raising and enforcement initiatives to help influence the behaviour of all road users. This includes ensuring the Region's community understands what a Safe System is and how individuals can contribute to and benefit from this approach.

The encouragement and promotion of Safe Road Use is already supported and undertaken by member Councils with support from the WALGA RoadWise Program. The RoadWise Program works with Local Governments and the community to support the implementation of *Towards Zero Road*.

Recent activities through the WALGA RoadWise Program by member Councils have included the 2014 *White Ribbons for Road Safety* campaign by the Cities of Bayswater, Belmont, Swan and the Shire of Kalamunda. The City of Swan has also developed road rule posters, has the use of a crash and speed display trailer, has provided free vehicle/trailer checks at Easter and Christmas, an annual *Blow Zero and Win* campaign with the East Metropolitan Traffic Police as well as monthly RoadWise meetings (made up on City staff and Elected Members, West Australian Police, a WALGA Road Safety Advisor and community group representatives).

As with safe speeds, safer road user behaviour also needs input and support from the West Australian Police in terms of enforcing traffic rules and providing a visible deterrence to inappropriate and unsafe behaviour.

Based on *Towards Zero WA's Road Safety Strategy*, safe road use behaviour can have the following impact on the identified regional road safety issues:

	Impact		
Intersections			
Run-off road			
Motorcyclists			
Pedestrians			
Cyclists			
Speeding			
Inattention/distraction			
Drink or drug driving			
	Some/indirect benefit	Moderate benefit	Substantial benefit

KFA3: Safe Road Use

	Actions	Timeframe	Priority
3.1	Advocate and support member Councils carrying out local/regional awareness campaigns relating to identified local/regional road safety issues.	Ongoing	High
3.2	Advocate and support external organisations carrying out local/regional awareness campaigns relating to identified local/regional road safety issues.	Ongoing	High
3.3	Support member Councils requests to the West Australian Police to carry out risk targeted enforcement based on crash data.	Ongoing	Medium

KFA 4. Safe Vehicles

Recent improvements and enhancements to vehicle safety performance, such as Electronic Stability Control, Intelligent Speed Adaptation, active head restraints and side impact/head-protecting airbags, have resulted in the improved protection of vehicle occupants and other road users (secondary safety benefits) in the event of a crash as well as the ability to avoid a collision in the first place (primary safety benefits). Such safe vehicle initiatives are reflected through the Australasian New Car Assessment Program (ANCAP) ratings, with those vehicles with a 5 star rating having good or acceptable levels of protection to vehicle occupants whilst vehicles with a 4 star rating have good to marginal levels of protection. Occupants of vehicles have “twice the chance of being killed or seriously injured in a 3 star ANCAP safety rated car compared to a 5 star ANCAP safety rated car”¹⁷.

Member Councils as well as organisations/corporations based within their local area operate fleet vehicles, which when combined, make up a large proportion of new vehicle sales. As such, opportunities exist to encourage the purchase of safer vehicles when organisations decide to upgrade/update their current fleet for employees as part of an Occupational Health and Safety approach. Given the more regular turn-over and re-sale of such vehicles, this in turn ensures safer vehicles are more widely available in the market as second-hand vehicles.

Given that workplace related road crashes are the most common cause of death, injury and absence from work in Australia¹⁸, the WALGA RoadWise Program has developed a Fleet Safety Resource Kit to assist local governments in developing and adopting fleet safety policies. Some member Councils, such as the City of Swan, already have a safe fleet policy, as well as employee driver development training.

Based on *Towards Zero WA’s Road Safety Strategy*, safe vehicles can have the following impact on the identified regional road safety issues:

	Impact		
Intersections			
Run-off road			
Motorcyclists			
Pedestrians			
Cyclists			
Speeding			
Inattention/distraction			
Drink or drug driving			
	Some/indirect benefit	Moderate benefit	Substantial benefit

KFA4: Safe Vehicles

	Actions	Timeframe	Priority
4.1	Advocate for member Councils and organisations that make up the RITS IAG to have 5 star rated fleet vehicles.	Ongoing	High
4.2	Develop a pro-forma policy to support member Councils to have a Safe Fleet and Driving Policy where these do not exist.	Ongoing	Medium
4.3	Advocate and support member Councils carrying out local/regional awareness campaigns relating to safe vehicles.	Ongoing	Low
4.4	Advocate for making safe vehicles and specific safety features compulsory for government vehicles (at all levels of government).	Ongoing	Low
4.5	Encourage corporate fleets to purchase safe vehicles and vehicle safety features.	Ongoing	Low

¹⁷ANCAP – Safety Ratings Explained (accessed 17 September 2015). <https://www.ancap.com.au/safety-ratings-explained>

¹⁸WALGA – Roadwise. Fleet Safety Resource Kit (accessed 17 September 2015).<http://www.roadwise.asn.au/fleet-safety-resource-kit.aspx>

KFA 5. Road Safety Planning and Governance

The importance of road safety to the Region is reflected in the development of this Plan and by the existing support and identification of actions as set out in the member Councils own community plans and documents. For example, the Town of Bassendean's *Strategic Community Plan 2013-2023* has the objective of providing safe access for all road users, with associated strategies including the provision of cycle facilities plus monitoring of traffic and safety interventions. The City of Bayswater's *Strategic Community Plan 2013-2023* has a vision of connecting local centres and creating safe and welcoming places for people. Furthermore, the City specifically identifies the need to facilitate initiatives that maintain and improve road safety. Similarly, relevant actions identified in the City of Belmont's *Corporate Business Plan 2013-2017* include reviewing the relevance of the City's current road network to suit future needs, investigating improved public transport access and implementing the City's *Bike Plan* and *TravelSmart Plan*. The *Local Bike Plan 2013-2018* also notes a specific focus on the provision of safe cycling routes to schools including off-street facilities and crossing locations.

