

The background of the report cover is a photograph of a two-lane asphalt road stretching into the distance. The road is flanked by mature trees with light-colored bark. A white car is visible in the distance on the road. In the foreground on the right, a large tree trunk is partially visible, with some roots exposed at the edge of the road. The overall scene is bright and sunny, with shadows cast across the road surface.

Regional Road Assessment: Adelaide Hills

Report: December 2020

Motor | Home | Travel

RAA at a glance



South Australia's
largest
membership organisation



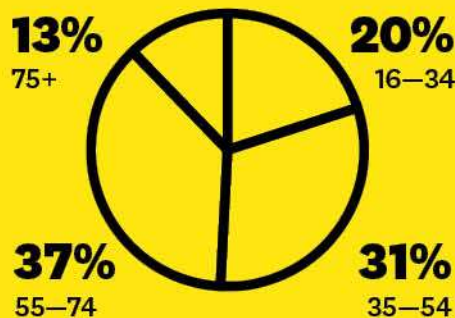
Advocating for South
Australians for over
115 years



750k+
current members
(55% of SA adults)



52%
Just over half our
members are women



Our members span
all adult age groups



1000+
staff employed
across SA



Largest
personal lines
insurer in SA



340k+
roadside callouts
per year



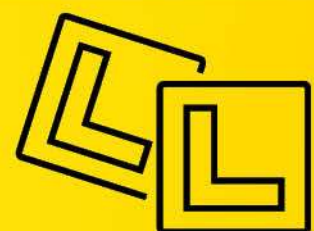
530+
tourism providers
promoted on Experience SA



450+
businesses accredited
through RAA's Approved
Repairer network




29k+
people educated on
road, bike and child
safety each year



23k+
free lessons delivered
to keep SA learner
drivers safe

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Executive Summary

RAA is South Australia's largest member organisation, representing more than 750,000 South Australians – about half the state's population. Through our diverse range of motor, home and travel products and services, we engage with our members in a variety of ways. This has given us unique insights into transport infrastructure improvements that South Australians want and need.

RAA has had a trusted advocacy role in transport and mobility for more than 115 years, and through this we've developed an expert understanding of South Australia's transport infrastructure requirements. We ensure our advocacy is evidence-based by consulting with industry, government and our members and by utilising open source data, research and technical field work to develop and test our recommendations.

RAA aligns its mobility advocacy with the following three themes:

- **Safe** – A safe mobility system can be defined as a system that not only achieves, but outperforms, national and international safety benchmarks. It encompasses safe people, using safe vehicles, on safe roads, at safe speeds.
- **Accessible** – To have a cost efficient, convenient and reliable transport network as an essential part of personal mobility.
- **Sustainable** - Sustainable mobility encompasses the needs of current and future generations, and considers financial, societal and environmental factors.

The methodology used to produce this report involved engagement with key stakeholders to enable a review of community feedback (member and non-member) prior to undertaking several weeks of field work to assess and review the issues raised. The findings and subsequent recommendations from this field work are presented throughout this report along with a review of open-source information including crash, traffic volume and expiation data.

Through community feedback received as part of our Adelaide Hills regional road assessment, the South Eastern Freeway was identified as the biggest pain-point in the Adelaide Hills Region. This piece of infrastructure is vital to the Adelaide Hills region, but also the whole state due to its significance to both freight and tourism in South Australia. As such, the South Eastern Freeway was reviewed in RAA's 2020 South Eastern Freeway Highway Assessment, published in May 2020.

RAA now outlines a series of recommendations aimed at improving safety, mobility and tourism in the Adelaide Hills region as part of this regional assessment report. The list below summarises several key recommendations, with a full list of recommendations included later in this report.

RAA's key recommendations for the Adelaide Hills



Greenhill Rd, Greenhill

Mobility and Tourism

Amy Gillett Bikeway

Provide funding to extend the Amy Gillett Bikeway from Birdwood to Mount Pleasant and from Balhannah to Hahndorf. This follows on from the October 2020 announcement that \$2.6m funding has been provided to extend the bikeway from Mount Torrens to Birdwood. (**Recommendation 1A**)



Onkaparinga Valley Rd, Mount Torrens

On-demand bus services

Continue running on-demand buses in Mount Barker, following the popularity of the service during the initial trial. (**Recommendation 1B**)

Hahndorf improvements

As part of the \$250m Hahndorf Township Improvements and Access Upgrade, fund the Hahndorf Main Street Revitalisation Project, and investigate building a Park 'n' Ride facility at Verdun interchange to better serve the northern Adelaide Hills and Hahndorf. (**Recommendations 1C, 1D, 1E**)



Mt Barker Rd, Hahndorf

Roads and safety

Rural junction active warning system (RJAWS)

Expand the use of rural junction active warning systems (RJAWS) throughout the Adelaide Hills region at intersections where other safety upgrades may not be possible. Sites for consideration include North East Rd/Lower North East Rd and Gorge Rd/Torrens Hill Rd. (**Recommendations 2A, 8H, 8I, 9D, 9E, 15S**)

Roadside hazards

Implement a dedicated Adelaide Hills region roadside hazard mitigation program to provide corridor-wide safety upgrades based on AusRAP star ratings. Most roads in the Adelaide Hills region require some level of barrier protection or hazard removal, as identified throughout the Adelaide Hills regional road assessment report. (**Recommendations 2B, 4A, 7E, 8A, 8C, 9A, 12A, 13B, 14D, 15A, 15F, 15G, 15J, 15P**)

RAA's key recommendations for the Adelaide Hills (continued)

Audio tactile centreline markings

Expand the use of audio tactile centreline markings throughout the Adelaide Hills region to encourage motorcyclists to take safer paths through corners. Roads for consideration include Lobethal Rd and Strathalbyn Rd. (**Recommendations 2C, 5A, 7A, 8B, 12B, 14A**)



Gorge Rd, Millbrook

South Eastern Freeway

Adopt recommendations of RAA's 2020 South Eastern Freeway Highway Assessment. (**Recommendation 3**)



South Eastern Freeway, Crafers

Speed limits

Adopt a safe and consistent approach to speed limits on key corridors including Onkaparinga Valley Rd, Greenhill Rd and Mount Barker Rd. (**Recommendations 4C, 5B, 6B, 7C, 8D, 8E, 9E, 12D, 13A, 14C**)

Road maintenance

Undertake pavement rehabilitation works on roads including Onkaparinga Valley Rd, Lobethal Rd, North East Rd and Gorge Rd. (**Recommendations 4D, 5C, 6C, 7D, 8F, 9B, 13C, 13E, 15D, 15K, 15N**)



Onkaparinga Valley Rd, Birdwood

Long Valley Road

Consider dividing treatments such as a wire rope centre barrier to separate opposing traffic flows on Long Valley Rd, which will reduce the likelihood of head-on crashes. (**Recommendation 11A**)

Intersection upgrades

Intersection upgrades at locations including Onkaparinga Valley Rd/Tiers Rd/Nairne Rd, Church Hill Rd/Old Mt Barker Rd, Nairne Rd/Old Princes Hwy, Battunga Rd/Mawson Rd, and Warren Rd/Lucky Hit Rd/Martin Hill Rd. (**Recommendations 4E, 8H, 8I, 8J, 9C, 9D, 9E, 10A, 15C, 15I, 15R, 15S, 15T**)



Church Hill Rd/Old Mt Barker Rd, Echunga

Notes

Notes on crash data

Unless otherwise specified, crash data quoted within this report is sourced from the Road Crash Data dataset uploaded by the Department of Infrastructure and Transport on the Data SA website. Crash data is for the five year period between 2015 and 2019 (unless otherwise specified) because it is the most recent data available at the time of publishing this report.

Casualty crashes are defined as a crash where at least one person is injured or killed as a result of the crash. Property damage only crashes are not considered in crash data analysis within this report unless explicitly specified.

Units within the road crash database include animals and objects, but for the purpose of analysing the units involved in crashes, only human controlled units are considered unless otherwise specified.

Casualty crashes per 100 million vehicle kilometres travelled (vkt) have been calculated for various roads and road sections throughout this report for comparative purposes. The calculation for vehicle kilometres travelled is $vkt = AADT \times \text{length of road}$ and can be considered the approximate number of kilometres travelled by vehicles on that particular section of road. Crashes per 100m vkt allows for a comparison of historic crash risk across different road sections.

