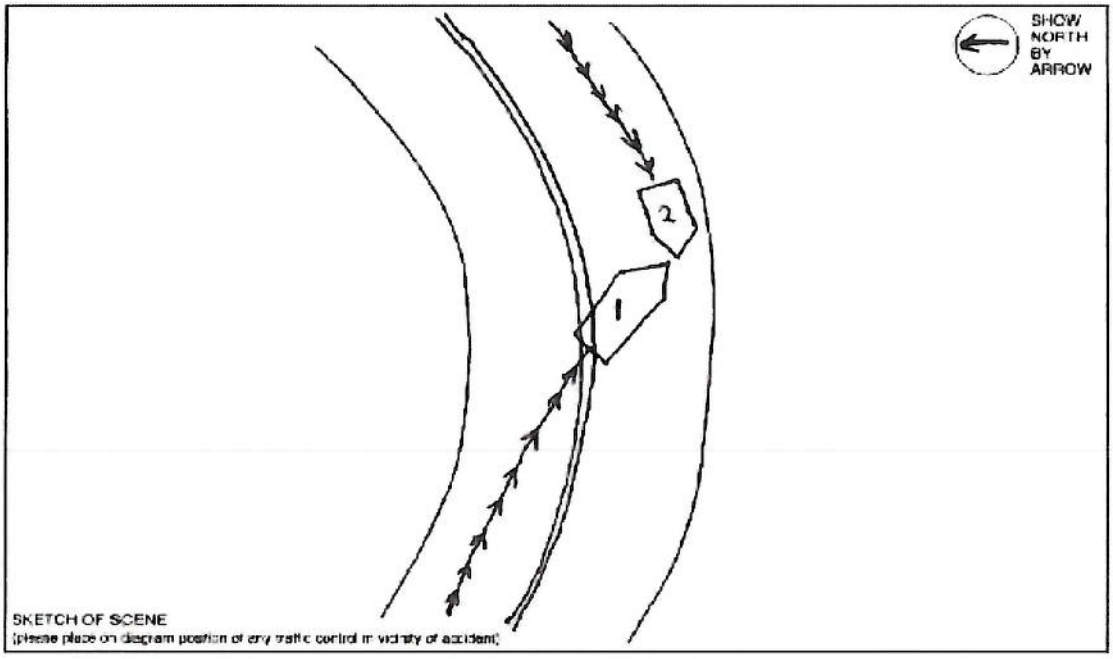
# A Review of Serious Casualty Head-on Crashes in Tasmania

Department of Infrastructure, Energy and Resources

Tasmania
Explore the possibilities

# A Review of
# **Serious Casualty Head-on Crashes**
# in Tasmania




Traffic & Infrastructure Branch
Department of Infrastructure, Energy and Resources
March 2009

# Contents


## 1. Introduction

## 2. Purpose

## 3. Understanding Head-on crashes
3.1 Crash data
3.2 Severity
3.3 Speed limit
3.4 Crash type
3.5 Road owner
3.6 Distribution

## 4. How to address Head-on crashes
4.1 Identifying and assessing sites
4.2 Incidence and consequence
4.3 Loss-of-control, on curves
4.4 Loss-of-control, on straights
4.5 Unsealed roads
4.6 Incorrect overtaking
4.7 Other

## 5. Progress in treating Head-on crashes
5.1 Crash trends
5.2 Benefit-cost-ratio projects
5.3 Mass action program
5.4 Treating crash clusters
5.5 Locations of highest risk

## 6. Summary
6.1 Understanding the problem
6.2 Treatment options
6.3 Progress

## Appendix A
Locations with two or more serious casualty head-on crashes


| | Name | Signature | Date |
|---|---|---|---|
| Written by: | Donald Howatson | D. Howatson | 23 March 2009 |
| Reviewed by: | Simon Buxton | SBuxton | 23 March 2009 |

# 1. Introduction

The 'Tasmanian Road Safety Strategy 2007-2016' sets out four key strategic directions for reducing road trauma. The second of these is to provide 'best practice infrastructure'.

The Strategy also identifies head-on crashes as one of the three types of crashes that result in a significant number of serious casualties in Tasmania.

There are a number of Programs running in Tasmania that target funds at road safety improvements and the provision of best practice infrastructure. These include:

- Tasmanian Road Safety Strategy – Infrastructure Program;
- AusLink Black Spot Program and Black Spot Nation Building Package;
- State Black Spot Program; and
- State Roads – Safer Roads Program.