The Shire of Kalamunda's *Community Strategic Plan to 2023* advocates for high quality public transport as well as promoting alternative modes of transport with the aim of increasing walking and cycling in the Shire with supporting high quality and safe infrastructure. The Shire's *Corporate Business Plan 2013-2017* also notes the need to develop a Road Safety Precincts Action Plan.

KFA 5: Road Safety Planning and Governance

The Shire of Mundaring's *Strategic Community Plan 2013-2023* acknowledges the EMRC *Regional Integrated Transport Strategy* and its action plan to help create a regional transport network that is efficient, safe and integrates all modes of transport and seeks to support/advocate for better public transport. Of particular note is the required service level of road surfaces being rideable, safe and providing year round access, with safety being measured in terms of less than 500 reported crashes/year on roads in the Shire.

The City of Swan's *Strategic Community Plan 2012-2022* notes that as part of the built environment, its vision is to have attractive, safe and maintained built assets, roads and streetscapes. As part of the outcome that infrastructure meets the community's needs, the City specifically measures its progress in terms of the number of fatal and serious road crashes. The City's Plan also includes an objective of advocating and providing alternative modes of transport through advocating for public transport and the provision of walking and cycling facilities (as measured by the length of walking/cycling paths and number of public transport passengers).

The above elements of member Councils' own strategic and planning documents as well as the Federal, State and Main Roads WA commitment to road safety are all aligned in terms of undertaking the identified actions to improve road safety in the Region. This requires the implementation of activities targeting specific agreed road safety issues and hazardous locations/routes. The EMRC supports the above approach.

	Actions	Timeframe	Priority
5.1	Monitor and participate in the development of State and Local government strategies that relate to transport and specifically road safety in the Region.	Ongoing	Low
5.2	Undertake community engagement exercises to determine road safety issues in the Region.	Medium	Low
5.3	Advocate for research activities such as annually identifying specific road safety issues relative to each local authority to assist with crash location identification as well as awareness and education efforts in the Region.	Ongoing	Medium
5.4	Support the TravelSmart and public transport initiatives in the Region given that one of the Safe System guiding principles relates to increased use of public transport given that buses and trains are safer modes of travel compared to cars and motorcycles ¹⁹ .	Ongoing	Medium

¹⁹Towards Zero – WA Road Safety Strategy

Implementation

The EMRC, in partnership with RITS IAG, will effectively advocate for the implementation of actions listed within the *Regional Road Safety Plan*.

Governance

The implementation of the Plan will be governed according to the following structure:

- The Plan will focus on the day-to-day activities that impact or affect road safety within the Region;
- The Plan will be used as a basis for the EMRC to seek member Council funding and local, state and federal grant funding;
- The RITS IAG will provide on-going feedback and review of the Plan as part of its regular meetings and will refer actions and achievements back to the Plan; and
- Progress against the actions and objectives of the Plan will be reported to EMRC Executive Management and Council.

Resources

Implementation of the *Regional Road Safety Plan* is expected to be resourced through a blend of member Council contributions supplemented by local, state and federal government grants for projects. Pending the nature of the actions arising from the Plan, EMRC project officers will 'advocate for' and assist member Councils with the implementation on such actions as advised by the RITS IAG.

Review

A minor review of the Plan (focusing on updating actions and priorities) should be undertaken annually. An annual workshop to review progress will include the RITS IAG which will allow the Plan to act as a living document, evolving over time, as road safety issues confronting the Region change and actions are progressed.

Projects

To assist in the implementation of the *Regional Road Safety Plan*, the EMRC will provide an advocacy role to Local, State and Federal government, relevant agencies and key stakeholders. In addition, the EMRC in conjunction with member Councils will progress and/or coordinate relevant projects to address identified actions within the Plan.

Projects will be agreed upon by the RITS IAG and outlined in the annual Regional Services Projects Summary which is presented to the Chief Executive Officer Advisory Committee (CEOAC) and Council and discussed in detail with relevant directors and officers from each member Council.

Monitoring and Communication

Effective implementation will also necessitate regular reporting and monitoring. All member Councils and the EMRC Council will be kept up-to-date with progress towards achieving the stated outcomes within the Plan. This will occur regularly through the Regional Development Activity Report to Council. Where appropriate, the community will be informed of significant progress through the EMRC website, media releases and newsletters.

Regular updates will also be provided to the RITS IAG with opportunities for input from the group.