Notes on star ratings

Throughout this regional road assessment, AusRAP star ratings are provided for roads throughout the Adelaide Hills Region. The AusRAP star rating system, a subsidiary of the International Road Assessment Program (iRAP), assesses several key criteria to establish the safety rating of a road from one to five stars with the latter representing the safest. Star ratings have been provided for discrete sites throughout the Adelaide Hills region that are typical of the overall road network or to highlight certain deficiencies. These ratings have been calculated using the iRAP 'ViDA' demonstrator tool. AusRAP star ratings are based on the international iRAP model which estimates an average 40% reduction in fatal and serious crashes for each incremental increase in star rating¹.

Table 1: Estimated reduction in fatalities and serious injuries with increases in AusRAP star rating (iRAP, 2020).

Star rating	Relative proportion of fatalities and serious injuries
1	1
2	0.6
3	0.36
4	0.216
5	0.1296

RAA advocates for all regional highways to be rated a minimum of three stars to reduce the number of lives lost and serious injuries on South Australian roads. Our recent submission to the state road safety strategy to 2031 recommends firstly that these ratings are released publicly, and secondly they are used as a tool to identify and justify safety upgrades across South Australia's regional road network to achieve a three star rating or better on all state highways.

¹ iRAP, 2020, *The Business Case for Safer Roads*, <<https://www.vaccinesforroads.org/business-case-for-safer-roads/>>.

Background

RAA's Safety and Infrastructure team periodically evaluates the South Australian regional road network based on the concerns of regional RAA members and other regional residents. During this assessment of the Adelaide Hills region, the team travelled several thousand kilometres within the Adelaide Hills region, encompassing more than 30 roads and intersections over five days of assessments in December 2019 and August 2020.

The devastating Cudlee Creek Bushfires in December 2019 resulted in a postponement of this assessment, followed by COVID-19 travel restrictions causing a secondary postponement until local travel by RAA staff for the purposes of conducting road assessments was deemed safe.

This is RAA's first regional road assessment in the Adelaide Hills region, and follows on from an extensive review of the South Eastern Freeway, with this report released in May 2020 and downloadable from <https://www.raa.com.au/roadassessments>.

RAA consulted with Adelaide Hills Council and regional stakeholders including Regional Development Australia (RDA) and the Local Government Association (LGA). A detailed survey was also distributed to 6,026 RAA members residing in the Adelaide Hills region, and promoted in local media, from which 614 responses were received. Information was sought regarding locations that were deemed unsafe or inefficient, challenges for freight operations, and issues with other forms of mobility such as active and community transport experienced throughout the region.

The area assessed (shown overleaf) is defined by the combined boundaries of the Adelaide Hills Council and Mount Barker District Council. Further to these council regions, RAA reviewed the full length of cross-regional corridors including North East Road/Torrens Valley Road, Long Valley Road and Strathalbyn Road.



Figure 1: Boundary of the Adelaide Hills region assessed by RAA

Recommendations

Recommendations throughout this report are ranked using a priority colour scale as depicted below. The primary factors considered when prioritising recommendations are the importance to survey respondents, road safety, traffic volumes and importance to tourism and industry in the region. However, not all these factors may contribute to a given priority.

Timeframes mentioned below are a general guide only and may not be applicable to every recommendation within this report.

Recommendation colour scales

High priority recommendation

This issue is of very high importance to the local community, has significant implications to road safety, is located on a busy road corridor and is important to tourism and industry in the region. These recommendations should be committed to within 12 months.

Mid-high priority recommendation

This issue is of high importance to the local community, has implications to road safety, is generally located on a busy road corridor and can be important to tourism and industry in the region. These recommendations should be committed to within 3 years or as part of routine maintenance.

Mid priority recommendation

This issue is moderately important to the local community, has some road safety implications and may be important to tourism and industry in the region. These recommendations should be committed to within 5 years or as part of routine maintenance.

Mid-low priority recommendation

This issue has been raised by the local community, may have some road safety implications or be important to tourism and industry in the region. These recommendations should be implemented as part of routine maintenance, or as part of a longer-term vision.

Low priority recommendation

This issue may have road safety implications or has some level of importance to tourism and industry in the region. These recommendations should be implemented as part of routine maintenance, rolled out gradually or as part of a longer-term vision.

Full list of recommendations

The below list of recommendations is displayed in the order they appear throughout this report.

To improve tourism and mobility within the region...

Recommendation 1A

Provide funding to extend the Amy Gillett Bikeway from Birdwood to Mount Pleasant and from Balhannah to Hahndorf.

Recommendation 1B

Continue running on-demand buses in Mount Barker following the high uptake of the initial trial.

Recommendation 1C

Investigate a new Park 'n' Ride facility at Verdun interchange that would better serve the Northern Adelaide Hills and Hahndorf.

Recommendation 1D

Consider incorporating a visitor information centre at Verdun as part of a new park 'n' Ride facility.

Recommendation 1E

DIT allocate at least \$3m funding towards the Hahndorf Main Street revitalisation project as part of the \$250m *Hahndorf Township Improvements and Access* upgrade, which will substantially improve street appeal and tourism attractiveness in one of South Australia's busiest tourist destinations.

To improve safety broadly across the region...

Recommendation 2A

Expand the use of rural junction active warning systems (RJAWS) throughout the Adelaide Hills region where other safety upgrades may not otherwise be possible.

Recommendation 2B

Implement a dedicated Adelaide Hills region roadside hazard mitigation program to provide corridor-wide safety upgrades based on AusRAP star ratings.

Recommendation 2C

Expand the use of ATLM centreline markings throughout the Adelaide Hills region to encourage motorcyclists to take safer paths through corners.

To improve safety on roads and at intersections reviewed by RAA...

South Eastern Freeway

Recommendation 3

Adopt all recommendations of RAA's *2020 South Eastern Freeway Highway Assessment*.

Onkaparinga Valley Road

Recommendation 4A

Install additional safety barriers to reduce the likelihood of errant vehicles colliding with trees located within five metres of Onkaparinga Valley Road.

Recommendation 4B

Widen bridges along the length of Onkaparinga Valley Road, with priority given to those located in the 100km/h zone between Birdwood and Charleston. This will improve safety and has the potential to allow the use of more productive freight transport by resolving some first and last mile issues now that the freight route between Mannum and Lobethal has been upgraded to allow the use of PBS level 2A vehicles.

Recommendation 4C

Adopt a consistent approach to speed limits on Onkaparinga Valley Road that reflects current best practice and Australian Standard 1742.4.

Recommendation 4D

Undertake pavement rehabilitation between Verdun and Balhannah, between Mount Torrens and Birdwood, and road resealing within the Birdwood township.

Recommendation 4E

Upgrade the intersection with Tiers Road and Nairne Road in Woodside to improve safety and freight access.

Greenhill Road

Recommendation 5A

Install centre line ATLM along Greenhill Road to deter drivers and motorcycle riders from crossing the centre line.

Recommendation 5B

Review the speed limit on Greenhill Road between Burnside and Summertown with consideration given to adopting a 60km/h speed limit which will have minimal impact on regular travel times on this section of Greenhill Road.

Recommendation 5C

Undertake resealing around curves exhibiting pavement failures along the whole corridor with consideration given to a full reseal between Burnside and Summertown.

Mount Barker Road

Recommendation 6A

Explore opportunities to extend the existing Stirling cycle lane through to Aldgate. As a minimum a cycle lane should be provided where carriageway width allows, as there are some potential bottlenecks along the route.

Recommendation 6B

Review speed limits between Bridgewater and Mount Barker with an aim to reduce the number of changes required.

Recommendation 6C

As a minimum, repair localised failures between Mount Barker and Hahndorf, but consider a full reseal for this section.

Lobethal Road

Recommendation 7A

Following on from the success of the Gorge Road trials, install ATLM centreline markings along Lobethal Road to encourage motorcycle riders to adopt a safer path around curves and reduce the likelihood of head on crashes occurring.

Recommendation 7B

Install edge lines on both sides of Lobethal Road through Basket Range.

Recommendation 7C

Install '60 AHEAD' signs on approaches to 60km/h zones through Norton Summit and Lenswood.

Recommendation 7D

Undertake localised resealing around curves exhibiting pavement failures.

Recommendation 7E

Remove roadside hazards and/or install additional barrier protection between Lobethal and Ashton.

Recommendation 7F

Consider a street sweeping strategy along Lobethal Road involving periodic review and sweeping on an ad hoc basis to ensure full road width is available to all road users.

North East Road/Torrens Valley Road

Recommendation 8A

Install additional barrier protection between Inglewood and Gumeracha given the high rate of crashes involving fixed objects. It is critically important that all new barriers are fitted with motorcycle underrun protection and all existing barriers have this retrofitted.