Projects for inclusion in these Programs are identified, assessed and prioritised by the Traffic Safety Section of the Department of Infrastructure, Energy and Resources (DIER).

# 2. Purpose

The purpose of this Report is to:

- Improve our understanding of the incidence and circumstances of serious casualty head-on crashes in Tasmania.
- Discuss treatment options for reducing the risk of these crashes and how to prioritise such treatments.
- Review the progress that has been achieved in reducing serious casualty head-on crashes and the potential for further improvements.

# 3. Understanding Head-on crashes

## 3.1 Crash data

Details of all crashes reported to Tasmania Police are recorded on a Traffic Accident Report form that is then electronically stored on the Crash Data Manager computer system which is maintained by DIER.

The Traffic Accident Report categorises the severity of the crash based on the most severe injury that was received by any person involved in the crash. Crashes where a person dies within 30 days of the crash are categorised as fatalities, and crashes where a person is admitted to hospital for at least 24 hours are categorised as serious injuries.

In this Report, the term 'serious casualty' is used to collectively describe fatalities and serious injuries. The numbers in this Report are based on counting each crash once – they do not allow for the fact that more than one person could be injured in the same crash.

During the five-year period (2004-2008) there were 1,580 serious casualty crashes in Tasmania, comprising 221 fatal crashes and 1,359 serious injury crashes. Of these serious casualty crashes 207 (13%) involved head-on collisions.

## 3.2 Severity

A head-on collision is the type of crash most likely to result in death. Because the vehicles involved are travelling in opposite directions, the impact speed can be around 200 km/h on a rural road.

Head-on crashes are especially tragic because, while the driver of one vehicle may cause the crash, it can result in death or serious injury to occupants of other vehicles.

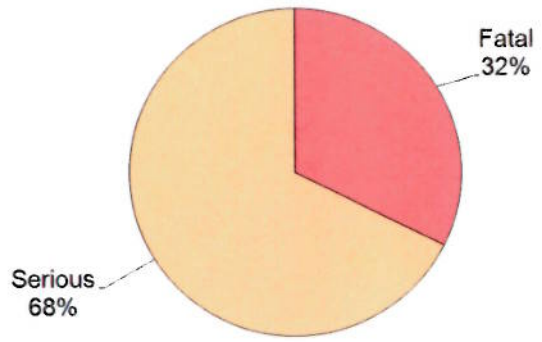



Figure 3.1 – Serious casualty head-on crashes (2004-2008), Severity

## 3.3 Speed limit

Over two-thirds of serious casualty head-on crashes occur on roads with a speed limit of 100 or 110 km/h.

This reflects the fact that the faster a driver travels, the more likely he is to make an error or lose control, which could then lead to a collision with a vehicle travelling in the opposite direction. Furthermore, the faster the two vehicles are travelling, the greater the impact speed and the resultant damage and injury will be.

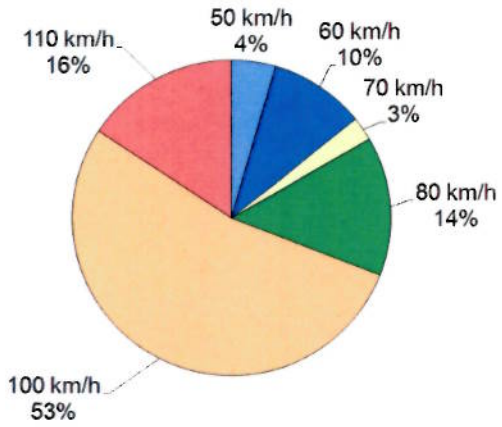



Figure 3.2 – Serious casualty head-on crashes (2004-2008), Speed limit

## 3.4 Crash type

Over three-quarters of serious casualty head-on crashes are caused by vehicles losing control and crossing onto the wrong side of the road.

Almost half of all head-on crashes involve loss-of-control on curves. If there had not been a vehicle travelling in the opposite direction, either the driver would have regained control or the vehicle would have run-off the road. In this way, all incidents involving vehicles losing control to the right are potential head-on crashes.

Detailed analysis of head-on crashes caused by loss-of-control on curves shows that about two-thirds involve the vehicle on the inside of the curve crossing into the outside lane. The other third involve the vehicle in the outside lane entering the inside lane; some of these were caused by drivers trying to cut the corner.