Appendices

Appendix A: Stakeholders and Partners

Key stakeholders

The following key stakeholders are directly involved in the implementation of the *Regional Road Safety Plan* where activities are under their control. They are supported by partners (direct and indirect) that make up the Regional Integrated Transport Strategy Implementation Advisory Group (RITS IAG) as well as other agencies.

Member Councils

Each of the six local government authorities assume responsibility for designing, building and maintaining their local road networks as well advocating for road safety improvements for those elements that are outside of their immediate control (such as speed limits, the use of traffic signals and the installation of traffic signs and pavement markings). Austroads²⁰ also notes that road agencies such as local government authorities (and Main Roads WA) have a duty of care and must undertake what is reasonable of them to be aware of deficiencies of the road network, to assess and prioritise treatments and have a system for remedying them.

Specifically, member Councils can directly influence²¹ road safety through its processes and operations as a lead agency through:

- As a road controlling authority:
 - ⇒ Identifying and prioritising road safety issues and deficiencies. These can be in terms of specific locations (black spots or routes) but also more generic for instance highlighting particular concerns for types of road users (e.g. pedestrians, cyclists, motor cyclists, young people etc.), behaviours (e.g. drink driving) or road user movements (e.g. losing control on bends) as well as selecting appropriate countermeasures (taking resources and/or other external constraints into account), allocating responsibility and timing.
 - ⇒ Ensuring new designs (and existing arrangements) are assessed for safety through road safety audits.
 - ⇒ Ensuring asset management policies and practices are geared towards maintaining a safe road network.
 - ⇒ Ensuring traffic management such as parking takes road safety into account.
 - ⇒ Managing vegetation/urban design to ensure road safety hazards are not unintentionally introduced, sight distances at intersections/traffic signs are provided and clear path ways are maintained.
 - ⇒
- As a planning authority:
 - ⇒ By ensuring road safety is not compromised or caused by the traffic impact of developments and that layouts/access arrangements are fit for purpose.
 - ⇒
- As an employer, fleet operator and client:
 - ⇒ Having a safe driving policy (potentially extending to implementing/requiring ISO 39001 Road Traffic Safety Management compliance from suppliers in due course) and a commitment to only purchase safe vehicles based on ANCAP results.

In addition to the above local government roles and responsibilities, community groups can also influence and contribute to road safety outcomes in various ways.

²⁰Austroads Guide to Road Safety Part 1: Road Safety Overview. 2013

²¹Austroads Guide to Road Safety. Part 4: Local Government and Community Road Safety. 2009

Eastern Metropolitan Regional Council (EMRC)

The EMRC can advocate for road safety and has commenced this through the RITS IAG and the identification and development of the Regional Road Safety Plan. Additional actions of the EMRC relate to its response as an employer, fleet operator and client.

Direct Partners

The following agencies can have a direct role on improving road safety from a State wide perspective as well as within the Region. Many (but not all) of the agencies are represented on the RITS IAG.

Main Roads WA

Main Roads WA designs, builds and maintains the state road network as well as collecting and analysing crash data. It is also responsible for the setting of speed limits and the approval/installation of traffic signals, traffic signs and pavement markings. Main Roads WA also administers funding programs such as the Federal and State Black Spot Programs as well as the Metropolitan Regional Road Group road maintenance and road improvement programs.

Road Safety Commission

The Road Safety Commission was established July 2015 as a resulting outcome from the 'Browne Report', *A review of Road Safety Governance in Western Australia*²². The Road Safety Commission was previously known as the Office of Road Safety.

The Road Safety Commission leads/coordinates and monitors the implementation of *Towards Zero WA's Road Safety Strategy 2008-2020*, develops policies and strategy development on road safety, undertakes and delivers road safety education campaigns and provides administrative support to the Road Safety Council. It also manages the Road Trauma Trust Account (RTTA) which is intended to implement priority safety projects that are consistent with the *Towards Zero Strategy* (as well as administering the Road Safety Community Grants program which is funded through the RTTA).

West Australian Police

The West Australian Police enforces road user behaviour as well as collecting/recording information about road crashes.

Department of Transport

The Department of Transport sets standards for the licensing of drivers, riders and vehicles as well as actually licensing drivers, riders and vehicles. It also supports and encourages the use of alternative forms of transport including the administration of funding for cycling projects.

Department of Planning

The Department of Planning is Western Australia's lead land-use planning agency. The Department is responsible for planning the States cities and towns, transport networks, parks and recreation reserves and a range of social and physical infrastructure. The department also encourages planning and design that enhances road safety.

Public Transport Authority (PTA)

The PTA was created to clarify the function of the Department of Planning and Infrastructure to consolidate the responsibility for the delivery of public transport in WA. The PTA has a vision of "increasing the use of public transport

²²A review of road safety governance in Western Australia: <http://rsc.wa.gov.au/Statistics-Research/Road-Safety-Reviews>

West Australian Local Government Association (WALGA)

WALGA represents member Councils on the State Road Safety Council and provides leadership to, and advocacy for local government. Specifically, it operates and coordinates a number of road safety activities through its RoadWise Program:

- Local Government Advocacy, Leadership and Policy.
- Community Road Safety Network including supporting local RoadWise committees.
- Type 1 Child Car Restraint Fitting Service.

