# Western Highway Upgrade: Review of Economic Appraisal and Road Crash History – 2025 update

William McDougall 30 November 2025

## 1 Background

I, William McDougall, am an independent transport planner and engineer with over 40 years' experience in appraisal processes for major projects and strategy planning, including economic appraisal for transport projects and road safety analyses.

I am an experienced expert witness in transport planning matters. I have acted as such for various clients during EES hearings for Melbourne Metro Rail Tunnel, West Gate Tunnel and North East Link in recent years.

I have prepared this report as an independent expert witness.

My summary CV is given at the end of this report.

### 1.1 This review

This review is in two parts following:

- Section 2 discusses the economic appraisal for the Western Highway upgrade project, contained in the 2012 EES documentation; and
- Section 3 analyses the road safety record of the Western Highway as a whole, also focussing on the Beaufort to Buangor and Buangor to Ararat sections.

Data and other sources used for the analyses are referenced throughout the document.

**NOTE**

This is an updated version of my original report dated 19 November 2020. The update is mainly concerned with Section 3 (review of road safety), which has been updated with more recent data. Some additional comments are also made in Section 2 (economic appraisal).

Where there are changes or additions to interpretation of the material presented, they are highlighted in blue, like this paragraph.

# 2 Economic appraisal review

This review is based on available material describing the economic benefits of upgrading Western Highway west of Beaufort (the Beaufort-Stawell duplication), particularly the following reports prepared for the EES:

- Technical Appendix D: Western Highway Project – Section 2: Beaufort to Ararat: Traffic and Transport Impact Assessment Report (GHD, 2012).
- Technical Appendix P: Western Highway Project – Section 2: Beaufort to Ararat: Economic Impact Assessment Report (GHD, 2012).

**NOTE**

This section is largely unchanged. I have reviewed it and there are no changes needed. However, as stated at the end of this section, the economic appraisal omits valuation of key relevancies that have since been the subject of considerable community concern. Chief among these is the cultural heritage aspect, which the economic appraisal omitted entirely. There was some assessment done in the (later) EES, but this has been subject to controversy as well, leading to the preparation of a new Cultural Heritage Management Plan which is yet to be concluded (at the time of writing).

No allowance was made in the economic appraisal for items such as:

- Social and cultural values
- Loss of habitat, vegetation and biomass
- Land severance

Australian appraisal guidance (ATAP) makes it clear that aspects such as this should always be assessed for inclusion.

The economic appraisal was done in 2012 and is therefore considerably out of date. It was based on assumptions that no longer apply.

If decisions were made on the basis of economic return, then this project would not proceed. However, in this case (and in many others), a decision to create a dual carriageway to Stawell was made for purely political reasons, and there is also a suggestion that the 110km/h standard proposed was a condition of Federal funding for the project.

## 2.1 Overall justification

General justification for the project is open to question. There seems to have been a strategic decision that Western Highway needs duplicating from Beaufort to Stawell, without clear evidence of the need. It is understood that the project first appeared in Auslink (a Commonwealth Government national road funding process, now defunct) and then in the 2008 Victorian Transport Plan. It is unknown if there was a cost-benefit analysis done for Auslink.

The Grattan Institute report *'Roads to riches: better transport investment'* says a lot about rural road projects, including the Geelong to Colac upgrade of Princes Highway. This project stands out amongst the ones they looked at for its high cost (and cost blow-outs) and apparent lack of justification. The Western Highway Upgrade is not mentioned, but parallels can be drawn.

## 2.2 Traffic flow and growth - updated

Traffic flow (from counts done in the first week of March 2012) was 6,000 to 6,100 vehicles an average day, with 31-34% heavy vehicles. Traffic in March is typically about 4% above the annual average, so AADT (annual average daily traffic) would be 5,800 vehicles.

Traffic was projected to grow at 1.59% a year.

According to more recent traffic data from the Department of Transport and Planning (DTP), the traffic flow between Beaufort and Ararat has been estimated as shown in Table 1. The 2020 and 2024 figures are estimated from trends in this data, also allowing for the effects of COVID-19.

***Table 1: DTP traffic estimates for Western Highway Beaufort to Ararat***

| 2-way daily traffic | 2007 | 2014 | 2015 | 2016 | 2017 | 2020 (est) | 2024 (est) |
|---|---|---|---|---|---|---|---|
| All vehicles (AADT) | 5,100 | 6,000 | 5,400 | 5,500 | 5,700 | 4,500 | 6,300 |
| Commercial vehicles | 1,580 | 1,630 | 1,440 | 1,290 | 1,240 | 1,030 | 1,330 |

*Source: estimated from 2000-2019 information data.vic.gov.au, November 2025*

The long-run (2007-2017) annual growth rate in these figures is 1.4% a year, lower than was assumed in 2012, but the traffic flow has also been fluctuating from one year to the next, particularly during COVID. Commercial vehicle volumes have also fluctuated, and they are probably less now than they were in 2007.

**These estimated traffic flows should ideally be validated and updated by undertaking new physical traffic counts between Beaufort and Ararat. To my knowledge, there have not been any such counts done – or at least, published – for a considerable time.**

**It is worth mentioning that the Big Build project website for the Western Highway upgrade still (November 2025) claims that** *"More than 6000 vehicles travel the Western Highway west of Ballarat each day, including 1500 trucks. This traffic is expected to double by 2025." (Project Benefits sheet).*

**Clearly, this increase has not materialised; traffic on the Buangor-Ararat section has grown slowly, and is still probably around 6,000 AADT, on average.**

## 2.3 Road user benefits

The cost-benefit analysis quantifies a range of road user benefits for 30 years after the road opens to traffic:

- Vehicle operating cost savings
- Travel time savings
- Crash cost savings
- Externality savings

A residual value is calculated at the end of 30 years, and the total is discounted to present values (using a discount rate of 4.4%) for comparison with the construction and maintenance cost. This gives a measure of the economic worth of the project, which is given as 0.5 to 0.6 (actually 0.54 to 0.55) for the three options assessed.

The GHD report asserts that 'such BCRs are common for rural highway upgrades because of the high cost involved for long corridors' without providing any evidence. This is an unsubstantiated

claim; in my experience, many rural road projects achieve BCRs well over 1.0, especially if they achieve significant time and safety savings. In this case, the main reason for the low BCR is that the road carries low traffic volumes, so not many journeys would benefit from the upgrade.

It appears that the traffic conditions with and without the project were estimated for 2025 (i.e. year 8 of the 30-year project period, with 2018 as year 1). The annual benefits were calculated in this year and then extrapolated assuming a constant growth rate of 1.5-1.6% per annum.

## 2.4 Discount rate

The economic appraisal used a discount rate of 4.4%, whereas Victorian Treasury recommends 7% (and has done for some time, despite arguments that it is too high).

If the cost-benefit analysis was calculated using 7% (with no other changes), the overall effect would be to reduce the GHD benefit-cost ratio from 0.55 to about 0.37. Present value of costs would go down by 5%, and benefits by 38%.

## 2.5 Costs

The present value costs are overestimated, because:

- GHD escalated the capital cost values year-by-year through the construction period before discounting them to 2012. The correct method is to express all future-year costs (and benefits) in 2012 dollars, then discount them using the chosen discount rate (they used 4.4%) – this reduces the present value of capital costs (and the residual value) by about 10%.
- The maintenance costs could be less, because of no longer needing to maintain parts of the old road, but this has not been estimated herein.

## 2.6 Benefits

### *2.6.1 General*

All the benefits appear to have been calculated for an average day in the year 2025 only (the eighth year after opening), then annualised and spread out across the 30-year evaluation period. No attempt has apparently been made to recalculate the benefits in another year further into the 30-year project life, which is a better approach – traffic growth can obviously affect the results. If this had been done, the project benefits might have increased somewhat (because the existing road would have been more affected by extra traffic growth than the new one).

The annualisation factor is unknown. If the traffic flow was converted to AADT (annual average daily traffic), which is the usual convention, then a factor of 365 would apply.

### *2.6.2 Vehicle operating costs (VOC) saving*

This is the largest benefit item (50% of total benefits).

The VOC calculation relies on estimating vehicle travel speeds and road surface condition (roughness). The speeds depend on quite a few factors, including the grades and curves along the route but also the surface roughness.

The surface roughness comes into play again when estimating the vehicle operating cost, because it affects fuel consumption, tyre and suspension wear and other running costs.

The formula used is from Austroads report AP-R264-05 (2005). That might have been valid in 2012, but the methods have since changed and are given in ATAP (Australian Transport Assessment & Planning) Guidelines. A comparable calculation using the ATAP guidance would probably give similar results, however.

Although the new road increases the vehicle-km travelled, the better-quality road results in lower VOC unit rates. The net effect is a vehicle operating cost saving.

The main factor affecting the VOC rate is the assumed surface roughness. The new road is assumed to have half the roughness value of the old road. The implicit assumptions are that the new road will be built and then maintained to a much better quality than the existing road, and that, in the no-project case, the existing road surface would never be improved (for example, by resurfacing it at suitable intervals).

This is highly optimistic and produces very large vehicle operating cost savings. No evidence is given to support the assumed halving of the roughness value as a starting point, and on top of that it is much more likely that the new road's surface condition would deteriorate over time, so its VOC unit rate would increase over time. If the net effect is to gradually reduce the annual VOC saving to zero by year 30, it would reduce the present value of VOC savings by about 40%.

The VOC calculations produce unusually large benefits depending almost entirely on the surface condition assumption. Because of this, further research should have been done to establish a more realistic starting-point roughness value, and a way of allowing for future traffic growth and surface quality (and thus VOC), based on assumed maintenance levels, for both the project and no-project cases.

### *2.6.3 Travel time saving*

Travel time savings make up 27% of total benefits.