Recommendation 8B

Install ATLM centrelines between Paracombe Road and Gorge Road.

Recommendation 8C

Install additional motorcycle friendly barrier protection on the 3km section east of Birdwood to Randell Road.

Recommendation 8D

Install 'speed limit ahead' signage on each approach to Inglewood, Gumeracha, Birdwood and Mt Pleasant.

Recommendation 8E

Consider an 80km/h speed limit on the 3km section east of Birdwood to Randell Road.

Recommendation 8F

Undertake pavement rehabilitation on curves between South Para Road and Gorge Road to reduce risk to motorcycle and bicycle riders.

Recommendation 8G

Widen bridges along the route, in particular the Gumeracha Bridge (near the intersection with Gorge Road) and the Blumberg Bridge (just west of Birdwood).

Recommendation 8H

Install a rural junction active warning system (RJAWS) at the intersection with Houghton Hollow Road to account for very poor sight distance.

Recommendation 8I

Install a rural junction active warning system (RJAWS) at the intersection with Lower North East Road to account for very poor sight distance.

Recommendation 8J

Ensure that sight distance and potential queueing issues for southwest bound traffic is resolved as part of the proposed South Para Road and North East Road upgrade.

Gorge Road

Recommendation 9A

Install additional roadside barriers along Gorge Road to reduce exposure to roadside hazards.

Recommendation 9B

Undertake localised pavement rehabilitation in the 80km/h zone dividing Cudlee Creek.

Recommendation 9C

Duplicate and enlarge existing W3-1 'stop sign ahead' sign on the approach to the intersection with North East Road. Supplementary '140m' distance plates should also be added to the sign array to advise of the distance to intersection, which is still unseen until approximately 25m before the stop sign.

Recommendation 9D

Install a rural junction active warning system (RJAWS) at the intersection with Gorge Road and Torrens Hill Road to account for very poor sight distance.

Recommendation 9E

Consider installing a rural junction active warning system (RJAWS) at the intersection with Gorge Road and Tippet Road to account for very poor sight distance, however a reduced speed limit may be more practical in this location.

Nairne Road

Recommendation 10A

Install a roundabout at the intersection of Nairne Road (Woodside Road) and Old Princes Highway in Nairne.

Long Valley Road

Recommendation 11A

Consider dividing treatments such as a wire rope centre barrier to separate opposing traffic flows on Long Valley Road and reduce the likelihood of head on crashes occurring.

Recommendation 11B

Install the additional overtaking lane, originally announced in 2019, within the 2020/21 financial year.

Lower North East Road

Recommendation 12A

Further barrier installation along Lower North East Road to reduce exposure to roadside hazards.

Recommendation 12B

Install audio tactile centreline along Lower North East Road to encourage motorcycle riders to adopt a safer path around curves.

Recommendation 12C

Explore the feasibility of widening Lower North East Road between Perseverance Road and Paracombe Road.

Recommendation 12D

Install '50 AHEAD' signage prior to the introduction of the 50km/h speed limit in Houghton.

Recommendation 12E

Refresh centreline markings and reinstall yellow centreline RRPM's that have been dislodged.

Mount Lofty Summit Road

Recommendation 13A

Reduce the speed limit on Mount Lofty Summit Road to 60km/h between Greenhill Road and Mount Lofty Summit

Recommendation 13B

Install motorcycle friendly barriers between Greenhill Road and Mount Lofty Summit.

Recommendation 13C

Consider extending the Crafers Bikeway to Mount Lofty Summit, and as a minimum, reseal road shoulders between Crafers and Summer Hill Drive and mark these shoulders as a cycle lane to encourage/mandate use by cyclists.

Recommendation 13D

Review and install additional cyclist warning signage on Mount Lofty Summit Road.

Recommendation 13E

Reseal Mount Lofty Summit Road between Greenhill Road and Mt Lofty Summit.

Recommendation 13F

Review pedestrian crossing points with a focus on improved visibility of pedestrians crossing and waiting to cross Mount Lofty Summit Road.

Strathalbyn Road

Recommendation 14A

Install centre line ATLM along Strathalbyn Road between Flaxley and Strathalbyn to deter motorcycle riders from crossing the centre line in this high-risk location.

Recommendation 14B

Seal shoulders to 1m wide on Strathalbyn Road (0.5m minimum where environment is constrained)

Recommendation 14C

Install '50 AHEAD' signage on each approach to Macclesfield, and other townships if speed limit consolidation takes place along Strathalbyn Road.

Recommendation 14D

Install additional motorcycle friendly barriers on Strathalbyn Road.

Other roads reviewed

Recommendation 15A

Install additional barriers to reduce risk posed by to large roadside trees on Battunga Road.

Recommendation 15B

Consider installing an overtaking lane in each direction on Battunga Road.

Recommendation 15C

Explore the feasibility of an upgrade at the intersection of Battunga Road and Mawson Road in Meadows.

Recommendation 15D

Undertake localised pavement rehabilitation on Old Norton Summit Road, particularly around curves.

Recommendation 15E

Undertake improvements to signage and delineation on Old Norton Summit Road

Recommendation 15F

Install additional barrier protection (including motorcycle underrun) along Montacute Road.

Recommendation 15G

Install additional barrier protection (including motorcycle underrun) along Marble Hill Road.

Recommendation 15H

Review and replace intersection warning signage as necessary along Montacute Road and Marble Hill Road.

Recommendation 15I

Widen the eastern shoulder of Kenton Valley Road through the intersection with Burfords Hill Road to allow northbound traffic to pass a vehicle turning right.

Other roads reviewed (continued...)

Recommendation 15J

Install motorcycle friendly crash barriers on South Para Road between Chain of Ponds and Kersbrook to reduce the risk of serious crashes with trees.

Recommendation 15K

Undertake pavement rehabilitation, which may extend to a full reseal, along Upper Sturt Road between Hawthorndene Drive and Crafers.

Recommendation 15L

Install further parking controls (yellow edge lines, parking restriction signs) in slow vehicle turnouts to ensure they are not used as parking bays.

Recommendation 15M

Investigate the provision of a continuous footpath between Crafers and the Mount Lofty Botanic Gardens access point on Lampert Road

Recommendation 15N

Reseal Piccadilly Road between Piccadilly and Summertown

Recommendation 15O

Consider future duplication of Flaxley Road between Wellington Road and Martin Road (Heysen Boulevard) as residential developments progress and if traffic conditions approach capacity.

Recommendation 15P

Install additional barriers on Flaxley Road to reduce exposure to roadside hazards.

Recommendation 15Q

Seal shoulders on Flaxley Road between Church Hill Road and Strathalbyn Road.

Recommendation 15R

Install a roundabout as proposed at the intersection of Wellington Road and Victoria Road in Mount Barker.

Recommendation 15S

Upgrade the intersection with Church Hill Road and Old Mount Barker Road in Echunga to reduce speeds and improve sight lines, with consideration given to installing a rural junction active warning system (RJAWS).

Recommendation 15T

Upgrade the intersection with Warren Road, Lucky Hit Road and Martin Hill Road in Cromer, funded under the 2021-22 *Black Spot Program*, or otherwise.

Discussion and survey analysis

Objectives and methodology

Prior to completing the Adelaide Hills Regional Road Assessment, RAA surveyed Adelaide Hills residents and road users to help us:

- gain awareness of local road and mobility issues
- test and develop a priority roads list for conducting site investigations
- identify key issues with road infrastructure
- identify any gaps in current road safety/mobility options

RAA emailed 6,026 of our members living in the Adelaide Hills Council and Mount Barker District Council (DC) areas inviting them to participate in an online survey, which resulted in 416 responses received (a 7% response rate). In addition, the survey link was shared with regional stakeholders (including local media) for them to distribute, and this method led to a further 198 responses. In total, 614 responses were collected between 18 September and 14 October 2019.

The survey sought information on a range of access and safety issues and took a median of 32 minutes for respondents to complete.

Respondent demographics

Of the 614 responses received, a slight majority (54%) were from females and close to three quarters (72%) were from 45-74 year olds. Nearly nine in ten respondents (88%) lived in either the Adelaide Hills Council or Mount Barker DC areas, with the Adelaide Hills Council area (56%) best represented.