Royal Automobile Club (RAC)

RAC represents the interests of more than 800,000 Western Australians. A key role for RAC has always been to act as a voice for its members, and as a strong public advocate on the mobility issues affecting Western Australians. RAC collaborates with Government and other organisations to ensure safe, accessible and sustainable mobility options are available for its members and the community.

Indirect Partners

The following agencies play key roles in improving road safety in the state and are typically members of the state Road Safety Council.

Road User Representatives

Road user representatives include, but are not limited to motorist organisations, road transport (freight) industry, cyclists, pedestrians and motorcyclists.

Department of Education and Training

The Department of Education and Training educates young road users about safer behaviour on the road through schools and the TAFE system.

Department of Health

The Department of Health attends to and treats those injured in a road crash as well collecting data on those that have been killed and/or injured in a road crash. The Department of Health also typically advocates and supports healthy public policy/environments.

Insurance Commission of Western Australia

The Insurance Commission manages motor vehicle injury claims, collects and analyses casualty crash data and provides supplementary funding to support agreed road safety initiatives.

Appendix B The Eastern Metropolitan Region's Road Safety Profile

Figure B1 shows the trend in Killed and Serious Injury (KSI) crashes in the Region over the past five years with the overall casualty types by age range shown in Figure B2.

Figure B1

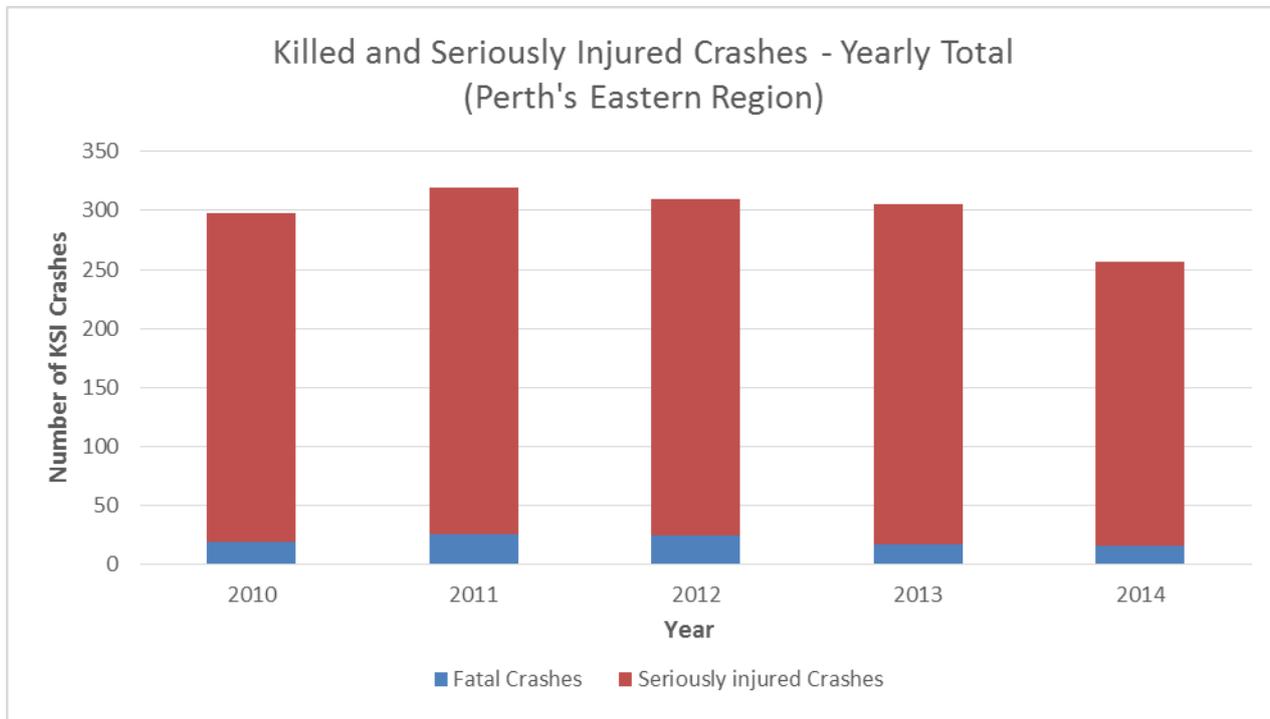
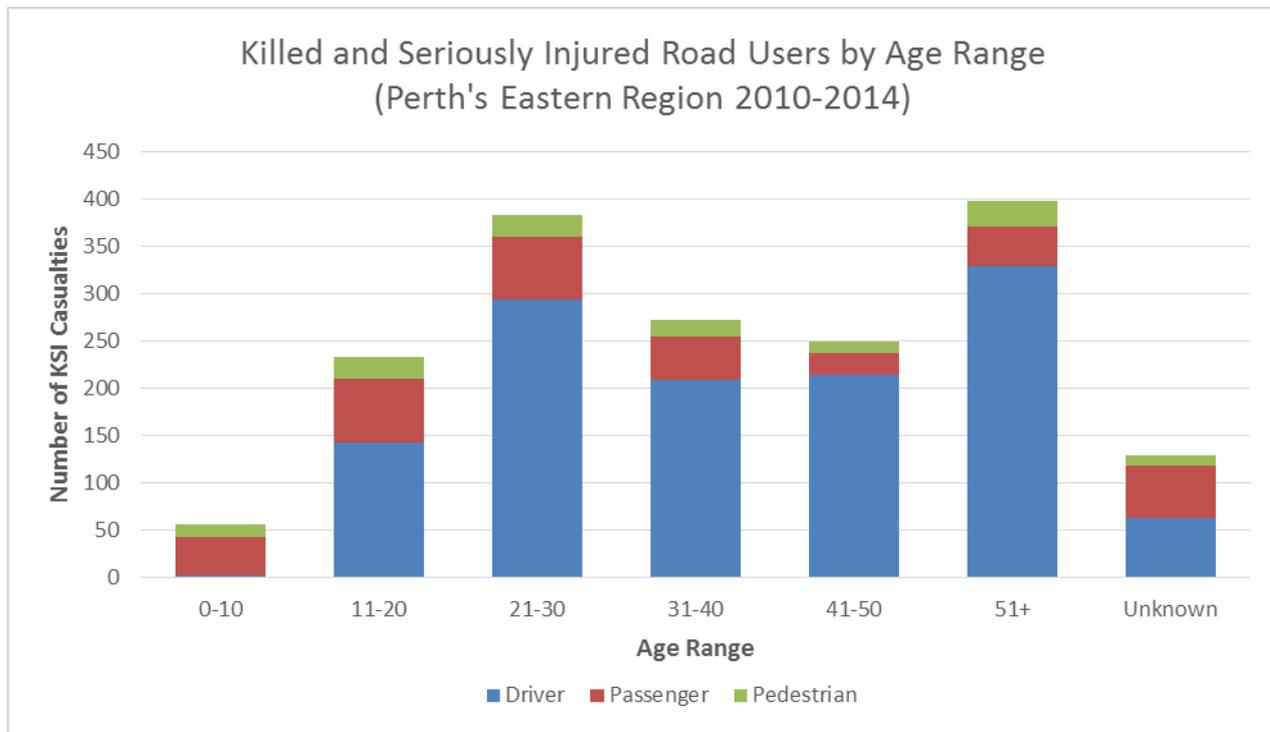