They are calculated by estimating travel times over the old and new roads, and applying values of travel time saving (VTTS, for different vehicle types and purposes) to them.

GHD used VTTS as shown in Table 2. The latest published values from ATAP Guidance, deflated to 2012 dollars, are given for comparison.

***Table 2: Values of travel time saving used in GHD appraisal compared to latest figures***

| Vehicle type | Value of travel time saving ($/hour, 2012 prices) | |
|---|---|---|
| | GHD value | Latest ATAP equivalent |
| Articulated trucks | $48.38 | $44.26 |
| Rigid trucks | $34.00 | $32.34 |
| Light commercial vehicle | $35.04 | $30.76 |
| Cars undertaking business travel | $55.99 | $61.22 |
| Cars undertaking private travel | $22.89 | $24.68 |

Because some values of time have increased, and others have decreased, using the latest values would not change the present value of travel time savings significantly.

### *2.6.4 Crash cost savings*

Crash cost savings make up 5% of benefits.

They are calculated by assuming that the new road will be 30% safer than the old one. The rationale for this is that, in 2012, VicRoads had a road safety strategy which was aiming for a 30% reduction in the incidence and severity of road crashes by 2017.

This is illogical and wildly erroneous; if that strategy had been successful, then there would have been a 30% reduction in crashes – and their severity – across the entire network[1], and this effect could not be attributed to the Western Highway upgrade itself.

The correct way of estimating crash savings is to extract statistics by road type and compare the difference between the existing 2-lane road and the proposed 4-lane divided road, with the latter based on evidence of similar types of road elsewhere. Any future trends in road safety (for example, due to network-wide initiatives) could then be applied to both the project and no-project cases.

Further research would be needed to establish this more precisely, but a more reasonable assumption at the time could have been that the new road would be 10% safer than the old one (as opposed to 30% assumed by GHD), and that the entire network would see a 30% reduction in crashes by 2025. If so, the project crash benefits would go down by 53%.

A detailed review of the Western Highway's crash history is documented in Section 3.

### *2.6.5 Externalities*

The externality values used in the 2012 cost-benefit analysis have not changed much since then. They cover greenhouse gas emissions, noise and air pollution from the project, which were assessed as being very small.

After decades of inaction on emissions, including carbon pricing, it ought to be time to review the imputed value of carbon emissions. However, apart from emissions produced during construction, the Western Highway upgrade probably won't (of itself) make much difference to future emissions. Broader trends, such as eliminating fossil fuelled vehicles, will be the main influence.

### *2.6.6 Overall effects*

Table 3 summarises the overall effects of the changes discussed above, for route Option 1 (which was the route finally chosen, following the EES panel recommendations). The effect would be to reduce the benefit-cost ratio from 0.54 to 0.47. If the discount rate had been 7% instead of 4.4%, the benefit-cost ratio would be 0.32.

The effect on the cost-benefit analysis for Options 2 and 3 has not been calculated herein, but they would be proportionally similar.

[1] In any case, the targeted 30% reduction by 2017 was highly optimistic.
According to CrashStats, state-wide injury crashes went down by only 4% from 2012 to 2017, and the severity of crashes (measured by human capital cost – see Section 3 herein) went down by 8%.
Furthermore, between 2017 and 2024, the incidence of crashes went down another 4%, and severity another 5%.

***Table 3: Effect of revised assumptions on benefit-cost ratio***

| Item | GHD Option 1 | Adjusted results using revised assumptions | |
|---|---|---|---|
| | | 4.4% discount rate (as GHD original) | 7% discount rate (Vic Treasury spec) |
| Vehicle operating cost savings | $87M | $54M | $40M |
| Travel time savings | $46M | $50M | $33M |
| Crash cost savings | $9M | $6M | $4M |
| Externalities* | $0M* | $0M* | $0M* |
| Residual value | $32M | $29M | $13M |
| **Present value of benefits** | **$174M** | **$139M** | **$89M** |
| Capital cost | $314M | $283M | $268M |
| Maintenance cost | $9M | $9M | $6M |
| **Present value of costs** | **$323M** | **$292M** | **$274M** |
| **Benefit cost ratio** | **0.54** | **0.47** | **0.32** |
| **Net present value** | **-$149M** | **-$154M** | **-$185M** |

** Externalities are very small (less than $100,000 in present value terms), so are rounded off to zero in the above.*

### *2.6.7 Other issues*

In addition to the user benefits, the appraisal quantified:

- construction employment and flow-on effects;
- effects on businesses and industries downstream from the project;
- values of freight and connectivity, and
- impacts on the grain harvest.

No allowance was made (beyond land acquisition costs) for effects like land severance, loss of habitat, loss of vegetation/biomass and the social/cultural value of land and items lost.

The latest (ATAP) guidance says the following:

*'If, after using the default values, some externalities are of sufficient magnitude to make a significant difference to the summary results of the CBA, then - as part of a detailed CBA - consider undertaking modelling or survey work to identify externalities specific to the impacts of the initiative being appraised.*

*The first step will be to estimate the quantities of the externalities in physical terms for the Base and Project Cases.*

*The second step is to value the externalities. When valuing an externality, the aim is to find out how much the affected people are willing to pay to avoid the externality, or how much they are willing to accept to put up with it. Techniques to do this include hedonic pricing, stated preference surveys, and estimation of mitigation costs or damage and avoidance costs.'*

*Source: ATAP T2 Cost Benefit Analysis, May 2018*

Given the significant concerns raised by stakeholders, in particular relative to the cultural significance of trees affected by the road upgrade, it could be argued that efforts should have been made to value them in economic terms using the above principles.

Even with the optimistic and erroneous assumptions discussed herein, the project does not return a positive economic benefit (its costs are substantially higher than its benefits). If its impact on cultural values was recognised and properly accounted for, it would necessarily reflect the strength of the community's concerns (because the method of valuation involves consulting affected people). It is reasonable to expect that this would produce further large disbenefits, thus worsening the already poor economic performance of the project.

# 3 Road crash history analysis – updated throughout

## 3.1 Summary findings

This section provides an updated analysis of 25 years (2000 to 2024) of road crash data for the Western Highway and Freeway, from the Deer Park Bypass to the South Australian border, with a focus on the Beaufort-Buangor-Ararat sections.

**NOTE**

Crashstats data used for this analysis is available online. It is updated monthly, but with a lag of 7 months. For this update the data was downloaded in October 2025, and it contains crashes up to 28 February 2025.

In general, the updated data doesn't change the key messages of my 2020 report. There have been a couple of fatalities on the Buangor to Ararat section (in 2024 and 2025 – the latter is not yet in the Crashstats database) which have been cited by proponents as increasing the need for the upgrade.

However, the updated data still shows that:

- The Buangor to Ararat section is still one of the safer sections of the road; and
- There is no clear evidence that the recently-upgraded sections are safer than they were before upgrading.

Key findings from the analysis are summarised as follows:

- Overall, the 5-year rolling average crash rate (injury accidents per million vehicle-kilometres) for the Western Freeway/Highway route[2] is low (0.06), at 27% of the Victorian average (0.23). This means that there are many roads in the State that are much more dangerous than the Western Highway.
- The Buangor to Ararat section has a crash rate 36% of the Victorian average, and 47% of that for Regional Victoria.
- From 2000 to 2024, there were 15 fatalities on the Highway between Beaufort and Ararat. However, only five of these occurred between Buangor and Ararat. The rest were on the Beaufort to Buangor section, including three lives lost since it was upgraded to a dual carriageway in April 2016.
- Three of the lives lost between Buangor and Ararat were in two separate head-on crashes in 2002, about 0.5km south-east of Ararat. There were no road deaths on the Buangor to Ararat section for 18 years. In 2021 another driver was killed running off the road in the same location, and in 2024 there was a fatality in a head-on crash. This was at the junction of Hillside Road, Buangor, just west of bridge over the railway.
- Compared to the Highway section as a whole, the Buangor to Ararat section has a higher proportion of single-vehicle crashes (37% compared to 28%), slightly higher crashes with fixed objects (31% compared with 29%), and slightly more crashes involving heavy commercial vehicles (17% compared to 15%).

If the safety of the Buangor to Ararat section is a high priority (and the data suggests that is questionable), it could be improved substantially by low-cost solutions such as lowering the speed

[2] That is, the entire route from Deer Park to the Vic/SA border.

limit, installing wire rope safety barriers and upgrading the road markings. It is a straight and relatively flat section of road. An 80km/h speed limit would increase travel times over the 16.8km section by only 2.5 minutes.

Subject to further research, there are probably several examples of regional roads, with similar traffic volumes to the Buangor-Ararat section of Western Highway, where speed reductions and safety barrier treatments have been implemented in recent years; it is an important element of the State Government's road safety strategy.

## 3.2 Data used

### *3.2.1 Crash data*

Road crash data files were downloaded from VicRoads' website on 29 October 2020, and again on 30 October 2025. There are two sets of data; one for 2000-2005 and the other for 2006-2025.

The data files were combined to produce continuous data from 1 January 2000 to 26 February 2025. Because of their incompleteness, 2025 results have been ignored, leaving the full 25 years from 2000 to 2024 for analysis.

The incidents recorded in this dataset are personal injury accidents (PIAs); incidents involving property damage only are not included (the vast majority of these are not reported to the police and are thus unknown).