Almost one-third of all head-on crashes involve loss-of-control on straights. Tasmania Police attribute the cause of over three-quarters of these crashes to the driver being asleep, fatigued or inattentive.

8% of serious casualty head-on crashes involve incorrect overtaking. About one-quarter of these involve drivers crossing double continuous lines and ignoring other existing overtaking restrictions.

Almost one in ten serious casualty head-on crashes occur on gravel roads. Gravel roads typically carry comparatively low traffic volumes and are often quite narrow. Even when gravel roads are sufficiently wide for two traffic lanes, drivers often choose to drive down the middle. Most of the head-on crashes on gravel roads occur on bends or crests. The combination of narrow width and limited forward sight distance result in head-on crashes when drivers are travelling too fast to stop in time.

The remaining 5% of serious casualty head-on crashes involve a variety of other circumstances.

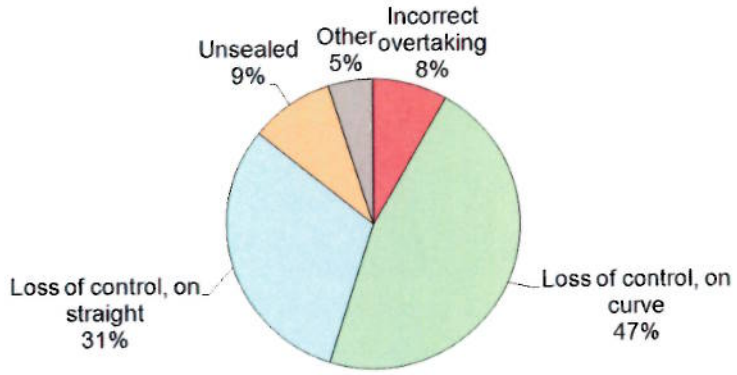



Figure 3.3 – Serious casualty head-on crashes (2004-2008), Crash type

## 3.5 Road owner

Tasmanian roads can be categorised as follows:

- AusLink network – forms the basis of the Australian Government's investment in roads in Tasmania - approximately 400 kilometres (2%);
- State maintained roads - approximately 3,250 kilometres (19%); and
- Council maintained roads - approximately 14,000 kilometres (79%).

Almost one-quarter of all serious casualty head-on crashes occur on the AusLink network. This apparent over-representation is because of the comparatively high traffic volumes carried by these roads. The incidence of head-on crashes is sensitive to traffic volume because the likelihood of a driver making an error or losing control increases with traffic volume, and is then compounded by a corresponding increase in vehicles travelling in the opposite direction.

In recognition of its higher design standards, the majority of the AusLink network is subject to a 110 km/h speed limit. Nevertheless, when a crash occurs the faster vehicle speeds result in more severe damage and injury.

The average number of head-on collisions per kilometre on AusLink roads is low in absolute terms, but is significantly higher than most State maintained or Council roads. Slightly less than half of all serious casualty head-on crashes occur on State maintained roads.

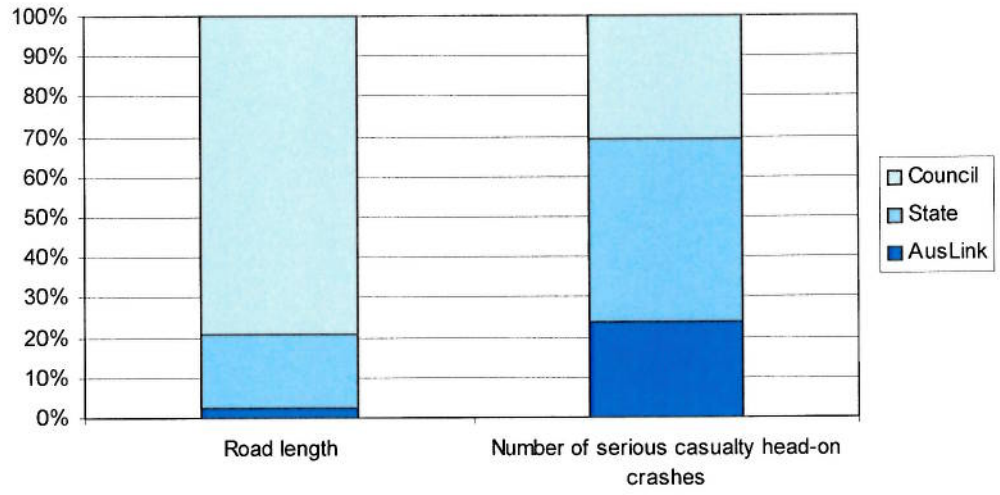



Figure 3.4 – Serious casualty head-on crashes (2004-2008), Road owner

## 3.6 Distribution

The 204 serious casualty head-on crashes that occurred during the five-year period (2004-2008) are very dispersed – only 39 of the crashes occurred on the same road and within 1 kilometre of another.