Table 2: Survey respondent demographics

Subgroup	No. of responses	% of total
Council Area		
Adelaide Hills Council	346	56%
Mount Barker District Council	192	31%
Alexandrina Council	22	4%
City of Onkaparinga Council	14	2%
Other (but identify with the Adelaide Hills region)	40	7%
Gender		
Male	274	45%
Female	334	54%
Other/Prefer not to say	6	1%
Age		
18-34	81	13%
35-44	77	13%
45-54	133	22%
55-64	157	26%
65-74	155	25%
75+	11	2%
Total	614	100%

This report summarises the views of those who chose to participate in the survey and does not claim to be representative of all residents of the Adelaide Hills. For the purposes of this report, the Adelaide Hills and Mount Barker council areas have been analysed separately, and are typically only reported where they differ from the overall results. Responses from all council areas are included within the 'total' figures. The report also highlights differences in results between males and females and between three age bands: 18-44 years; 45-64 years; and those aged 65 and over.

Mobility profile

When asked about their travel habits, six in ten respondents (60%) indicated they drive every day and 96% that they drive at least 3 days per week. In contrast, only 6% used an alternative transport mode every day, with 36% not using an alternative mode of transport at all. Those aged 65 and over (45%) were significantly less likely than younger respondents to drive every day and were more likely to instead drive no more than 3-4 days per week (23% compared with 13% overall).

On average, how many days per week do you...

Base: All respondents (n=614)

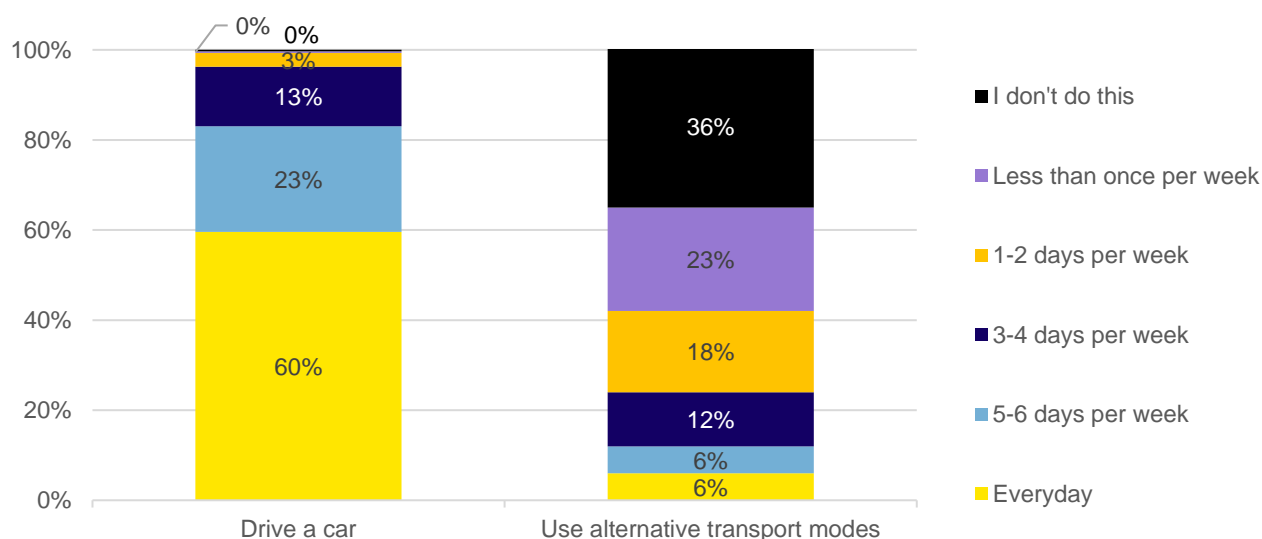


Figure 2: Travel habits of survey respondents

The most common form of alternative transport to a car was walking (46%), followed by bus (22%), bicycle (13%) and motorcycle (8%). Males were more likely than females to travel by bicycle (19% compared with 8%), motorcycle (13% compared with 4%) and truck (5% compared with 0%). Bus usage increased with age – from 16% of 18-44 year olds to 21% of 45-64 year olds and 29% of those aged 65 and over.

Which forms of alternative transport do you use?

Base: All respondents (n=614)

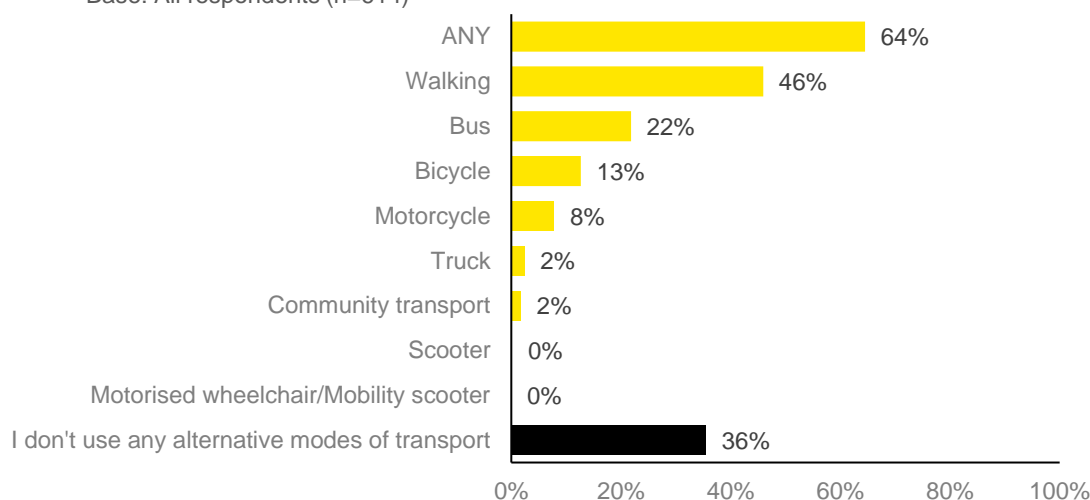


Figure 3: Alternative transport use amongst survey respondents

The top reasons for residents to travel outside of their council area were for work (59%), to visit family or friends (58%) and for shopping (51%). These were followed by social activities (44%), health and medical appointments (41%) and study (7%). The other most common reason given was taking children to and from school.

Residents of the Adelaide Hills Council were more likely than residents of Mount Barker DC to travel outside of their local area for shopping (56% compared with 43%). Differences were also seen by age group, with shopping (66%) and health/medical appointments (58%) more likely to be a main travel reason for those aged 65 and over and work (18%) less likely to be one. Work (77%) and study (16%) were most likely to be a main reason for travel for those aged 18-44.

What would be your main reason for travelling outside of your local area?

Base: All respondents (n=614)

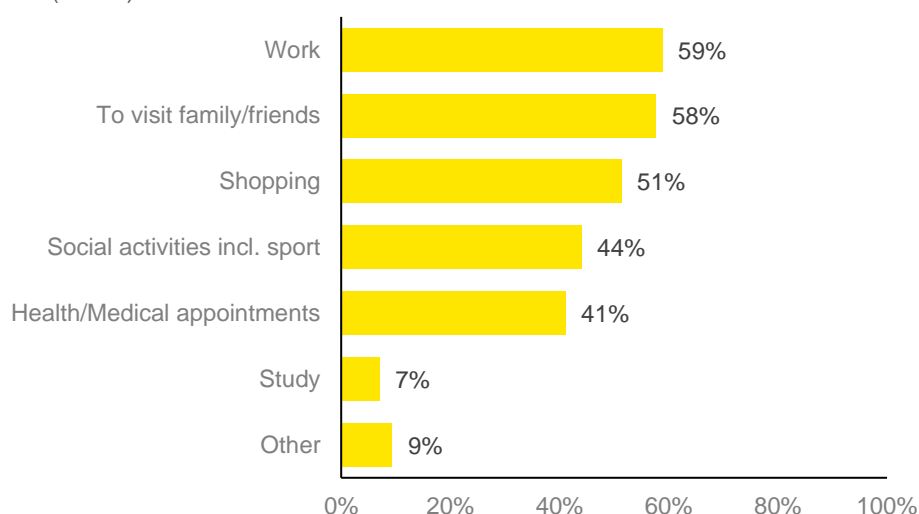


Figure 4: Main reasons survey respondents travel outside their local area

Adverse weather conditions in the Adelaide Hills region have an impact on the mobility of respondents. In particular around four in ten are moderately or severely affected by bushfires (40%), fog/mist (40%), storms (37%) or rain (35%). Wind (23%) and ice (19%) typically have less of an

impact, with around two in ten severely or moderately affected by these. Of all weather conditions, bushfires severely affect the highest proportion of respondents (22%), but there are also 20% of respondents who were not affected at all by bushfires, whereas almost all respondents were affected in some way by fog/mist and storms. It should be noted that these responses were received prior to the tragic Cudlee Creek bushfire in December of 2019.