VicRoads' *Crashstats User Guide (2013)* states that:

*The CrashStats database contains statistics of road traffic accidents which were reported to the police and which met the following conditions:*

- *That the accident occurred from the calendar year 1987 onwards.*
- *That the accident resulted in:*
    - *The death of any person within thirty days of the accident.*
    - *Personal injury as identified by the police officers completing the accident report.*
- *That the accident occurred on any road, street, thoroughfare, footpath, railway level crossing, or any place open to the public.*
- *That the accident involved one or more road vehicles which, at the time of the accident were in motion, including motor cars, station wagons, utilities, panel vans, motor cycles, trucks, buses, trams and railway vehicles, pedal cyclists and ridden animals.*

### *3.2.2 Traffic data*

Traffic flow data was downloaded from data.vic.gov.au on 10 August 2025. It is a GIS file containing summary traffic flows for all state-controlled roads in Victoria, in the form of annual average daily traffic (AADT) flows and commercial vehicle traffic flows for every year between 2001 to 2019. Trend-based extrapolations were made for previous and later years to provide yearly estimates for 2000 to 2024 (to match the available full calendar years in the crash data).

Crash and traffic data for the Western Highway and Western Freeway were extracted from this data and reviewed. In particular, crash location coordinates and road chainages were carefully checked to ensure that they were correct and internally consistent.

**NOTE**

For this 2025 update, all of the crash data was reviewed again for correctness. Because of this, and the fact that successive updates of crash data often alter records from earlier years as well, there may be slight differences between this report and the 2020 version.

## 3.3 Analysis

The route was divided up into 38 segments, between major intersections on the Freeway and between towns and through major towns separately along the Highway. These segments were then summarised into longer sections for simplification, as shown in Table 4. The summary sections maintained the detail of the segments from Beaufort to Ararat, the focus of this review.

Analysis comprised several different components:

1. **Traffic flow** data was reviewed and summarised along the route.
2. **Crash rates** (crashes per vehicle-km) was calculated to explore their distribution.
3. **Crash severity** was explored by analysing human consequences (fatalities and injuries).
4. **Crash causation** factors were analysed to explore any notable patterns.

At the end of this note, conclusions are drawn from the analysis findings.

### *Table 4: Western Freeway/Highway – segments for crash analysis*

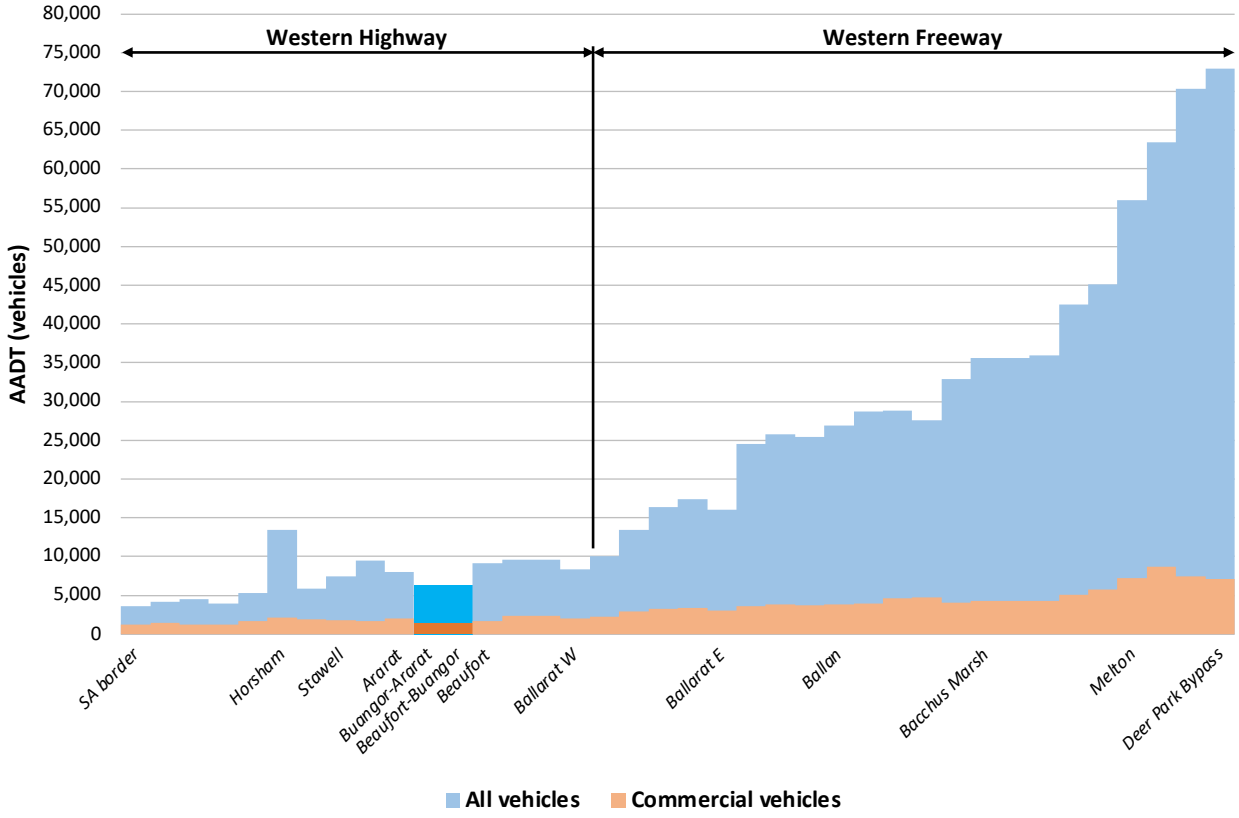
| Road | Segments No | From | To | km | Code* | Summary sections | km |
|---|---|---|---|---|---|---|---|
| **Western Fwy** | 1 | Deer Park Bypass | Hopkins Rd | 4.0 | F | | |
| | 2 | Hopkins Rd | Leakes Rd | 5.0 | F | | |
| | 3 | Leakes Rd | Melton Hwy | 5.3 | F | | |
| | 4 | Melton Hwy | Coburns Rd | 3.3 | F | | |
| | 5 | Coburns Rd | Hopetoun Park Rd | 5.9 | F | | |
| | 6 | Hopetoun Park Rd | Bacchus Marsh Rd | 1.9 | F | | |
| | 7 | Bacchus Marsh Rd | Gisborne Rd | 4.9 | F | | |
| | 8 | Gisborne Rd | Halletts Way | 1.4 | F | | |
| | 9 | Halletts Way | Bacchus Marsh Rd | 0.7 | F | | |
| | 10 | Bacchus Marsh Rd | Mortons Rd | 2.6 | F | | |
| | 11 | Mortons Rd | Pentland Hills Rd | 2.9 | F | Deer Pk BP-Fwy end | 96.7 |
| | 12 | Pentland Hills Rd | Greendale-Myrniong Rd | 6.4 | F | | |
| | 13 | Greendale-Myrniong Rd | Old Melbourne Rd | 5.7 | F | | |
| | 14 | Old Melbourne Rd | Ballan-Daylesford Rd | 5.2 | F | | |
| | 15 | Ballan-Daylesford Rd | Moorabool W Rd | 9.7 | F | | |
| | 16 | Moorabool W Rd | Forbes Rd | 13.2 | F | | |
| | 17 | Forbes Rd | Ballarat-Burrumbeet Rd | 3.5 | F | | |
| | 18 | Ballarat-Burrumbeet Rd | Daylesford Rd | 1.7 | F | | |
| | 19 | Daylesford Rd | Midland Hwy | 6.7 | F | | |
| | 20 | Midland Hwy | Gillies Street | 1.6 | F | | |
| | 21 | Gillies Street | Learmonth Rd | 2.2 | F | | |
| | 22 | Learmonth Rd | Sunraysia Hwy | 2.7 | F | | |
| **Western Hwy** | 23 | Sunraysia Hwy | Remembrance Dr | 10.1 | D | Fwy-Dual cway end | 31.7 |
| | 24 | Remembrance Dr | Dual cway end | 21.6 | D | | |
| | 25 | Dual cway end | Beaufort E 60 sign | 3.7 | S | Dual end-Beaufort | 7.1 |
| | 26 | Beaufort E 60 sign | Beaufort W 60 sign | 3.4 | U | | |
| | **27** | **Beaufort W 60 sign** | **Buangor (2016 upgrade)** | **23.0** | D | **Beaufort-Buangor** | **23.0** |
| | **28** | **Buangor (2016 upgrade)** | **Ararat E 80 sign** | **16.9** | S | **Buangor-Ararat** | **16.9** |
| | 29 | Ararat E 80 sign | Ararat W 80 sign | 6.1 | U | Through Ararat | 6.1 |
| | 30 | Ararat W 80 sign | Stawell E 80 sign | 23.8 | S | Ararat-Stawell | 23.8 |
| | 31 | Stawell E 80 sign | Stawell W 80 sign | 3.8 | U | | |
| | 32 | Stawell W 80 sign | Horsham E 80 sign | 67.5 | S | | |
| | 33 | Horsham E 80 sign | Horsham W 80 sign | 4.5 | U | | |
| | 34 | Horsham W 80 sign | Pimpinio | 8.5 | S | Stawell-SA border | 205.2 |
| | 35 | Pimpinio | Dimboola | 19.1 | S | | |
| | 36 | Dimboola | Nhill | 37.9 | S | | |
| | 37 | Nhill | Kaniva | 39.5 | S | | |
| | 38 | Kaniva | SA border | 24.4 | S | | |
| **Total length (km)** | | | | **410.4** | | | **410.4** |

** F = Freeway, D = dual carriageway, S = single carriageway, U = urban highway*

## 3.4 Traffic flow

Estimated daily 2024 annual average daily traffic (AADT) flows on each segment along the route are shown in Figure 1 (total traffic and commercial vehicles).

***Figure 1: 2024 average daily traffic***




This clearly shows how the traffic levels reduce considerably west of Melbourne, and again west of Ballarat. It also shows that commercial vehicle traffic levels do not go down by the same amount as all traffic. The proportion of commercial vehicles in the traffic increases steadily, from about 10% at Deer Park Bypass to 21% at Buangor, and 34% at the SA border.

Local traffic adds noticeably to through traffic in Ararat, Stawell and Horsham. This affects all vehicles more than commercial vehicles.