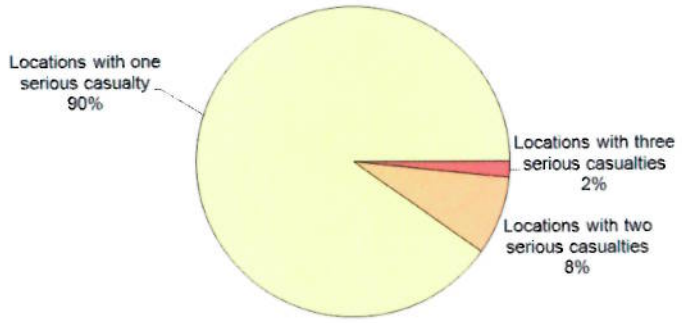



Figure 3.5 – Serious casualty head-on crashes (2004-2008), Distribution

There are only 18 sections of road in Tasmania that have had more than one serious casualty head-on crash within one kilometre of each other. These locations are listed in Appendix A. Five of the locations are on the AusLink network and the other thirteen are on State maintained roads. There are no Council roads that had more than one head-on crash in the same vicinity.

# 4. How to address Head-on crashes

## 4.1 Identifying and assessing sites

The incidence of serious casualty crashes is so low that it is not statistically significant for the purposes of identifying and prioritising safety works. Established best practice is to select locations based on all casualty crashes (fatal, serious injury, minor injury and first aid). This is the methodology prescribed for setting the AusLink Black Spot Program and evaluations have proven it to be extremely successful at delivering road trauma reduction.

Once the sections of road with the highest rate of head-on casualty crashes have been identified, the assessment process involves:

- analysing the traffic accident reports in detail to establish the precise nature of the crashes; and
- selecting the road safety treatment that best addresses the types of crashes that are occurring.

## 4.2 Incidence and consequence

Most head-on crashes occur on high-speed, high-volume roads and involve one driver losing control of their vehicle and crossing onto the wrong side of the road.

There are two broad categories of treatments to address these type of head-on crashes:

- those designed to reduce the incidence of vehicles losing control; and
- those designed to reduce the consequence of the incidents that do occur, by preventing the out-of-control vehicle from colliding with vehicles travelling in the opposite direction.

Treatments to reduce the incidence of loss-of-control crashes will be examined in detail later this year, in a separate Report on serious casualty run-off-road crashes. These treatments include:

- better delineation (warning signs, guideposts, centreline and edgeline markings, and retro-reflective pavement markers (RRPMs));
- improved skid resistance;
- shoulder sealing; and
- audible markings.

Treatments specifically designed to reduce the consequence by preventing the loss-of-control leading to a head-on crashe comprise:

- constructing dual carriageways; and
- widening roads to accommodate wire rope safety fencing along painted medians.

## 4.3 Loss-of-control, on curve

Almost half of all head-on crashes involve one driver losing control on a curve and colliding with a vehicle travelling in the opposite direction.

Dual carriageways typically have four lanes, two lanes in each direction, and there is continuous provision for vehicles to overtake each other. This is a very expensive type of treatment and requires substantial land acquisition.

Photo 4.1 – Dual carriageway

Providing wire rope safety fencing along a painted median prevents head-on crashes but is significantly less expensive than constructing a dual carriageway. This type of treatment is typically three lanes wide, two in one direction and one in the other. The direction with two lanes swaps over every couple of kilometres so that vehicles travelling in the other direction can overtake each other.

Marginal widening of some existing roads can be sufficient to allow wire rope safety fencing to be provided along a painted median.