Females were more likely than males to indicate that they have had their mobility moderately or severely affected by adverse weather conditions, including fog/mist (49% compared with 29%), storms (45% compared with 28%), rain (41% compared with 29%) and wind (29% compared with 16%). Those aged 65 and over were least likely to indicate they have had their mobility severely or moderately affected by rain, with only 25% being affected in this way. Residents of the Adelaide Hills Council area were significantly more likely than Mount Barker DC to be severely or moderately affected by bushfires (47% compared with 29%), which may partly reflect the impact of the Sampson Flat bushfire in 2015 which significantly impacted the northern Adelaide Hills.

To what extent do the following weather conditions affect your mobility in the Adelaide Hills region?

Base: All respondents (n=614)

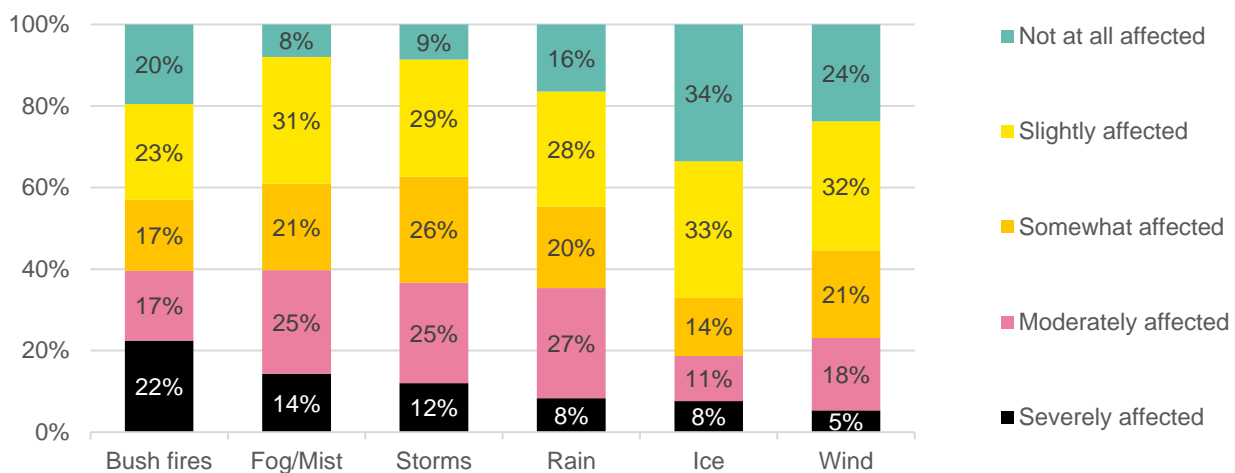


Figure 5: Impact of weather conditions on mobility in the Adelaide Hills region

Road standards and improvements

Respondents were asked on a 0-10 scale whether they agreed that roads in the Adelaide Hills are maintained to an acceptable standard. A majority of respondents (53%) disagreed (giving a score of 0-4), while a third of respondents (33%) agreed (scoring between 6-10). The average rating across all respondents was 4.2 out of 10 (where 10 = strongly agree that roads are maintained to an acceptable standard). Results were consistent by age, gender and council area.

On a scale of 0-10, how strongly do you agree or disagree that roads in the Adelaide Hills are maintained to an acceptable standard?

Base: All respondents (n=614)

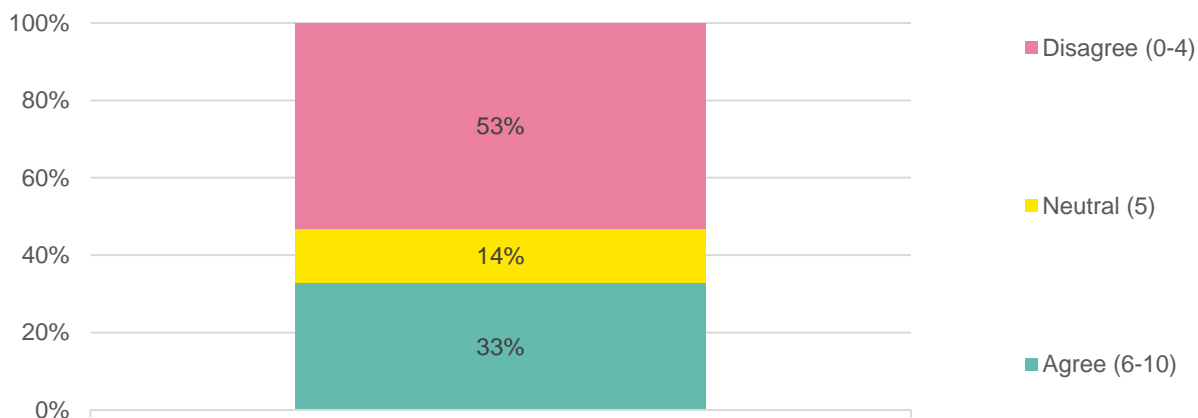


Figure 6: Level of agreeance amongst survey respondents that roads in the Adelaide Hills are maintained to an acceptable standard

When asked to select the most concerning road issues in the region, eight in ten respondents selected 'uneven or undulating road surface' (79%) and 'pot holes' (78%), while three quarters (73%) selected 'unsafe intersections'. Over six in ten were concerned about 'lack of overtaking opportunities' (66%) and 'narrow roads, lanes or bridges' (61%), and around four in ten were concerned about 'poor or no line markings' (43%), 'poor/inadequate signage' (41%) and 'roadside vegetation' (41%). Out of the options provided, levels of concern were lowest relating to 'not enough guard rails' (22%) and 'roadside rest areas' (18%). A range of other issues were also raised, including inadequate facilities for cyclists and pedestrians, inappropriate or inconsistent speed limits, and lack of sealed road shoulders.

Concern about lack of overtaking opportunities and not enough guard rails were correlated with age: 80% of 18-44 year olds were concerned about lack of overtaking opportunities and 34% were concerned about there not being enough guard rails, compared with 55% and 12% respectively of those aged 65 and over. Roadside vegetation was of concern for 47% of Adelaide Hills Council residents and 34% of Mount Barker DC residents.

Overall, when ranking the issues, the number one concern for respondents was most commonly 'uneven or undulating road surface' (24%), followed by 'unsafe intersections' (18%) and 'pot holes' (17%).

Please rank the items below in the order you consider to be the biggest concerns regarding roads in the region...

Base: All respondents (n=614)

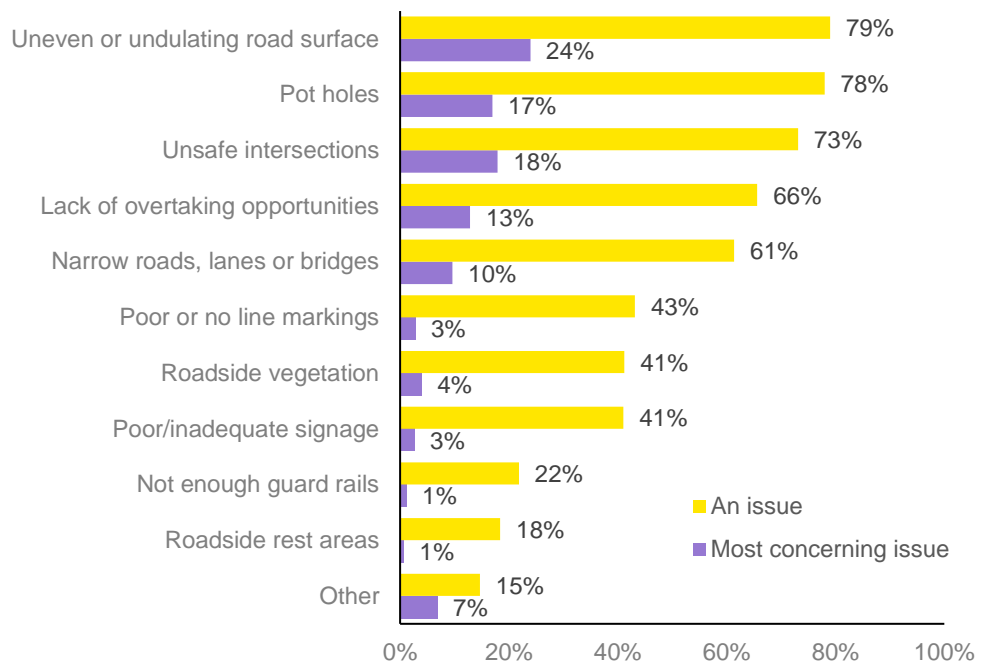


Figure 7: Survey respondents' biggest concerns regarding roads in the region

Eight in ten respondents (80%) felt that major improvements are needed within the region to improve the road/transport conditions. A slightly higher proportion of residents from Mount Barker DC were likely to feel that major improvements are needed (85%), compared with those from the Adelaide Hills Council area (77%).