## 3.5 Crash rates

The usual measure of the road crash rate is the number of PIAs per million vehicle-kilometres (PIA/Mvkm). This enables comparison of the overall safety performance of different road segments with varying traffic levels and lengths, over suitable time periods.

Crash rates have been calculated for every year from 2001 to 2019. From this, rolling 5-year averages were calculated for each summary road segment, from 2005-2019.

Overall rolling 5-year averages for Greater Melbourne and Victoria were also calculated for comparison, using total annual vehicle-km travelled from *Australian Infrastructure Statistics Yearbook 2019* by the Bureau of Infrastructure and Transport Research Economics (BITRE).

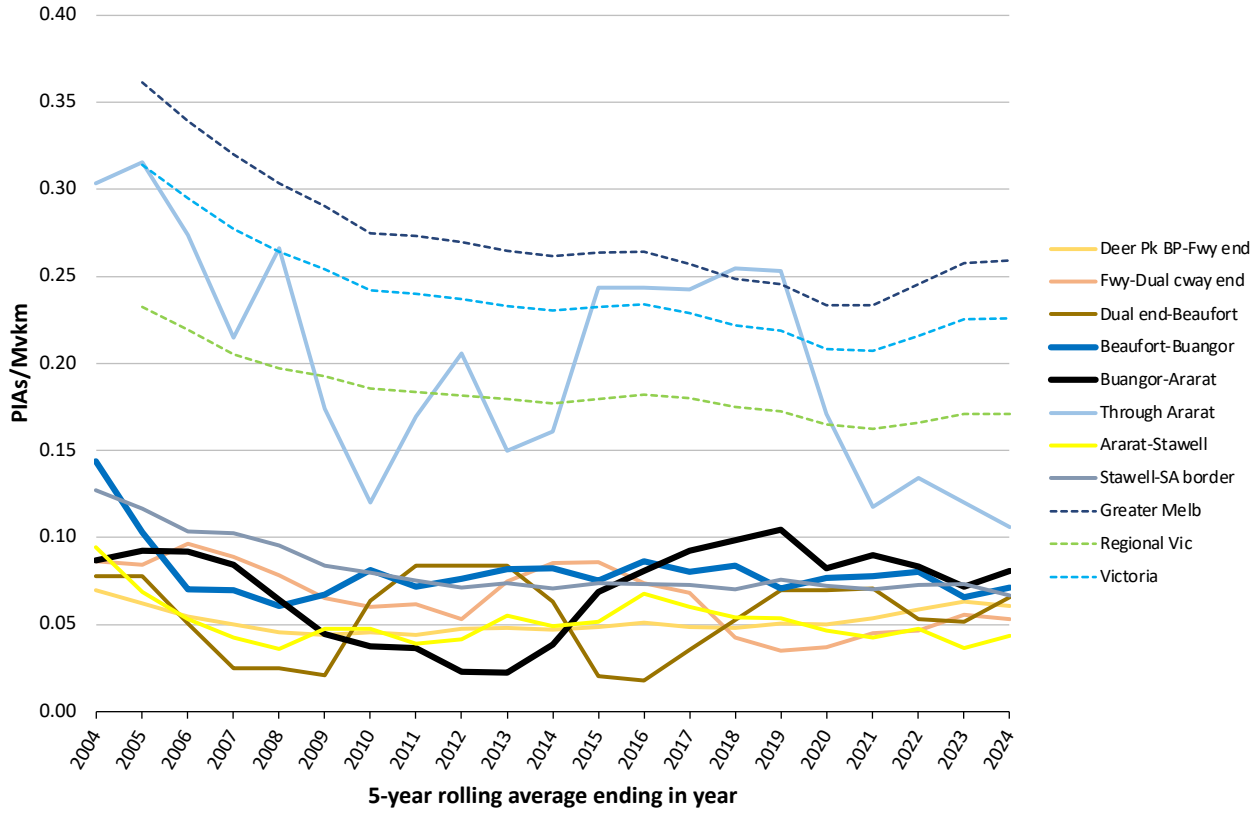
Results are shown in Table 5 and Figure 2.

## *Table 5: Crash rates*

| Road | Summary sections | Length (km) | 5-year rolling average PIA/Mvkm | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
| **Western Fwy** | Deer Pk BP-Fwy end | 97 | 0.07 | 0.06 | 0.05 | 0.05 | 0.05 | 0.04 | 0.05 | 0.04 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.06 | 0.06 | 0.06 |
| **Western Hwy** | Fwy-Dual cway end | 32 | 0.09 | 0.08 | 0.10 | 0.09 | 0.08 | 0.07 | 0.06 | 0.06 | 0.05 | 0.07 | 0.09 | 0.09 | 0.07 | 0.07 | 0.04 | 0.03 | 0.04 | 0.04 | 0.05 | 0.06 | 0.05 |
| | Dual end-Beaufort | 4 | 0.08 | 0.08 | 0.05 | 0.02 | 0.02 | 0.02 | 0.06 | 0.08 | 0.08 | 0.08 | 0.06 | 0.02 | 0.02 | 0.04 | 0.05 | 0.07 | 0.07 | 0.07 | 0.05 | 0.05 | 0.07 |
| | **Beaufort-Buangor** | **26** | **0.14** | **0.10** | **0.07** | **0.07** | **0.06** | **0.07** | **0.08** | **0.07** | **0.08** | **0.08** | **0.08** | **0.08** | **0.09** | **0.08** | **0.08** | **0.07** | **0.08** | **0.08** | **0.08** | **0.07** | **0.07** |
| | **Buangor-Ararat** | **17** | **0.09** | **0.09** | **0.09** | **0.08** | **0.06** | **0.04** | **0.04** | **0.04** | **0.02** | **0.02** | **0.04** | **0.07** | **0.08** | **0.09** | **0.10** | **0.10** | **0.08** | **0.09** | **0.08** | **0.07** | **0.08** |
| | Through Ararat | 6 | 0.30 | 0.32 | 0.27 | 0.21 | 0.27 | 0.17 | 0.12 | 0.17 | 0.21 | 0.15 | 0.16 | 0.24 | 0.24 | 0.24 | 0.25 | 0.25 | 0.17 | 0.12 | 0.13 | 0.12 | 0.11 |
| | Ararat-Stawell | 24 | 0.09 | 0.07 | 0.05 | 0.04 | 0.04 | 0.05 | 0.05 | 0.04 | 0.04 | 0.05 | 0.05 | 0.05 | 0.07 | 0.06 | 0.05 | 0.05 | 0.05 | 0.04 | 0.05 | 0.04 | 0.04 |
| | Stawell-SA border | 205 | 0.13 | 0.12 | 0.10 | 0.10 | 0.10 | 0.08 | 0.08 | 0.08 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.08 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 |
| **Total route** | | 410 | 0.09 | 0.08 | 0.07 | 0.07 | 0.06 | 0.06 | 0.06 | 0.05 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 |
| **Western Hwy road types** | Rural dual cway | 55 | 0.10 | 0.08 | 0.08 | 0.08 | 0.07 | 0.06 | 0.07 | 0.06 | 0.06 | 0.08 | 0.09 | 0.08 | 0.08 | 0.07 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.06 | 0.05 |
| | Rural single cway | 241 | 0.09 | 0.08 | 0.07 | 0.06 | 0.06 | 0.06 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 |
| | Urban | 18 | 0.49 | 0.45 | 0.37 | 0.36 | 0.34 | 0.28 | 0.27 | 0.27 | 0.25 | 0.23 | 0.25 | 0.27 | 0.28 | 0.29 | 0.29 | 0.29 | 0.25 | 0.23 | 0.25 | 0.25 | 0.22 |
| **For comparison** | Greater Melb | | | 0.36 | 0.34 | 0.32 | 0.30 | 0.29 | 0.27 | 0.27 | 0.27 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.25 | 0.25 | 0.23 | 0.23 | 0.25 | 0.26 | 0.26 |
| | Regional Vic | | | 0.23 | 0.22 | 0.21 | 0.20 | 0.19 | 0.19 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.17 | 0.16 | 0.16 | 0.17 | 0.17 | 0.17 |
| | Victoria | | | 0.31 | 0.29 | 0.28 | 0.26 | 0.25 | 0.24 | 0.24 | 0.24 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.22 | 0.22 | 0.21 | 0.21 | 0.22 | 0.23 | 0.23 |

Shows sections after improvement

## *Figure 2: Crash rates*




Firstly, it is important to note that, despite using a 5-year rolling average, the shortest sections in the analysis (from the end of the Freeway through to the west side of Ararat) have much more year-to-year variability than the longer sections. This is a common feature of crash analysis and emphasises the inherent underlying randomness of crash events, as well as their low occurrence relative to traffic flow.

As can be seen, the Western Freeway/Highway (apart from the section through Ararat) has significantly lower crash rates than the averages for Greater Melbourne and Regional Victoria as a whole.

The section through Ararat has the highest average crash rate (0.11 PIAs/Mvkm) in the 5 years up to 2024, and the Buangor to Ararat section has the second highest (0.08). Both sections have also seen increases in average crash occurrences since 2013 or earlier. The crash rate through Ararat has gone down considerably since 2019.

It is also noteworthy that the Buangor to Ararat section had very low crash rates through the early 2010s, compared to the other sections.

It is also noteworthy that the sections that were improved between 2013 and 2016 (shaded light blue in Table 5 and subsequent tables) do not show any appreciable improvement in crash rates. **This suggests that the dualling projects have not resulted in demonstrable safety improvements, and brings into question the assumed future 30% reduction in crash rates in the economic appraisal, as discussed in Section 2.**

## 3.6 Crash severity

Table 6 to Table 9 list the number of crashes, fatalities and personal injuries (serious and other) for every year from 2000 to 2019.