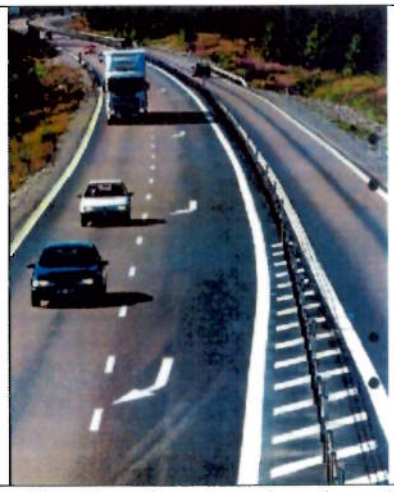


Photo 4.2 – Wire rope safety fencing along a painted median

## 4.4 Loss-of-control, on straight

31% of serious casualty head-on crashes result from a vehicle crossing onto the wrong side on a straight section of road. Tasmania Police attribute over three-quarters of these crashes to the driver being asleep, fatigued or inattentive.

The installation of audible centreline markings would alert drivers to the fact that they were crossing onto the wrong side of the road.

Although audible markings are expensive compared to conventional markings they are a comparatively cheap way of treating long sections of road. Therefore, they are considered to be the most cost-effective way of addressing head-on crashes.

Photo 4.3 – Audible centreline markings

## 4.5 Unsealed roads

9% of serious casualty head-on crashes occur on unsealed roads. Most of the crashes occur on bends or crests where limited width combine with reduced forward sight distance.

Photo 4.4 – Gravel road – limited width and reduced forward sight distance

A relevant countermeasure would be to widen the gravel road, particularly in the vicinity of curves and crests, so that there was more room for vehicles to pass each other.

However, given that there are more than 7,000 kilometres of rural gravel roads in Tasmania, and that they carry low volumes of traffic, this would be a very expensive exercise. The effectiveness of this approach would also be reduced by the preference that drivers show for driving along the middle of gravel roads, even when they are wide enough to accommodate two lanes.

Sealing gravel roads would make it easier for drivers to control their vehicles but this would be even more expensive and would incur higher ongoing maintenance costs.

## 4.6 Incorrect overtaking

The most obvious treatment for head-on crashes that occur while drivers are trying to overtake would appear to be prohibiting overtaking in the vicinity.

Photo 4.5 – Overtaking restrictions

However, caution needs to be exercised with this approach because if overtaking is prohibited over extensive lengths it could result in drivers being stuck behind slow-moving vehicles for excessive amounts of time and this could lead to frustrated drivers making bad decisions. About one-quarter of serious casualty head-on crashes involving incorrect overtaking occurred where overtaking was already prohibited and the driver ignored the restriction.

In Tasmania, overtaking markings are installed in accordance with the guidance in the relevant Australian Standard (AS1742, Part 2, Section 4.3.3).

The other relevant countermeasures for addressing head-on crashes caused by incorrect overtaking would be the provision of overtaking lanes. However, these are very expensive to construct and given that there have only been 17 serious casualty head-on crashes involving incorrect overtaking in the last five years, they would not be able to deliver substantial reductions in the total number of head-on crashes.

## 4.7 Other

Four serious casualty head-on crashes involve a vehicle travelling in the wrong direction along a dual carriageway.

This emphasises the importance of providing intuitive interchange layouts and carefully installing direction and regulatory signage (including 'No Entry' and 'Wrong Way Go Back' signs), to minimise the risk of a driver becoming confused.

# 5. Progress in treating Head-on crashes

## 5.1 Crash trends

The 'Tasmanian Road Safety Strategy 2007-2016' reports that during the ten-year period 1996 to 2005 there were 454 serious casualty head-on crashes, an average of 45 per year.

During the last five-year period 2004 to 2008, there were 204 serious casualty head-on crashes, an average of 41 per year.

The annual number of fatal and serious head-on crashes is slowly trending downwards.