Figure B2



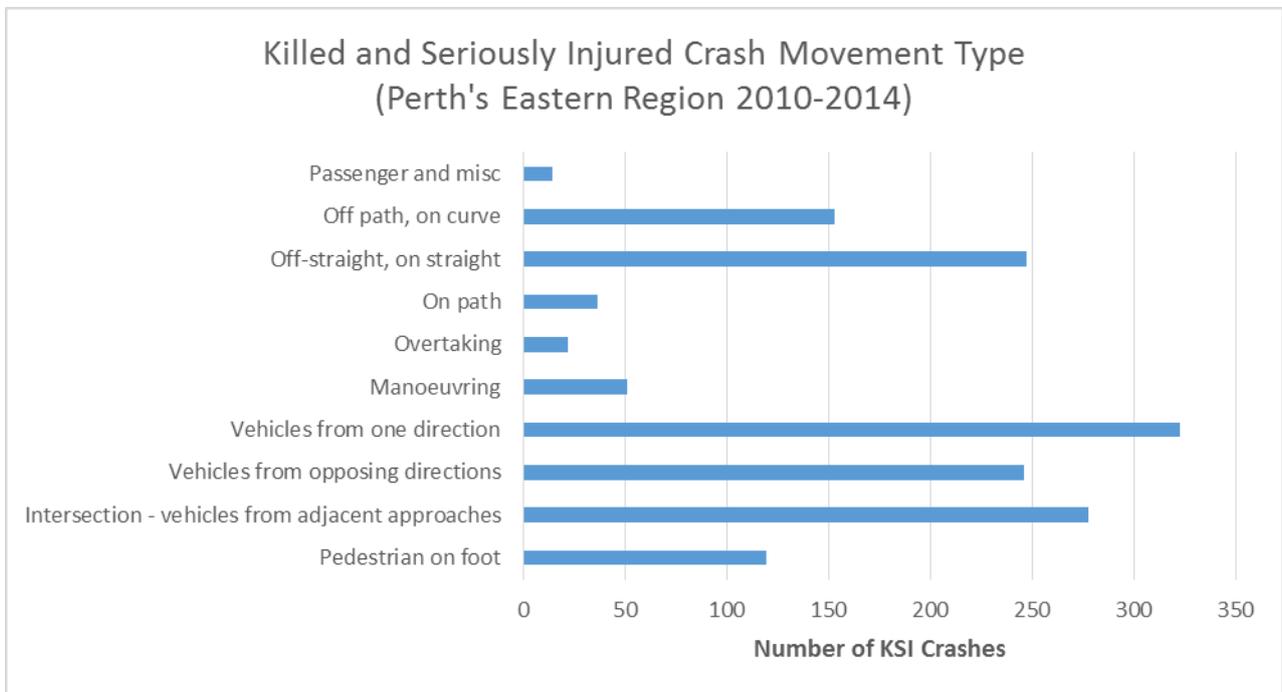
As indicated, by the very nature of road crashes requiring at least one driver to be involved in a crash, drivers of vehicles make up almost three quarters of all road users involved in a fatal or serious crash.