### *Table 6: Total injury crashes*

| Road | Summary sections | Personal injury accidents (PIAs) | | | | | | | | | | | | | | | | | | | | | | | | 25yr total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | |
| **Western Fwy** | Deer Pk BP-Fwy end | 52 | 55 | 38 | 45 | 39 | 35 | 37 | 26 | 33 | 37 | 46 | 39 | 46 | 39 | 40 | 64 | 57 | 41 | 42 | 59 | 53 | 71 | 74 | 74 | 48 | 1190 |
| **Western Hwy** | Fwy-Dual cway end | 5 | 2 | 8 | 5 | 6 | 5 | 6 | 6 | 2 | 2 | 4 | 8 | 4 | 10 | 7 | 5 | 4 | 2 | 1 | 4 | 5 | 7 | 3 | 6 | 3 | 120 |
| | Dual end-Beaufort | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 2 | 15 |
| | **Beaufort-Buangor** | **10** | **11** | **3** | **5** | **4** | **1** | **4** | **3** | **3** | **6** | **5** | **2** | **5** | **5** | **7** | **3** | **5** | **3** | **6** | **3** | **4** | **5** | **4** | **2** | **5** | **114** |
| | **Buangor-Ararat** | **1** | **1** | **4** | **4** | **3** | **2** | **1** | **3** | **1** | **0** | **1** | **1** | **1** | **1** | **3** | **6** | **3** | **3** | **2** | **4** | **2** | **4** | **2** | **0** | **6** | **59** |
| | Through Ararat | 2 | 3 | 4 | 1 | 6 | 3 | 1 | 1 | 4 | 1 | 0 | 5 | 4 | 1 | 2 | 6 | 5 | 4 | 2 | 2 | 0 | 1 | 6 | 1 | 1 | 66 |
| | Ararat-Stawell | 9 | 6 | 5 | 4 | 0 | 3 | 2 | 2 | 2 | 3 | 3 | 0 | 3 | 6 | 2 | 5 | 6 | 1 | 6 | 2 | 2 | 4 | 3 | 2 | 5 | 86 |
| | Stawell-SA border | 37 | 42 | 24 | 31 | 35 | 27 | 28 | 24 | 23 | 21 | 23 | 25 | 20 | 28 | 17 | 29 | 25 | 20 | 27 | 29 | 19 | 20 | 26 | 29 | 19 | 648 |
| **Total** | | 116 | 121 | 87 | 95 | 94 | 76 | 79 | 65 | 68 | 71 | 84 | 81 | 83 | 90 | 78 | 118 | 106 | 75 | 87 | 104 | 85 | 113 | 118 | 115 | 89 | 2298 |

### *Table 7: Fatalities*

| Road | Summary sections | Fatalities | | | | | | | | | | | | | | | | | | | | | | | | 25yr total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | |
| **Western Fwy** | Deer Pk BP-Fwy end | 1 | 4 | 5 | 1 | 5 | 3 | 3 | 1 | 1 | 1 | 2 | 0 | 1 | 4 | 1 | 2 | 4 | 1 | 2 | 4 | 2 | 1 | 4 | 0 | 3 | 56 |
| **Western Hwy** | Fwy-Dual cway end | 2 | 0 | 1 | 1 | 1 | 0 | 1 | 2 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 16 |
| | Dual end-Beaufort | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | **Beaufort-Buangor** | **0** | **2** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **4** | **0** | **0** | **0** | **0** | **0** | **1** | **2** | **1** | **0** | **0** | **0** | **0** | **0** | **0** | **10** |
| | **Buangor-Ararat** | **0** | **0** | **3** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **1** | **0** | **0** | **1** | **5** |
| | Through Ararat | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 4 |
| | Ararat-Stawell | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 12 |
| | Stawell-SA border | 8 | 2 | 1 | 8 | 7 | 2 | 3 | 1 | 2 | 1 | 1 | 3 | 0 | 3 | 1 | 2 | 1 | 0 | 0 | 2 | 2 | 8 | 1 | 1 | 0 | 60 |
| **Total** | | 13 | 9 | 13 | 10 | 14 | 5 | 7 | 4 | 3 | 2 | 7 | 7 | 1 | 10 | 2 | 5 | 9 | 3 | 3 | 8 | 5 | 11 | 6 | 1 | 5 | 163 |

### *Table 8: Serious person-injuries*

| Road | Summary sections | Serious person-injuries | | | | | | | | | | | | | | | | | | | | | | | | 25yr total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | |
| **Western Fwy** | Deer Pk BP-Fwy end | 33 | 31 | 24 | 25 | 14 | 21 | 22 | 27 | 20 | 28 | 23 | 31 | 28 | 21 | 11 | 40 | 36 | 21 | 30 | 32 | 21 | 28 | 52 | 30 | 18 | 667 |
| **Western Hwy** | Fwy-Dual cway end | 3 | 3 | 5 | 1 | 6 | 6 | 4 | 5 | 3 | 1 | 8 | 5 | 2 | 4 | 2 | 2 | 3 | 1 | 1 | 3 | 5 | 4 | 4 | 3 | 4 | 88 |
| | Dual end-Beaufort | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 2 | 11 |
| | **Beaufort-Buangor** | **8** | **7** | **4** | **6** | **2** | **0** | **5** | **2** | **4** | **5** | **3** | **1** | **5** | **3** | **7** | **1** | **3** | **0** | **3** | **2** | **1** | **0** | **2** | **0** | **1** | **75** |
| | **Buangor-Ararat** | **0** | **0** | **5** | **2** | **2** | **1** | **1** | **2** | **1** | **0** | **0** | **1** | **0** | **0** | **0** | **10** | **2** | **2** | **1** | **4** | **1** | **4** | **2** | **0** | **4** | **45** |
| | Through Ararat | 1 | 3 | 4 | 0 | 2 | 2 | 0 | 0 | 2 | 1 | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 2 | 0 | 0 | 23 |
| | Ararat-Stawell | 10 | 11 | 2 | 2 | 0 | 0 | 3 | 0 | 2 | 1 | 0 | 0 | 2 | 3 | 3 | 1 | 4 | 0 | 5 | 3 | 1 | 2 | 2 | 2 | 1 | 60 |
| | Stawell-SA border | 18 | 28 | 15 | 18 | 23 | 15 | 23 | 17 | 16 | 12 | 8 | 8 | 12 | 10 | 11 | 19 | 10 | 7 | 21 | 26 | 10 | 17 | 16 | 14 | 11 | 385 |
| **Total** | | 73 | 83 | 60 | 54 | 49 | 45 | 58 | 53 | 48 | 49 | 42 | 48 | 51 | 42 | 34 | 73 | 60 | 32 | 65 | 70 | 39 | 56 | 80 | 49 | 41 | 1354 |

### *Table 9: Other person-injuries*

| Road | Summary sections | Other person-injuries | | | | | | | | | | | | | | | | | | | | | | | | 25yr total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | |
| **Western Fwy** | Deer Pk BP-Fwy end | 53 | 52 | 35 | 34 | 37 | 37 | 26 | 12 | 26 | 33 | 40 | 29 | 41 | 33 | 40 | 63 | 56 | 31 | 36 | 54 | 45 | 68 | 84 | 69 | 41 | 1075 |
| **Western Hwy** | Fwy-Dual cway end | 4 | 0 | 9 | 5 | 10 | 4 | 4 | 6 | 4 | 3 | 2 | 9 | 3 | 17 | 8 | 5 | 1 | 2 | 0 | 10 | 4 | 8 | 0 | 6 | 1 | 125 |
| | Dual end-Beaufort | 0 | 1 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 1 | 0 | 2 | 1 | 14 |
| | **Beaufort-Buangor** | **14** | **8** | **0** | **2** | **3** | **1** | **1** | **1** | **10** | **3** | **4** | **1** | **5** | **6** | **9** | **2** | **4** | **3** | **9** | **1** | **4** | **6** | **4** | **3** | **4** | **108** |
| | **Buangor-Ararat** | **2** | **2** | **1** | **3** | **4** | **1** | **0** | **1** | **1** | **0** | **1** | **0** | **1** | **1** | **3** | **6** | **4** | **2** | **2** | **3** | **2** | **1** | **0** | **0** | **4** | **45** |
| | Through Ararat | 1 | 0 | 2 | 1 | 6 | 3 | 1 | 1 | 2 | 0 | 0 | 4 | 3 | 0 | 2 | 9 | 10 | 4 | 2 | 1 | 0 | 0 | 6 | 1 | 1 | 60 |
| | Ararat-Stawell | 8 | 5 | 5 | 3 | 0 | 4 | 1 | 3 | 1 | 2 | 4 | 0 | 1 | 4 | 2 | 4 | 6 | 1 | 6 | 2 | 2 | 2 | 1 | 3 | 6 | 76 |
| | Stawell-SA border | 40 | 28 | 22 | 22 | 24 | 25 | 19 | 21 | 20 | 19 | 27 | 21 | 17 | 34 | 27 | 34 | 27 | 28 | 21 | 64 | 16 | 20 | 21 | 26 | 13 | 636 |
| **Total** | | 122 | 96 | 74 | 70 | 88 | 75 | 52 | 45 | 64 | 60 | 80 | 64 | 71 | 95 | 91 | 123 | 110 | 71 | 76 | 136 | 73 | 106 | 116 | 110 | 71 | 2139 |

As already noted with crash rates, the inherent randomness of crash occurrences affects the shortest road sections most. This randomness also affects the distribution of fatalities more than injuries.