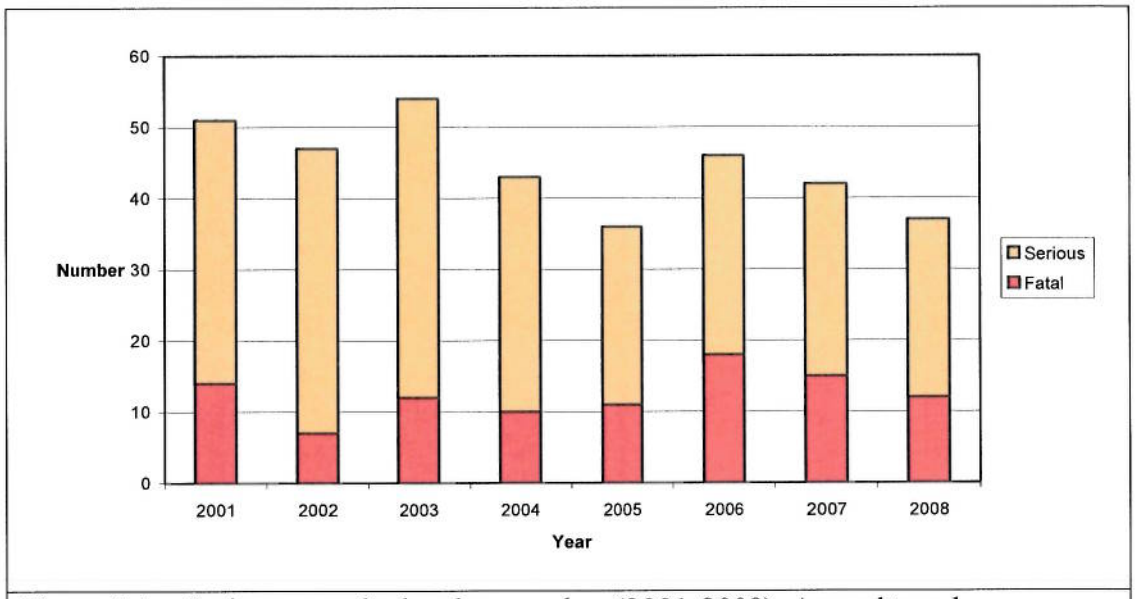



Figure 5.1 – Serious casualty head-on crashes (2001-2008), Annual trend

## 5.2 Benefit-cost-ratio projects

Over three-quarters of head-on crashes involve one driver losing control of their vehicle and crossing onto the wrong side of the road. Consequently, the targeted skid resistance improvements and enhanced delineation works being undertaken to reduce run-off-road crashes are also reducing the risk of head-on crashes.

Most head-on crashes on straights occur when a driver is asleep, fatigued or inattentive and crosses the centreline into oncoming traffic. Audible centreline markings alert drivers crossing the centreline and give them the opportunity to take corrective action.

AusLink roads have the highest rate of head-on crashes and the Midland and Bass Highways have the greatest number of incidents involving loss-of-control on straights. Consequently, the installation of audible centreline markings along the Midland Highway between Bagdad and Launceston will be completed this year. Another project to install audible centreline along the Bass Highway between Launceston and Burnie is being developed as a candidate for future funding.

The installation of audible centreline markings represents good value-for-money because long sections of road can be treated comparatively cheaply.

The very dispersed nature of head-on crashes means that it is generally not possible to justify treatments in purely economic terms using conventional benefit-cost-ratio methodologies.

## 5.3 Mass action program

A mass action program is a proactive accident reduction initiative that addresses a particular safety issue on an area-wide basis by applying a proven remedy to all locations having the same characteristics.

Following a multiple fatality involving a vehicle crossing the central median of a dual carriageway, DIER undertook a mass action program to install wire rope safety fencing along the median of all high-speed dual carriageways in Tasmania. This program has now been substantially completed with over 30 kilometres of wire rope safety fencing installed.

## 5.4 Treating crash clusters

Appendix A lists the 18 sections of road in Tasmania that have had more than one serious casualty head-on crash within one kilometre of each other.

Works have recently been completed or are in progress at nine of these sites. Of these, five involve treatments targeted at run-off-road crashes, two involve the installation of audible centreline markings and two involve the construction of dual carriageways. Works are proposed for a further three locations.

The remaining six locations are on roads with lower operating speeds and no works are currently planned, but DIER will continue to monitor their safety performance.

## 5.5 Locations of highest risk

The next step in treating head-on crashes is widening roads to accommodate wire rope safety fencing along painted medians or constructing more dual carriageways.

Works are currently being undertaken to install wire rope safety fencing along a painted median on the Midland Highway at Constitution Hill between Bagdad and Dysart, and on the East Tamar Highway at the new Batman Highway interchange. These will be demonstration projects for this type of treatment in Tasmania.

Widening roads to accommodate wire rope safety fencing along painted medians or constructing more dual carriageways is very expensive and so delivers modest returns when assessed using conventional economic appraisal techniques.

Nevertheless, schemes specifically designed to address head-on crashes will continue to be developed for the locations with the highest incidence and risk of head-on crashes.

# 6. Summary

## 6.1 Understanding the problem

Head-on crashes are the type of collision most likely to result in death. Head-on crashes are especially tragic because they involve a second vehicle that typically does not have anything to do with the cause of the crash.