The proportion of total crash numbers by Council varies due to their size, population and the extent (length and type) of the road network in their area. Killed and seriously injured crashes have been grouped together across the Region to develop an understanding of the regionally important issues.

Crash Types

Figure B3 sets out the different types of KSI crashes for the Region as a whole over the five year period from 2010 to 2014. The most significant road user movements involved in KSI crashes involve vehicles from one-direction (e.g. rear end collisions or side swipes), vehicles from adjacent approaches at intersections, vehicles running off the road (on curves and/or straights) either due to loss of control or swerving to avoid something and vehicles from opposing directions (either at intersections or at a midblock location, for example a head-on collision).

Figure B3



A detailed review of crashes at both member Council and regional level has resulted in the following road safety issues set out being identified and assessed.

Intersections: From Adjacent Approaches and/or Opposing Directions

A total of 424 KSI crashes occurred at intersections involving vehicles from adjacent approaches or opposing directions between 2010 and 2014. These amounted to over a quarter (28%) of all KSI crashes in the Region.

- 65% of these involved right angle movements typically involving 90 degree collisions with both vehicles going straight ahead (with one failing to give way) or a right turning vehicle being hit by a straight ahead movement from its right hand side. The remaining 35% were 'right turn through' collisions involving a right turning vehicle manoeuvring across a straight ahead vehicle, for instance without giving way.
- 38% of the above type of KSI crashes occurred at traffic signal controlled intersections, with roughly equal numbers occurring at intersections with either a Give Way (22%), Stop (19%) or no control (21%) provided. Less than 5% of these KSI crashes occurred at roundabouts.
- Over 85% of these KSI crashes occurred on roads with a speed limit of 70km/h or less.
- Approximately 20% of KSI crashes involving the specified movement at intersections involved speed as a factor (based on speed being specifically identified or not as a contributory factor).

Intersections: Rear-End Collisions

Rear-end collisions made up the vast majority (83%) of the 323 'vehicle from one direction' type of KSI crashes between 2010 and 2014. 60% of these occurred at intersections with the remaining 40% reported as being at mid-block locations.

- Of the rear-end intersection KSI crashes, 62% occurred at traffic signal controlled locations, with a quarter occurring at sites reported as not having any controls.
- The number of KSI rear-end crashes at intersections without any control is more than double those at intersections with Give Way or Stop controls reported as being provided.
- Less than 7% of rear-end KSI crashes occurred at roundabouts in the Region.
- Where speed was specifically considered as a potential contributory factor, speed as a particular issue was noted in only 10% of those KSI crashes.
- Only 16% of KSI rear end intersection collisions occurred in the wet or in dark/dawn/dusk conditions.
- Intersection rear-end KSI crashes typically occurred on roads with a speed limit of 60km/h and above (based on crash data with known speed limits provided).

With respect to intersection crashes in general, Table B1 on the overleaf shows the top 50 intersections in the Region ranked according to social costs of total crash numbers between 2010 and 2014. The ranking shown in the left hand column denotes its ranking for the State based on the social cost. It should be noted that some of these intersections may well have been treated over the past five years or are currently in the process of being funded/upgraded such as the Tonkin Highway/Horrie Miller intersection.

Table B1 Top 50 Intersections in Perth's Eastern Region ranked by social costs 2010-2014²³