Some key observations can be made from this data regarding the Beaufort-Buangor and Buangor-Ararat sections:

- There were 10 fatalities from Beaufort to Buangor. Four of these have occurred in the nine years since the April 2016 upgrade.
- There have been 5 fatalities from Buangor to Ararat in 25 years; there were none between 2002 and 2020 (18 years). According to the detailed information, four of these lives were lost in three separate crashes which occurred at almost the same location, 400-500m south-east of the Heath Street intersection. This is a short distance from the 80km/h speed signs just outside Ararat. All involved head-on vehicle collisions. Only one death has occurred (in 2024) in the contentious section of the route, further east.
- Excluding fatalities, there were 111 person-injuries in 64 crashes from Beaufort to Buangor (1.7 injuries per crash), and 70 person-injuries in 47 crashes from Buangor to Ararat (1.5 injuries per crash).

A reasonably consistent measure of crash severity is possible by using the Australian Transport Appraisal and Planning (ATAP) guidance values to attach a 'human capital' value to each crash, based on the number of fatalities, serious and other injuries in each crash.

The ATAP guidance (Part PV2, Table 13) assigns total human capital costs of $2.885M per fatality, $0.707M per serious injury and $0.026M per other injury, all per person and updated to June 2025 prices. These costs include human costs (e.g. medical, lost labour), vehicle costs (e.g. repairs, insurance) and general costs (e.g. emergency services, traffic delays).

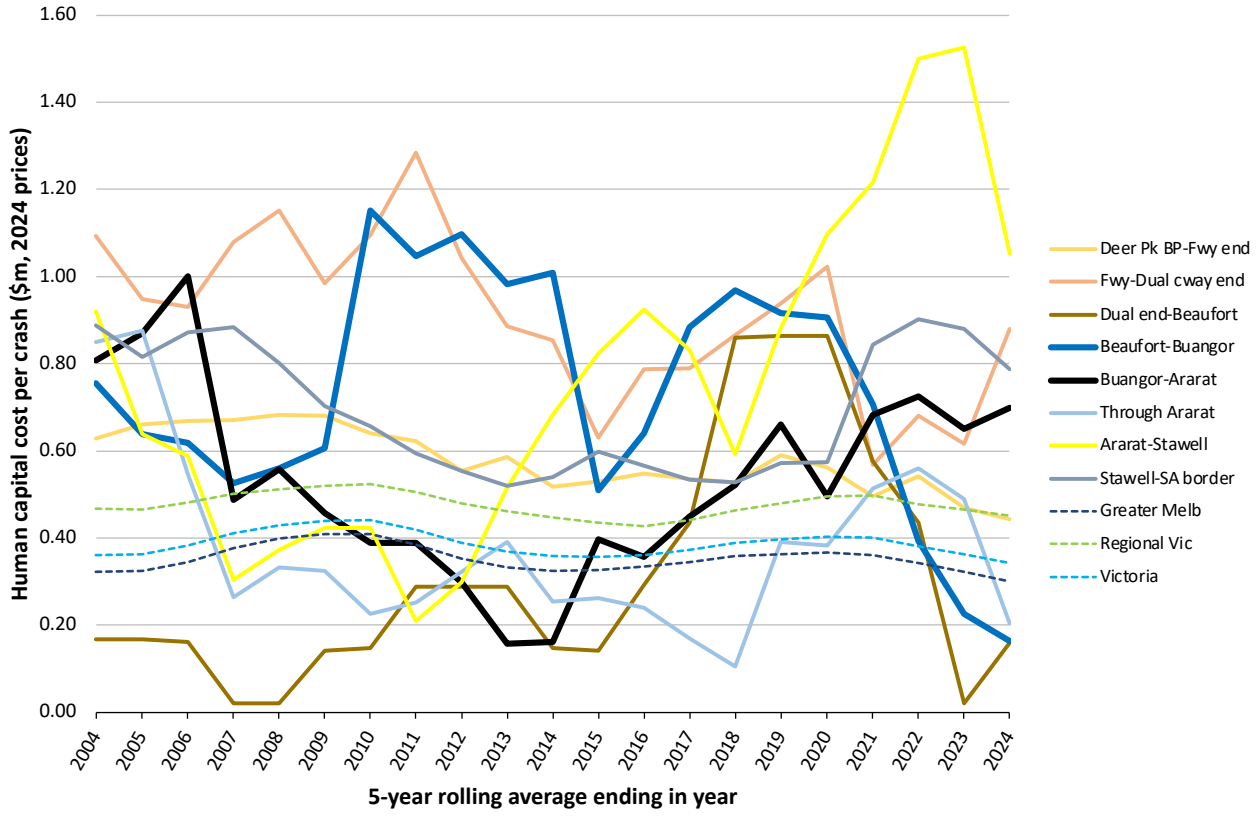
Assigning these values gives the human capital costs per crash as given in Table 10 and Figure 3 (5-year rolling average annual costs).

Note that there many-fold more injuries than fatalities on the roads. The total human capital cost of crashes in Victoria was $1.7 billion in 2024, of which 75% was due to injuries. This shows why concentrating on fatalities alone is extremely misleading when it comes to determining strategies to reduce the human cost of road casualties. Fatalities are far fewer in number than serious injuries, and they are inherently random in their occurrence. However, it is evident every day that fatalities are much viewed as much worse; they make regular headlines, and many road safety initiatives only take place in response to fatalities. This therefore ignores the vast majority of human capital costs which are incurred through injuries and their often life-changing consequences.

### *Table 10: Human capital costs per crash (as an indicator of crash severity)*

| Road | Summary sections | Length (km) | 5-year rolling average HC crash values (2019 $M per crash) | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
| **Western Fwy** | Deer Pk BP-Fwy end | 97 | 0.63 | 0.66 | 0.67 | 0.67 | 0.68 | 0.68 | 0.64 | 0.62 | 0.55 | 0.59 | 0.52 | 0.53 | 0.55 | 0.54 | 0.53 | 0.59 | 0.56 | 0.50 | 0.54 | 0.47 | 0.44 |
| **Western Hwy** | Fwy-Dual cway end | 32 | 1.09 | 0.95 | 0.93 | 1.08 | 1.15 | 0.98 | 1.10 | 1.28 | 1.04 | 0.89 | 0.85 | 0.63 | 0.79 | 0.79 | 0.87 | 0.94 | 1.02 | 0.57 | 0.68 | 0.62 | 0.88 |
| | Dual end-Beaufort | 4 | 0.17 | 0.17 | 0.16 | 0.02 | 0.02 | 0.14 | 0.15 | 0.29 | 0.29 | 0.29 | 0.15 | 0.14 | 0.29 | 0.43 | 0.86 | 0.86 | 0.86 | 0.58 | 0.43 | 0.02 | 0.16 |
| | **Beaufort-Buangor** | **26** | **0.75** | **0.64** | **0.62** | **0.53** | **0.56** | **0.61** | **1.15** | **1.05** | **1.10** | **0.98** | **1.01** | **0.51** | **0.64** | **0.88** | **0.97** | **0.92** | **0.91** | **0.71** | **0.39** | **0.23** | **0.16** |
| | **Buangor-Ararat** | **17** | **0.81** | **0.87** | **1.00** | **0.49** | **0.56** | **0.46** | **0.39** | **0.39** | **0.30** | **0.16** | **0.16** | **0.40** | **0.36** | **0.45** | **0.52** | **0.66** | **0.50** | **0.68** | **0.73** | **0.65** | **0.70** |
| | Through Ararat | 6 | 0.85 | 0.88 | 0.55 | 0.26 | 0.33 | 0.32 | 0.23 | 0.25 | 0.32 | 0.39 | 0.25 | 0.26 | 0.24 | 0.17 | 0.10 | 0.39 | 0.38 | 0.51 | 0.56 | 0.49 | 0.20 |
| | Ararat-Stawell | 24 | 0.92 | 0.64 | 0.59 | 0.30 | 0.37 | 0.42 | 0.42 | 0.21 | 0.30 | 0.52 | 0.68 | 0.82 | 0.92 | 0.83 | 0.59 | 0.88 | 1.10 | 1.22 | 1.50 | 1.53 | 1.05 |
| | Stawell-SA border | 205 | 0.89 | 0.82 | 0.87 | 0.88 | 0.80 | 0.70 | 0.66 | 0.59 | 0.55 | 0.52 | 0.54 | 0.60 | 0.57 | 0.53 | 0.53 | 0.57 | 0.57 | 0.84 | 0.90 | 0.88 | 0.79 |
| **Total** | | 410 | 0.80 | 0.77 | 0.78 | 0.75 | 0.73 | 0.69 | 0.68 | 0.66 | 0.61 | 0.61 | 0.58 | 0.57 | 0.57 | 0.56 | 0.55 | 0.62 | 0.60 | 0.60 | 0.64 | 0.58 | 0.54 |
| **For comparison** | Greater Melb | | 0.32 | 0.32 | 0.35 | 0.38 | 0.40 | 0.41 | 0.41 | 0.39 | 0.35 | 0.33 | 0.32 | 0.33 | 0.33 | 0.34 | 0.36 | 0.36 | 0.37 | 0.36 | 0.34 | 0.32 | 0.30 |
| | Regional Vic | | 0.47 | 0.46 | 0.48 | 0.50 | 0.51 | 0.52 | 0.52 | 0.50 | 0.48 | 0.46 | 0.45 | 0.44 | 0.43 | 0.44 | 0.46 | 0.48 | 0.49 | 0.50 | 0.48 | 0.47 | 0.45 |
| | Victoria | | 0.36 | 0.36 | 0.38 | 0.41 | 0.43 | 0.44 | 0.44 | 0.42 | 0.39 | 0.37 | 0.36 | 0.36 | 0.36 | 0.37 | 0.39 | 0.40 | 0.40 | 0.40 | 0.38 | 0.36 | 0.34 |

### *Figure 3: Human capital costs per crash*




The results show that crashes on the Buangor to Ararat section of the highway were steadily declining in severity between 2007 (when the effect of the 3 fatalities in 2002 was outside the 5-year average) and 2014 but has been increasing steadily since then.