In your opinion, are major road, mobility or transport improvements needed within the Adelaide Hills region? % Yes

Base: All respondents

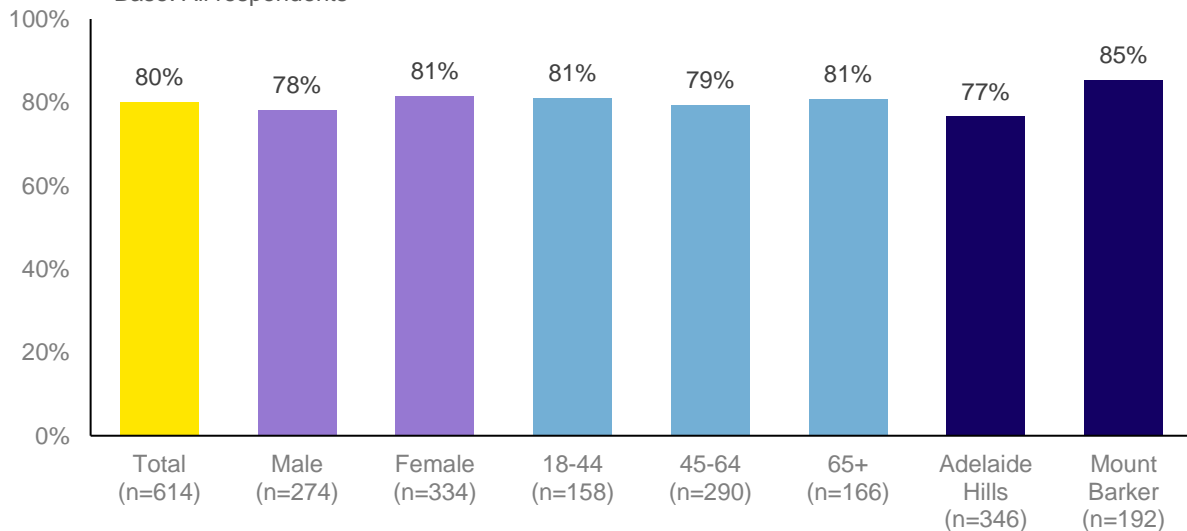


Figure 8: Percentage of survey respondents who believe major road, mobility or transport improvements are needed

Those who indicated a need for road improvements were asked to provide more information and identify specific roads in the region that they felt need improvements. Table 3 shows the top 15 roads and intersections mentioned by survey respondents across four open ended verbatim questions on major improvements needed, freight issues, speed limits, and ‘other’ issues. The five roads which received the most mentions included the South Eastern Freeway, Onkaparinga Valley Road, Nairne Road (Woodside – Nairne), Greenhill Road and Mount Barker Road in Hahndorf.

Table 3: Roads and intersections most raised in the regional community survey

Road name	No. of mentions
1. South Eastern Freeway	119
2. Onkaparinga Valley Road	66
3. Woodside Road / Old Princes Highway (Nairne)	50
4. Greenhill Road	49
5. Mount Barker Road (Hahndorf main street)	42
6. Onkaparinga Valley Road / Nairne Road / Tiers Road (Woodside)	33
7. SE Freeway onramps (various)	32
8. Mount Barker Road (excl. Hahndorf main street)	31
9. Gorge Road	26
10. Nairne Road (Woodside – Nairne)	26
11. Upper Sturt Road	22
12. Adelaide Road	21
13. North East Road	20
14. Piccadilly Road	20
15. Wellington Rd / Victoria Road (Mt Barker)	17

Respondents had the opportunity to provide more detail about the issues on the roads they nominated as in need of improvement. Issues raised most commonly related to poor road surfaces or congestion, with some roads and intersections also criticised for poor visibility, lack of width or difficulties when turning or merging.

Freight

When asked to select their main concerns regarding freight movement within the region, around three quarters of respondents selected 'road width' (78%), 'ability to overtake safely' (77%) and 'the size of trucks on some roads' (75%). Around two thirds were concerned about 'road surface' (66%) and 'intersection layout not suited to freight movement' (64%), and over half were concerned about 'speed' (58%) and 'intersection visibility' (52%). Out of the options provided, levels of concern were lowest relating to 'poor roadside signage' (19%) and 'roadside rest areas' (17%). A range of other issues relating to freight were also raised, including noise pollution and concerns on the South Eastern Freeway relating to congestion and safety.

Younger respondents (i.e. those aged 18-44) were most likely to be concerned about ability to overtake safely (88%) and intersection visibility (62%).

When ranking the issues, the number one concern for respondents was most commonly 'size of trucks on some roads' (22%), followed by 'ability to overtake safely' (18%), with 'road width' (14%) only the fourth most selected option after 'road surface' (15%).

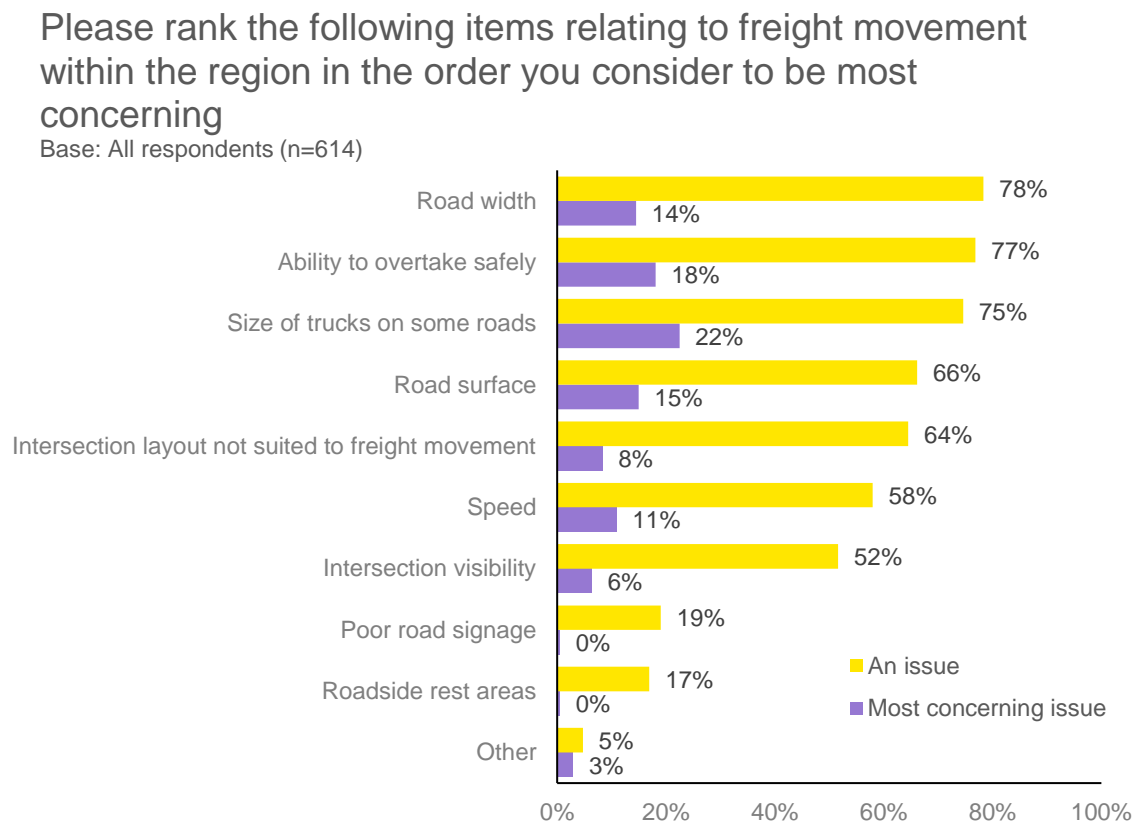


Figure 9: Survey respondent concerns regarding freight movement in the Adelaide Hills region

For further insight regarding freight interactions, respondents were asked whether there were any roads or intersections where they have experienced or noticed challenging or unsafe freight interactions, with two thirds (65%) indicating that there were. These respondents were able to provide further comment, with concerns raised on North East Road (Chain of Ponds), the South Eastern Freeway, Gorge Road, Greenhill Road, the main street of Hahndorf, Lobethal Road, Onkaparinga Valley Road, and Wellington Road. Respondents discussed some of the challenges posed by narrow, winding roads, including trucks encroaching on the other side of the road when cornering. They also highlighted trucks struggling to negotiate roundabouts and delays to faster traffic on the South Eastern Freeway caused by trucks overtaking other trucks. In relation to speed, trucks were criticised in some cases for driving dangerously fast and in other cases for causing congestion through driving too slowly.