State Ranking	Intersecting Roads		Member Council	Crash Frequency	Cost
1	TONKIN HWY	HORRIE MILLE	BELMONT	429	\$21,211,523
2	TONKIN HWY	COLLIER RD	BAYSWATER	329	\$16,635,871
3	REID HWY	MALAGA DR	SWAN	290	\$13,981,472
5	TONKIN HWY	HALE RD	KALAMUNDA	139	\$13,506,103
6	REID HWY	LORD ST	SWAN	177	\$13,265,668
7	ROE HWY	BERKSHIRE RD	KALAMUNDA	166	\$12,723,456
9	LEACH HWY	ABERNETHY RD	BELMONT	248	\$11,294,011
10	LEACH HWY	TONKIN HWY	BELMONT	216	\$11,238,627
11	TONKIN HWY	BENARA RD	BAYSWATER	190	\$10,639,937
14	GNANGARA RD	BEECHBORO RD	SWAN	121	\$10,108,471
15	TONKIN HWY	MORLEY DR	BAYSWATER	186	\$9,931,248
16	ROE HWY	ROE HWY ON -RAMP	KALAMUNDA	166	\$9,926,461
17	ROE HWY	KALAMUNDA RD	KALAMUNDA	190	\$9,509,551
19	TONKIN HWY	REID HWY	SWAN	146	\$8,868,619
22	TONKIN HWY	WELSHPOOL RD	KALAMUNDA	162	\$8,481,281
23	ROE HWY	MORRISON RD	SWAN	141	\$8,459,328
25	ROE HWY	H017 TONKIN	KALAMUNDA	157	\$7,666,260
27	ROE HWY	GREAT EASTER	SWAN	128	\$7,380,159
32	GUILDFORD RD	H017 TONKIN	BAYSWATER	126	\$7,194,664
37	REID HWY	BEECHBORO RD	SWAN	183	\$6,736,982
43	GREAT EASTERN	H017 TONKIN	BELMONT	214	\$6,394,658
44	GREAT NORTHERN	ROE HWY	SWAN	191	\$6,375,472
45	GREAT EASTERN	STIRLING CR	SWAN	72	\$6,173,269
83	ORRONG RD	ARCHER ST	BELMONT	126	\$4,991,718
84	GREAT EASTERN	PARK RD	MUNDARING	25	\$4,983,960
85	REID HWY	WEST SWAN RD	SWAN	152	\$4,962,352
87	GREAT EASTERN	GEH ON - H01	BELMONT	145	\$4,924,777
99	ROE HWY	TOODYAY RD	SWAN	92	\$4,632,088
110	MARSHALL RD	BEECHBORO RD	SWAN	107	\$4,481,659
111	GREAT NORTHERN	RUTLAND RD	SWAN	29	\$4,467,962
115	GREAT EASTERN	H020 GFF EB	BELMONT	106	\$4,368,618
120	WELSHPOOL RD	LEWIS RD	KALAMUNDA	26	\$4,316,845
126	GREAT EASTERN	RESOLUTION DR	BELMONT	113	\$4,110,887
162	BEECHBORO RD	MORLEY DR	BAYSWATER	83	\$3,668,281
164	TONKIN HWY	DUNREATH DR	BELMONT	77	\$3,638,018
183	GREAT EASTERN	LLOYD ST	SWAN	83	\$3,374,854
199	ORRONG RD	ALEXANDER RD	BELMONT	82	\$3,262,942
200	GREAT EASTERN	GUILDFORD RD	SWAN	99	\$3,260,772
204	GREAT EASTERN	COPPIN RD	MUNDARING	15	\$3,247,944
212	GREAT EASTERN	LOTON AV	SWAN	57	\$3,189,255
217	TOODYAY RD	CAMPERSIC RD	SWAN	13	\$3,152,787
218	BROUN AV	COODE ST	BAYSWATER	71	\$3,149,706
226	GUILDFORD RD	GUILDFORD RD	BAYSWATER	95	\$3,089,076

²³Estimated cost of road crashes at an intersection. The crash costs are derived using Willingness To Pay (WTP) approach; that is, the cost the community is willing to pay or to forego in exchange for a reduction in the probability of an injury (of varying severity) or death from road crashes (Fatal \$7,648,989; Hospital \$351,226; Medical \$77,395; Property Damage Only \$11,651).

228	BEECHBORO RD	BENARA RD	BAYSWATER	81	\$3,083,398
230	WALTER RD WEST	WELLINGTON R	BAYSWATER	88	\$3,069,049
231	BROUN AV	COLLIER RD	BAYSWATER	76	\$3,062,119
233	GUILDFORD RD	GARRATT RD	BAYSWATER	81	\$3,052,435
246	GREAT NORTHERN	WEST SWAN RD	SWAN	80	\$2,996,651
250	BREARLEY AV	SECOND ST	BELMONT	68	\$2,988,661
255	GREAT EASTERN	KALAMUNDA RD	SWAN	49	\$2,962,965

Run-Off Road Collisions

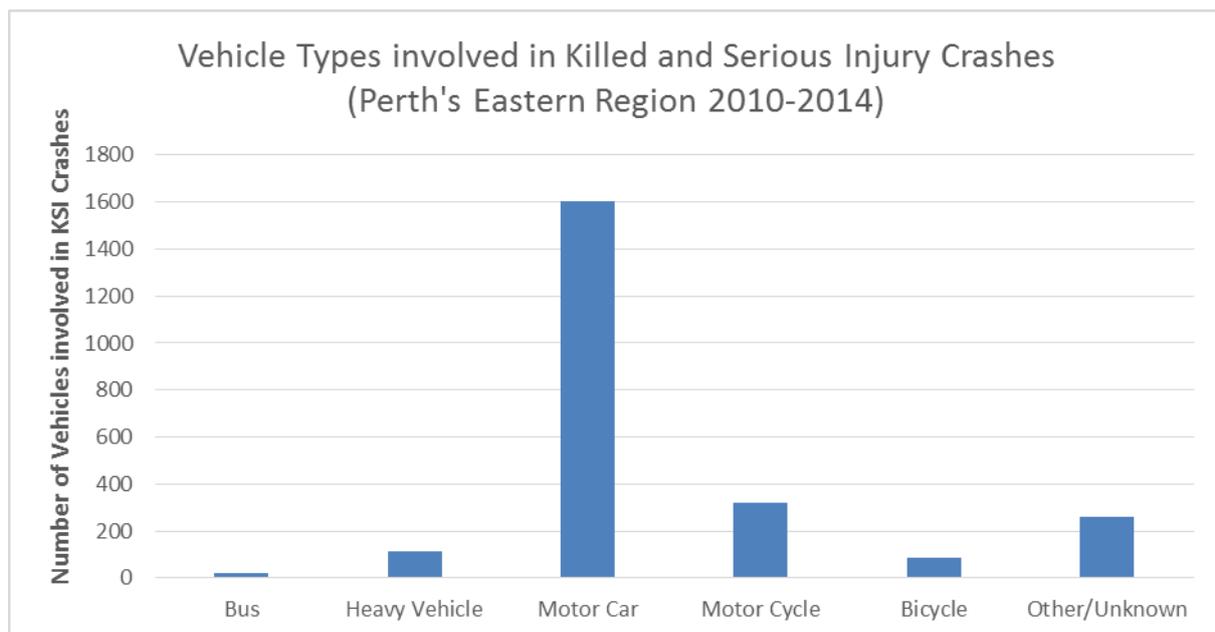
Drivers typically losing control of their vehicle and running off the road amounted to 27% of all KSI crashes between 2010 and 2014. 62% of these occurred on a straight road with the remaining 38% on a curve. Typically, three quarters of the 400 run-off road crashes over this period occurred at mid-block²⁴ locations.