The Beaufort to Buangor section however is affected by the number of fatalities occurring there, even after the 2016 upgrade to dual carriageway. There has been a substantial reduction in crash severity there from 2020 to 2024, however.

The Ararat to Stawell section also shows increasing crash severity over time, due in particular to five fatalities since 2013. This increased further still from 2018 to 2023.

In other sections of the route, human costs of crashes were highly variable from one year to the next. This emphasises the random nature of crashes, especially when analysed over relatively short sections of roads which have low traffic volumes.

## 3.7 Crash causation

Further analysis has been done to explore crash causation on sections of the Western Freeway/ Highway. Note that in the tables following, the total number of crashes may not always be consistent; this is because some crash entries did not have records of the factors analysed.

### *3.7.1 Crash types and conditions*

Crash types are summarised in Table 11. The Buangor to Ararat section shows a higher incidence of collisions with fixed objects than for the Highway as a whole (36% instead of 29%), and a corresponding reduction in collisions with vehicles. Collisions with animals are also a higher percentage, though numbers are small.

***Table 11: Crash types 2000-2024***

| Crash type | Number of crashes (2000 to 2024) | | | | | % by section | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Whole route | Freeway section | Highway section | Beaufort-Buangor | Buangor-Ararat | Whole route | Freeway section | Highway section | Beaufort-Buangor | Buangor-Ararat |
| Collision with vehicle | 1,189 | 590 | 599 | 33 | 25 | 51% | 49% | 54% | 39% | 42% |
| Collision with a fixed object | 676 | 376 | 300 | 26 | 23 | 29% | 31% | 27% | 31% | 38% |
| Vehicle overturned (no collision) | 197 | 102 | 95 | 7 | 4 | 9% | 9% | 9% | 8% | 7% |
| No collision and no object struck | 66 | 40 | 26 | 5 | 1 | 3% | 3% | 2% | 6% | 2% |
| Struck pedestrian | 64 | 27 | 37 | 0 | 1 | 3% | 2% | 3% | 0% | 2% |
| Collision with some other object | 56 | 34 | 22 | 4 | 2 | 2% | 3% | 2% | 5% | 3% |
| Struck animal | 50 | 24 | 26 | 8 | 3 | 2% | 2% | 2% | 10% | 5% |
| Fall from or in moving vehicle | 11 | 4 | 7 | 1 | 0 | 0% | 0% | 1% | 1% | 0% |
| Other accident | 3 | 1 | 2 | 0 | 1 | 0% | 0% | 0% | 0% | 2% |
| **Total** | **2,312** | **1,198** | **1,114** | **84** | **60** | 100% | 100% | 100% | 100% | 100% |

Table 12 shows the number of vehicles involved in each crash. Despite being a single carriageway, the Buangor to Ararat section has a lower incidence of two-vehicle crashes than the route as a whole (44% compared to 57%). However, it has a higher incidence of single-vehicle crashes (37% compared to 28%).

***Table 12: Number of vehicles involved 2000-2024***

| Number of vehicles involved | Number of crashes (2000 to 2024) | | | | | % by section | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Whole route | Freeway section | Highway section | Beaufort-Buangor | Buangor-Ararat | Whole route | Freeway section | Highway section | Beaufort-Buangor | Buangor-Ararat |
| Single vehicle | 1,010 | 542 | 468 | 47 | 30 | 28% | 30% | 26% | 37% | 33% |
| Two vehicles | 2,062 | 991 | 1,071 | 52 | 45 | 57% | 54% | 60% | 41% | 50% |
| Three or more vehicles | 558 | 303 | 255 | 27 | 15 | 15% | 17% | 14% | 21% | 17% |
| **Total** | **3,630** | **1,836** | **1,794** | **126** | **90** | 100% | 100% | 100% | 100% | 100% |

Weather conditions are shown in Table 13. In common with the Highway as a whole, the vast majority of crashes on the Buangor to Ararat section occurred in clear weather conditions.

***Table 13: Weather conditions 2000-2024***

| Weather conditions | Number of crashes (2000 to 2024) | | | | | % by section | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Whole route | Freeway section | Highway section | Beaufort-Buangor | Buangor-Ararat | Whole route | Freeway section | Highway section | Beaufort-Buangor | Buangor-Ararat |
| Raining | 317 | 198 | 119 | 19 | 6 | 13% | 16% | 10% | 20% | 10% |
| Clear | 1,817 | 885 | 932 | 61 | 50 | 76% | 71% | 81% | 65% | 81% |
| Fog | 63 | 34 | 29 | 3 | 2 | 3% | 3% | 3% | 3% | 3% |
| Not known | 105 | 78 | 27 | 2 | 3 | 4% | 6% | 2% | 2% | 5% |
| Snowing | 8 | 4 | 4 | 1 | 0 | 0% | 0% | 0% | 1% | 0% |
| Strong winds | 74 | 40 | 34 | 7 | 1 | 3% | 3% | 3% | 7% | 2% |
| Dust | 8 | 4 | 4 | 1 | 0 | 0% | 0% | 0% | 1% | 0% |
| Smoke | 4 | 1 | 3 | 0 | 0 | 0% | 0% | 0% | 0% | 0% |
| **Total** | **2,396** | **1,244** | **1,152** | **94** | **62** | 100% | 100% | 100% | 100% | 100% |

Road conditions are shown in Table 14. Again, there is no appreciable difference between the Buangor to Ararat section and the Highway as a whole; 83% of crashes occurred in dry surface conditions.

***Table 14: Road conditions 2000-2024***

| Road conditions | Number of crashes (2000 to 2024) | | | | | % by section | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Whole route | Freeway section | Highway section | Beaufort-Buangor | Buangor-Ararat | Whole route | Freeway section | Highway section | Beaufort-Buangor | Buangor-Ararat |
| Dry | 1,799 | 871 | 928 | 60 | 49 | 78% | 73% | 83% | 70% | 83% |
| Wet | 424 | 259 | 165 | 22 | 9 | 18% | 22% | 15% | 26% | 15% |
| Muddy | 6 | 4 | 2 | 0 | 0 | 0% | 0% | 0% | 0% | 0% |
| Icy | 38 | 27 | 11 | 4 | 1 | 2% | 2% | 1% | 5% | 2% |
| Snowy | 6 | 4 | 2 | 0 | 0 | 0% | 0% | 0% | 0% | 0% |
| Unknown | 38 | 28 | 10 | 0 | 0 | 2% | 2% | 1% | 0% | 0% |
| **Total** | **2,311** | **1,193** | **1,118** | **86** | **59** | 100% | 100% | 100% | 100% | 100% |

### *3.7.2 Vehicle types*

Table 15 shows the vehicle types involved in crashes.

***Table 15: Vehicle types 2000-2024***

| Vehicle types | Number of crashes (2000 to 2024) | | | | | % by section | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Whole route | Freeway section | Highway section | Beaufort-Buangor | Buangor-Ararat | Whole route | Freeway section | Highway section | Beaufort-Buangor | Buangor-Ararat |
| Bicycle | 35 | 3 | 32 | 0 | 0 | 1% | 0% | 2% | 0% | 0% |
| Motorcycle | 144 | 94 | 50 | 6 | 0 | 4% | 5% | 3% | 5% | 0% |
| Car | 2,269 | 1,311 | 958 | 78 | 54 | 63% | 65% | 59% | 62% | 60% |
| Light commercial | 574 | 334 | 240 | 19 | 16 | 16% | 17% | 15% | 15% | 18% |
| Heavy commercial | 550 | 241 | 309 | 22 | 18 | 15% | 12% | 19% | 17% | 20% |
| Bus | 16 | 9 | 7 | 1 | 0 | 0% | 0% | 0% | 1% | 0% |
| Other/not known | 42 | 23 | 19 | 0 | 2 | 1% | 1% | 1% | 0% | 2% |
| **TOTAL** | **3,630** | **2,015** | **1,615** | **126** | **90** | 100% | 100% | 100% | 100% | 100% |

Compared to the Highway section as a whole, the Buangor-Ararat section has a slightly higher incidence of heavy commercial vehicles in crashes (18% compared to 15%).

## 3.8 Conclusions

### *3.8.1 Crash rates*

All figures are 5-year rolling average to 2024, injury crashes per million vehicle-kilometres:

- The crash rate on the Western Freeway/Highway route as a whole is well below the Regional Victoria average (0.06 compared to 0.17).
- The Buangor to Ararat section has a higher crash rate of 0.09, while the Beaufort to Buangor section is 0.07.
- The highest crash rate on the sections analysed is through Ararat city (0.12). This has dropped significantly in the last 5 years.

Despite these variations, the route as a whole is substantially safer than the Victorian average of 0.23.

### *3.8.2 Crash severity*

There were no fatalities on the Buangor to Ararat section for 18 years.

Three deaths occurred in 2002. These lives were lost in two separate head-on collisions, both of which were very close to the Ararat end.

The Beaufort to Buangor section has experienced 10 deaths since 2000, including three since the dual carriageway upgrade was completed in April 2016.

Using 5-year rolling average 'human capital' costs, crashes from Beaufort to Buangor are much more severe ($1.1 million per crash) than from Buangor to Ararat ($0.34 million per crash).

Because of the lack of fatalities, the Buangor to Ararat section has a lower human cost per crash than the average for the entire Western Freeway/Highway, which is $0.44 million.

### *3.8.3 Crash causation*

Over twenty years, compared to the Highway overall, the Buangor to Ararat section has:

- A higher proportion of collisions with fixed objects, and lower with other vehicles
- A correspondingly higher incidence of single-vehicle crashes (and hence a lower incidence of multiple-vehicle crashes)
- No significant differences in weather or road surface conditions
- Lower involvement of heavy commercial vehicles in crashes, despite the high proportion of trucks in the traffic stream.