“Trucks going too fast and crossing double lines.”

“Roundabouts are too tight for large vehicles (buses, trucks) to navigate safely.”

“Trucks thinking they can pass another truck going up a hill, and banking traffic up for kilometres while they crawl past.”

The Lobethal Freight Access Upgrade project was underway at the time the survey was conducted. The project is now complete and allows for b-double access between Palmer and Lobethal. We asked respondents to indicate how they felt about the project, with 36% supporting it and 14% opposing it. Support was higher among males (45%) than among females (29%), while opposition was highest among those aged 65 and over (20%). Half of respondents (50%) were neutral about the project, either because they lacked knowledge about it or because they are not directly affected by the project (e.g. if they do not live nearby and rarely drive the project route). The location of the project in the Adelaide Hills Council area was reflected in responses, with those living in the Mount Barker DC area particularly likely to give a neutral response (61%).

Please indicate how you feel about the Lobethal Freight Access Upgrade project

Base: All respondents (n=614)

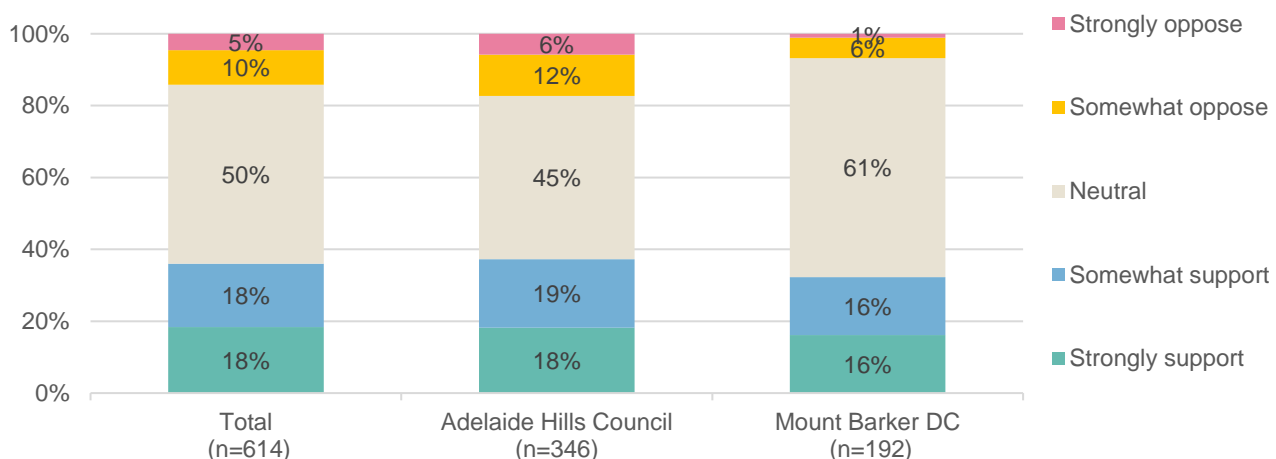


Figure 10: Level of community support for the Lobethal Freight Access Upgrade

Respondents were given the opportunity to provide a comment explaining their view on the Lobethal Freight Access Upgrade project. Those who supported the project welcomed the road upgrades it would bring, hoping it would reduce freight movements on unsafe routes (including routes through more built up areas, windier roads and the South Eastern Freeway) and saw economic benefits for the region. However, those opposed to the project questioned the suitability of the route given the narrowness of the existing roads and the size of b-double trucks. They were concerned about the impact on residents and other road users and felt that industrial operations such as the Lobethal abattoir should be relocated elsewhere.

“It’s a great idea to improve the roads to accommodate heavy vehicles servicing such things as the abattoir industry between Lobethal and Murray Bridge and hopefully decrease some heavy vehicle traffic throughout the hills and freeway.”

“Mt Torrens to Lobethal Road is not of a high enough standard for this type of traffic. This road in particular would need a major upgrade to be safe enough for b-doubles.”

In a similar question, we sought to identify attitudes towards the state government's \$20m master plan and business case for the GlobeLink project, which involved a new road and rail corridor behind the Adelaide Hills linking the national highway and rail networks near Murray Bridge and Truro. Overall, three quarters of respondents (77%) indicated support towards the project, two in ten (20%) were neutral and only 3% were opposed. Males (61%) and those aged 65 and over (65%) were particularly likely to strongly support the GlobeLink project, whereas there were no significant differences between residents of the two main council areas.

Please indicate how you feel about the GlobeLink project

Base: All respondents (n=614)

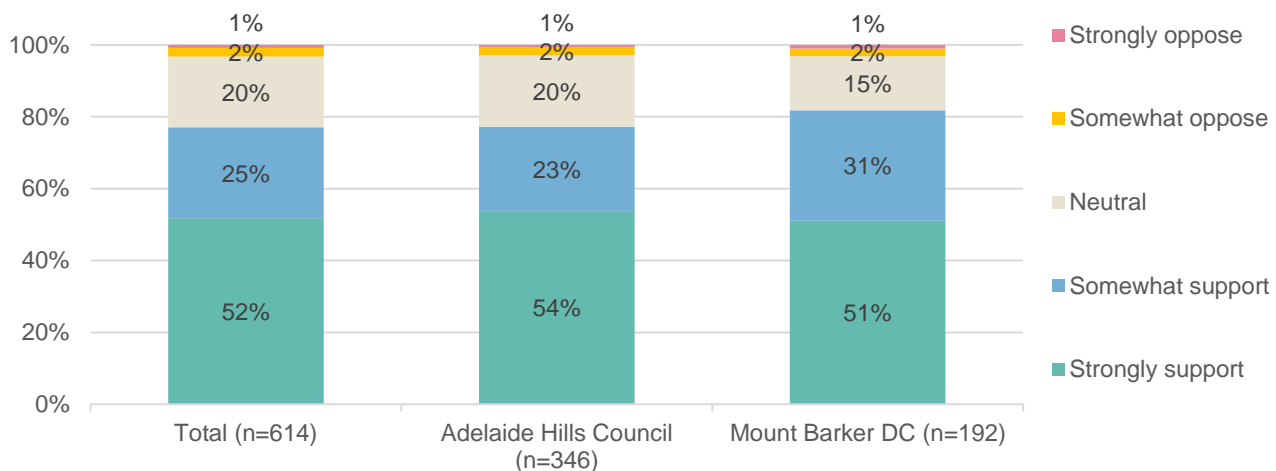


Figure 11: Level of community support for the GlobeLink project

Respondents were given the opportunity to provide a comment explaining their view on the GlobeLink project. Responses were similar to those received for the Lobethal Freight Access Upgrade and reflected the positive outcomes provided through having reduced freight movement and congestion on the South Eastern Freeway, through regional towns and through Adelaide suburbs and the economic benefits from more efficient freight travel. Those opposed to the project felt it was too expensive and the route was too indirect.

“Avoiding Portrush Road and SE Freeway will go a long way to managing heavy traffic and reduce danger in peak hour particularly with heavy vehicles combined with daily commuters.”

“It is a waste of money. Trucks wanting to get to Adelaide will not use it. Only trucks going through to Northern SA, NT & WA. And even they will not use it if it is further and more expensive.”

On January 28, 2020, the state government formally announced the decision not to proceed with the GlobeLink project, citing a lack of demand and economic benefit to justify the expenditure. RAA subsequently fast-tracked a review of the South Eastern Freeway independently of this report as a way of providing alternative freight route recommendations, with the report and findings available for download at www.raa.com.au/roadassessments.

There has been \$12m in funding allocated to upgrade the existing freight route south of Murray Bridge to the Sturt Highway to render this route a more attractive (albeit significantly longer) alternative to the South Eastern Freeway as announced on 24 June 2020².

² Government of South Australia, 2020, Media releases 24 June 2020, \$145 million to unlock infrastructure jobs in SA, accessed at [https://www.premier.sa.gov.au/news/media-releases/news/\\$145-million-to-unlock-infrastructure-jobs-in-sa](https://www.premier.sa.gov.au/news/media-releases/news/$145-million-to-unlock-infrastructure-jobs-in-sa).