Detailed analysis of serious casualty head-on crashes highlights that most of them occur on high-speed, high-volume roads and involve one driver losing control of their vehicle and crossing onto the wrong side of the road.

Serious casualty head-on crashes are very dispersed across the road network.

## 6.2 Treatment options

Given that the majority of head-on crashes are caused by drivers losing control of their vehicle, relevant treatments include:

- better skid resistance;
- better delineation; and
- shoulder sealing.

These treatments will be examined in detail in a Report on serious casualty run-off-the-road crashes that will be completed later this year.

Treatments specifically designed to reduce or prevent head-on crashes include:

- audible centreline markings;
- wire rope safety fencing along painted medians; and
- dual carriageways.

## 6.3 Progress

The annual number of fatal and serious head-on crashes is slowly trending downwards.

Implementing treatments targeted at run-off-the-road crashes has also been reducing the risk of head-on crashes.

The dispersed nature of head-on crashes makes it difficult to justify treatments in purely economic terms using conventional benefit-cost-ratio methodologies.

Schemes specifically designed to address head-on crashes will be targeted at the locations with the highest incidence and risk of head-on crashes.

# Appendix A

## Locations with two or more serious casualty head-on crashes (2004-2008)

| | | | | 2004-2008 Head-on crashes | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Ref** | **Location Description** | **Road owner** | **Speed Limit** | **Serious Casualty** | **Other Casualty** | **Property Damage** | **Total** | **Treatment** | **Status** |
| 1 | West Tamar Highway, Bradys Lookout | State | 100 | 3 | 0 | 1 | 4 | Wire rope safety fencing along painted median | Proposal |
| 2 | South Arm Highway, Howrah | State | 80 | 3 | 2 | 0 | 5 | Conversion to dual carriageway | In progress |
| 3 | Lyell Highway, Sorell Creek | State | 80 | 3 | 0 | 0 | 3 | Shoulder sealing | In progress |
| 4 | Midland Highway, Ross | AusLink | 110 | 2 | 0 | 0 | 2 | Audible centreline markings | In progress |
| 5 | Midland Highway, Symmons Plains | AusLink | 110 | 2 | 0 | 0 | 2 | Audible centreline markings | In progress |
| 6 | Bass Highway, Hagley | AusLink | 110 | 2 | 0 | 0 | 2 | Audible centreline markings | Proposal |
| 7 | Tasman Highway, Black Charlies Opening | State | 100 | 2 | 2 | 2 | 6 | Better skid resistance | Completed 2008 |
| 8 | Bass Highway, Doctors Rocks | State | 100 | 2 | 2 | 0 | 4 | Shoulder sealing | Completed 2009 |
| 9 | Channel Highway, Gardners Bay | State | 100 | 2 | 0 | 2 | 4 | No works proposed at this stage | x |
| 10 | Tea Tree Road, Tea Tree | State | 100 | 2 | 0 | 0 | 2 | Shoulder sealing | In progress |
| 11 | Tasman Highway, Springfield | State | 100 | 2 | 0 | 0 | 2 | No works proposed at this stage | x |
| 12 | East Derwent Highway, Old Beach | State | 80 | 2 | 1 | 3 | 6 | Shoulder sealing and realignment | Proposal |
| 13 | Devonport Road, bend at Horsehead Creek | State | 80 | 2 | 0 | 2 | 4 | Enhanced signage and delineation | Completed 2009 |
| 14 | Channel Highway, Margate | State | 80 | 2 | 0 | 1 | 3 | No works proposed at this stage | x |
| 15 | Tasman Bridge | AusLink | 70 | 2 | 3 | 0 | 5 | No works proposed at this stage | x |
| 16 | Midland Highway, Pontville | AusLink | 70 | 2 | 1 | 1 | 4 | Brighton-Pontville bypass | Being designed |
| 17 | Tasman Highway, St Helens | State | 60 | 2 | 1 | 4 | 7 | No works proposed at this stage | x |
| 18 | Hobart Road, New Norfolk | State | 60 | 2 | 1 | 0 | 3 | No works proposed at this stage | x |

Tasmania
Explore the possibilities

**TRAFFIC & INFRASTRUCTURE**

Roads & Traffic Division

Department of Infrastructure,
Energy & Resources

GPO Box 936, Hobart 7001

Ph: 1300 135513

Visit: www.dier.tas.gov.au