### *3.8.4 Response to KORS questions*

Before preparing this update, KORS asked the following questions. My responses are given in blue accordingly.

- Is this Buangor-Ararat stretch significantly worse than other nearby stretches of the Western Highway? E.g. the Ararat-Stawell section?

  It depends how this is measured.
  Of the seven sections of the road summarised, the 5-year rolling average crash rate (Table 5) shows that the Buangor-Ararat section ranks second highest after the section through Ararat. However, the other sections of two-lane road are not far behind. The lowest crash rates are on the dual carriageway and Freeway sections (mainly because of the much higher traffic volumes), and the Ararat-Stawell section.
  The 5-year average human capital cost ranking (Table 10) is different. This indicates the severity of crashes, and it shows that the Buangor-Ararat section ranks fourth (after the Ararat-Stawell, dual carriageway and Stawell-SA sections. The lowest-severity sections are Beaufort-Buangor and the single carriageway section east of Beaufort.

- Is it (or Western Highway if it is not significantly worse) significantly worse than other regional roads?

  Again, it depends – in terms of crash rate, the Western Highway/Freeway route is 36% of the regional average, so it is considerably safer when accounting for the traffic levels. However, the crash severity on the route is 19% higher than the regional average.

- Has the Ballarat-Beaufort duplication (completed 2014-2016) reduced fatalities or serious accidents on the Ballarat-Beaufort section?

  Average fatalities/year halved after the duplication, and all casualties/year went down by 14%. Crash severity (human cost/crash) went down by 35%.

- How have crash barriers affected crash rates?

  Difficult to say from the available data, unless we have the times and locations of installation.

- Has the accident rate spiked in recently? If so, why?

  It is well known that road deaths have increased since COVID; they increased 18% statewide from 2022-24.

  However, I estimate that overall crash rates have gone down by about 12% from 2022-24, while human costs have also reduced, by 11%. This is because serious injuries have gone down by about 17%.

  On the Western Highway/Freeway, fatalities are much fewer and fluctuate from year to year, so trends are more difficult to detect. The 5-year average is still affected by COVID, so it may not indicate longer term underlying trends.

  Causes are difficult to isolate, because research that I've seen focuses on the causes of death rather than injuries; driver distraction (particularly from phones) seems to be a hot topic.

- Comments on fatalities: It may be understandable that fatalities get extra attention even if the financial side of it does not warrant it - would you agree?

  Definitely, it's clear that this is so. However, the human cost of injuries is far higher – and more widespread – than it is for fatalities. The problem is that road safety improvement initiatives are often triggered only by fatalities, when they would be better informed by where injuries occur as well. The emotive response gets headlines, but it ignores the cause of 85% of the social costs.

### *3.8.5 Improving safety*

Despite the relatively high traffic level and truck component, the safety record of the Buangor-Ararat section of the Western Highway is comparatively good. The crash rate is substantially lower than the State average, despite the relatively low traffic volume. There were no fatalities for 18 years, although that sadly changed with the deaths in 2022 and 2024.

I am still of the opinion that the level of traffic on the route does not warrant the upgrading to a 110km/h dual carriageway; this seems to be an arbitrary decision. Traffic levels have not risen at anything like the rates anticipated, and the Big Build website's assertion that traffic will double by 2025 is misleading.

If improved safety is a key priority, low-cost treatments would probably be quite effective. Reducing the speed limit, installing safety barriers and/or improving road markings and hazard signage is a common solution in Victoria and would be well suited to this section of road.

There are several examples elsewhere in Victoria where such strategies have been implemented, on single-carriageway roads with comparable traffic volumes.

# William McDougall

## Personal details

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***Citizenship status:*** Australian citizen since 1994

## Qualifications and affiliations

BSc (Hons) Civil Engineering, City University (London), 1977
Past Member of the Institution of Engineers Australia
Member of the Chartered Institute of Logistics and Transport
Past Chair, Engineers Australia Victoria Transport Branch Committee

## Overview

I am a freelance transport planner and economist with over 45 years' experience in the UK, Australasia, Asia and the Middle East. I have directed a range of studies across all modes of transport and levels of detail, with an emphasis on technical complexity and strategic importance. I have extensive experience in strategy and policy development/analysis, multi-modal studies, economics and financial analysis, multi-criteria appraisal, stakeholder and community consultation, traffic and pedestrian simulation, survey design and transport demand modelling. I have contributed to transport initiatives in most Australian cities as well as in the UK, Asia and the Middle East.

## Fields of Special Competence

Public Transport and Highway Strategy; Sustainability in Transport; Planning and Feasibility Studies; Management Consulting and Facilitation; Traffic, Economic and Environmental Evaluation; Financial Modelling; Market Research and Surveys; Transport Modelling and Appraisal; Report and Article Writing; Community Consultation; Presentations, Media Articles and Interviews.

## Selected Recent Activities

**Expert Advisor and Witness** (2014-present). Advised various clients on transport issues relating to statutory processes (primarily EES hearings) for major Victorian projects – Suburban Rail Loop, North East Link, Fishermans Bend development, West Gate Tunnel, Melbourne Metro Rail, East West Link.
**Ballarat Rail** (2018). Advised on demand and layout requirements for a new rail station in Ballarat North.
**High Speed Rail** (2018). Demand forecasts and operating plans for high-speed rail in the Hume corridor.
**Grattan Institute** (2016). Transport Fellow helping to shape the research agenda and issues reporting.
**Transport in Cities** (2011-2014). To commemorate the 50th anniversary of Sir Colin Buchanan's White Paper *Traffic in Towns*', I wrote articles with Sir Colin's grandson Paul on future changes in urban transport.
**Melbourne Metro Tram Plan** (2013-14). Managed preparation of tram operating plans during/after construction of Melbourne Metro Rail Tunnel.
**Melbourne Airport Land Access Strategy** (2012-13). Directed a landside access strategy for Melbourne Airport. Explored aviation growth trajectories and associated landside transport task to develop a strategy to serve the demand, to provide a context for decision-making on the Airport Rail Link.
**Northern Rowville and Doncaster Rail Studies** (2011-13). Led the Victorian Government's Rowville Rail Study and peer-reviewed the concurrent Doncaster Rail Study. As well as technical and planning work, I held regular ministerial briefings and public presentations to explain findings and recommendations.
**Vauxhall Nine Elms Battersea Transport Study** (2008-9). Directed a study into transport needs for a major redevelopment of a large inner London area, including the iconic Battersea Power Station, to

accommodate an extra 40,000 people and 20,000 jobs. Demonstrated that the best solution would centre on extending the Underground from Kennington to Battersea Power Station to serve the development area.
**Oman Surface Transport Strategy Study** (2008-9). Provided specialist input to a review of the transport sector in Oman, including development of a travel demand model and reporting on future strategic transport needs and policies. My focus was on ways to develop public transport in Muscat, the capital.
**Melbourne Metro Rail Tunnel early studies** (2006). Led the development of early concepts for the alignment and design of a new rail tunnel to relieve Melbourne's inner city loop, and an operating strategy for the rail system to reorganise the services into grouped lines. This work shaped the Rail Network Development Plan released by PTV in 2013.
**Melbourne Metropolitan Tram Plan** (2003). Prepared a forward plan for the tram network, including route extensions, platform stops, low-floor trams, fleet renewal, depots and power supply upgrades.
**Northern Central City Corridor Study, Melbourne** (2001-2). Managed this study which involved community consultation, ministerial briefings and technical studies. Developed a strategy to develop public and active transport in Melbourne's inner north, to encourage alternatives to car use.

## Summary career history

| | |
|---|---|
| 2014 - present | Sole practitioner exploring new opportunities for better transport planning |
| 2016 | Transport Fellow, Grattan Institute (temporary placement) |
| 2010 - 2014 | Principal, Sinclair Knight Merz (now Jacobs Engineering), Australia |
| 2008 - 2010 | Principal and Project Director, Sinclair Knight Merz UK, London |
| 1997 - 2008 | Associate and Team Leader, Sinclair Knight Merz, Australia (Sydney and Melbourne) |
| 1994 - 1997 | Director, ODB Consulting, Sydney |
| 1985 - 1994 | Director and Project Leader, Travers Morgan Australia (Perth, Melbourne and Sydney) |
| 1977 - 1985 | Project Manager and Transport Planner, Travers Morgan and Partners UK (London) |
| 1972 - 1977 | Bachelor's degree student sponsored by Travers Morgan and Partners |

## Recent Papers and Presentations

- *Infrastructure decision making models.* Australian Cost Engineering Society, Melbourne 2025
- *Imagine this…* Greater Melbourne Transport Ecosystem and the Future of Mobility, Melbourne Planning Summit, 2019.
- *We haven't got a plan, so nothing can go wrong.* Smart Urban Futures Conference, Melbourne, 2019.
- *Decentralisation – how will it work?* Research paper for the Balance Victoria initiative, 2019.
- *Transport Planning Dysfunction.* 3068 Group AGM, 2018.
- *Fixing Melbourne's Transport – why we need a new approach.* Transport for Melbourne forum, 2018.
- *Politics, funding and transport – the need for systematic reform.* Australian Institute of Traffic Planning and Management National Conference, Adelaide, 2014.
- *Plan Melbourne: will it deliver integrated transport and land use?* Institute of Transportation Engineers (Australia & New Zealand Section) Seminar, Melbourne, 2014.
- *Societal shifts – cities on the move.* SKM Transport in Cities program article, 2013.
- *Autonomous vehicles – the next revolution.* SKM Transport in Cities program article, 2013.
- *2013 in Review.* Engineers Australia Victorian Transport Branch Seminar, Melbourne, 2013.
- *Guiding Melbourne's Urban Growth: Transport Futures.* UrbanMelbourne Seminar, Melbourne 2013.