- 60% of run-off road KSI crashes involved a vehicle hitting a roadside object (other than a kerb).
- 19% occurred in the wet (compared to a Metropolitan average for all KSI crashes of 12% and 14% for the Region)
- 53% were affected by light conditions and are known to have occurred during the dark or at dawn/dusk.
- Where the speed limit is known, one third of run-off road KSI crashes occurred on roads with a speed limit of 80km/h and over (i.e. rural locations). Over a quarter of such crashes occurred on roads with a 50km/h speed limit.
- Where speed was specifically considered as a potential contributory factor, speed as a particular issue was only noted in 50% of those KSI crashes.

Vehicles/Road Users Involved in KSI Crashes

As indicated in Figure B4, motor cars (cars, utes and station wagons) were most common vehicle type involved in KSI crashes in the Region between 2010 and 2014. Motorcycles formed the second most common type of vehicle (13%) followed by heavy vehicles (5%) and bicycles (4%).

Figure B4



²⁴A section of road in-between intersections

Motorcyclists

In total, there were 24 motorcyclists killed and 296 seriously injured in the Region between 2010 and 2014. As such, just under a quarter of all road users killed in the Region were motorcyclists.

- 55% of KSI crashes involving motorcyclists occurred at mid-block locations.
- 27% of KSI crashes involving motorcyclists occurred in the dark/dawn/dusk.
- 36% of KSI crashes involving motorcyclists occurred at the weekend.
- 51% of mid-block motorcycle KSI crashes involved a motorcyclist losing control of their machine/swerving and running off the road – with 40% of these hitting a roadside object such as tree (excluding kerbs). 17% of KSI crashes involving motorcyclists on mid-block sections of roads occurred at driveways.
- Where speed was considered as a potential contributory factor, 41% of motorcycle KSI crashes were reported as having speed as a factor. Where the speed limit is known, 21% of motorcycle KSI crashes occurred on roads with a speed limit of 80km/h or more – compared with 26% on roads with a 50km/h speed limit.
- 87 out of the 145 KSI crashes involving a motorcyclist at an intersection occurred at either a Stop/Give way controlled or uncontrolled T-intersection or crossroad.

Cyclists

In total, there were three cyclists killed and 84 seriously injured in the Region between 2010 and 2014.

- 59% percent of KSI crashes involving cyclists occurred at intersections.
- 25% of KSI crashes involving cyclists occurred in the dark/dawn/dusk with crashes being evenly spread over the week (but typically slightly higher on a weekday compared to the weekend).
- 11 KSI crashes involving cyclists occurred at a roundabout whilst 16 occurred traffic signal controlled intersections, 16 at Stop/Give Way controlled/uncontrolled T intersections and five at Stop/Give Way controlled/uncontrolled crossroads.
- 39 of the 51 cyclist KSI intersection crashes involved a right angle collision.
- 10 of the 36 midblock KSI crashes involved a cyclist manoeuvring from the footpath/ driveway.

Pedestrians

In addition to the above two types of vulnerable road users, in total there were 16²⁵ pedestrians killed and 110 seriously injured in the Region between 2010 and 2014.

- 80% percent of 'hit pedestrian' type KSI crashes occurred at mid-block locations.
- 39% of 'hit pedestrian' type KSI crashes occurred in the dark/dawn/dusk with this percentage increasing to over half of all 'hit pedestrian' type KSI crashes at the weekend.
- 11% of 'hit pedestrian' type KSI crashes occurred at either an intersection traffic signal controlled location, a mid-block traffic signal controlled crossing, a zebra crossing or at a location with a pedestrian refuge island/ traffic calming.
- 19% of 'hit pedestrian' type KSI crashes involved a pedestrian playing, working, lying or standing in the carriageway.
- For those pedestrians killed or seriously injured, 13 were aged 0 to 10 years, 23 were aged between 11 and 20 years and 27 pedestrians were aged 51 years and over.

²⁵ Excludes a person involved in a fatal crash in a motorised wheelchair.

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