Road safety

Respondents were asked to rank the most concerning road safety issues in the Adelaide Hills from a range of factors relating to road design, road maintenance, speed limits and road user behaviour. Two thirds of respondents selected poor cyclist behaviour (68%) and sealed road maintenance (66%) among their concerns, six in ten selected road conditions (59%) and poor behaviour from visitor drivers (58%) and just over half selected driving/riding under the influence of alcohol or drugs (55%), poor behaviour from local drivers (54%) and road geometry (51%). More than four in ten selected poor pedestrian infrastructure (49%), poor motorcyclist behaviour (48%), inappropriate speed limits (47%), poor drainage (46%) and unsealed road maintenance (44%) and around a third selected roadside vegetation/fixed hazards (36%). A range of other issues relating to road safety were also raised, including inadequate cycling infrastructure, lack of passing places and low speed limits leading to driver frustration.

Females were most likely than males to be concerned about poor pedestrian infrastructure (54% compared with 43%) and poor drainage (51% compared with 39%). Poor drainage was also a bigger concern for 18-44 year olds (58%) than those aged 65+ and over (30%). Mount Barker DC residents were concerned about poor road user behaviour by local drivers (63%) and maintenance on unsealed roads (52%).

When ranking the issues, the number one concern for respondents was maintenance on sealed roads (16%), followed by poor cyclist behaviour (14%).

Please rank the following items in the order you consider to be the biggest road safety concerns in the region

Base: All respondents (n=614)

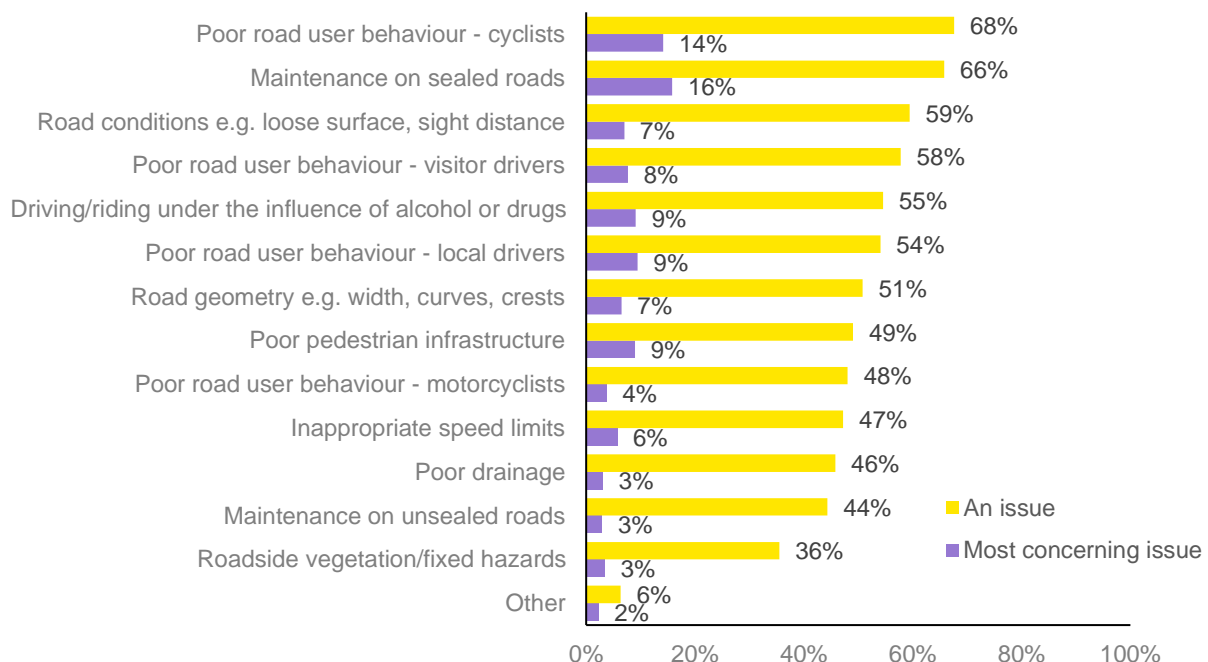


Figure 12: Most concerning road safety issues in the Adelaide Hills region as rated by survey respondents

Residents were asked whether they thought locals and/or tourists would be involved in the majority of crashes in the region, to which three in ten (31%) believed an equal number of tourists and locals contributed to road crashes. Around two in ten respondents (21%) indicated locals were more likely to be involved, and a similar proportion (20%) felt visitors would be more likely to be involved. The remaining 28% were unsure.

Those aged between 18 and 44 (28%), and male respondents (24%) were particularly likely to perceive that visitors are involved in the majority of crashes, and Adelaide Hills Council residents were more likely than Mount Barker DC residents to believe this (24% compared with 12%).

Who do you believe are involved in the majority of crashes within the region?

Base: All respondent (n=614)

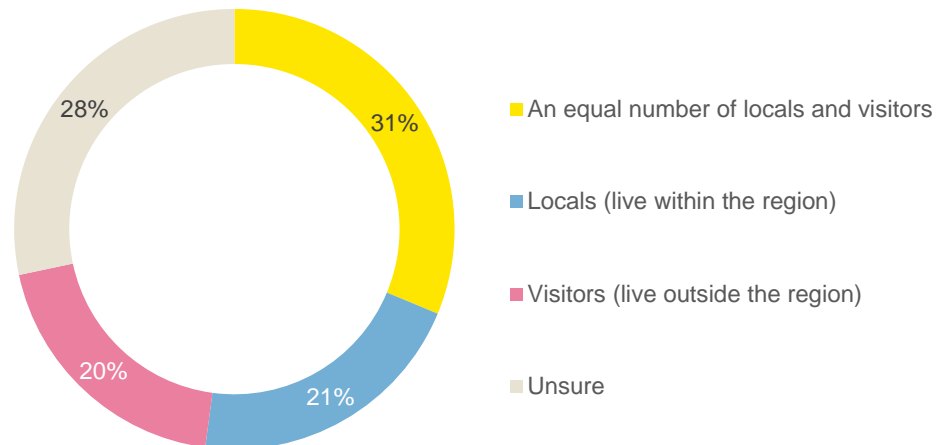


Figure 13: Survey respondent perceptions of whether visiting or local drivers are involved in the majority of crashes

When asked whether there were any unsealed/gravel roads in the region that they have safety concerns about, 22% raised issues with specific roads and provided further information about these locations. At least three nominations each were received for Croft Road (Lenswood), Harrogate Road (Harrogate), Liebelt Road (Biggs Flat) and Windsor Avenue (Hahndorf), with issues on unsealed roads generally relating to potholes, corrugations, poor maintenance schedules and poor visibility.

“Many are corrugated or potholed and the grader just fills them up for them to reappear a week later. Our heavy hills rains wash a lot of it away too and it just gets regraded with no real rectification made. Plus time between damage and grading is way beyond acceptable.”

“Blind bends, too narrow for dual carriage, potholes, high volume of non-local traffic.”

When asked whether there were any roads or intersections that were considered unsafe (that hadn't already been mentioned), 44% indicated there were and provided additional information. A number of the comments received related to safety concerns on Adelaide Road (difficulties turning right onto/from the South Eastern Freeway), Greenhill Road (tight bends, poor visibility, high cyclist use, lack of overtaking opportunities), Long Valley Road (poor visibility, lack of overtaking opportunities), Mount Barker Road, Nairne Road (difficulties turning at intersection with Onkaparinga Valley Road), North East Road (narrow road with poor visibility at various intersections), the South Eastern Freeway (problems with merging onto the freeway from on-ramps), Wellington Road (calls for a roundabout at the intersection with Victoria Road) and Woodside Road (difficulties turning at intersection with Old Princes Highway).

The Rural Junction Active Warning System (RJAWS) is currently used at two intersections in the Adelaide Hills region: Cudlee Creek Road/Fox Creek Road (Cudlee Creek); and Bull Creek Road/Paris Creek Road (Bull Creek) to lower the speed of traffic approaching the respective junctions. The system detects vehicles approaching the intersection from the side road and automatically lowers the speed limit on the through road to provide a safer gap for vehicles entering from the side road. This technology is used in locations where sight distance is poor under current operating speeds and the cost to increase sight distance is prohibitive.

When asked about their support for the Rural Junction Active Warning System (RJAWS), three quarters (72%) of respondents gave their support towards this technology being used in locations with poor geometry and only 3% were opposed. A quarter (25%) gave a neutral response, typically because they were unfamiliar with the technology and/or intersections where it has been implemented. There were no significant differences by gender, age or council area.

How would you rate your level of support of RJAWS to improve safety at intersections with poor geometry?

Base: All respondents (n=614)

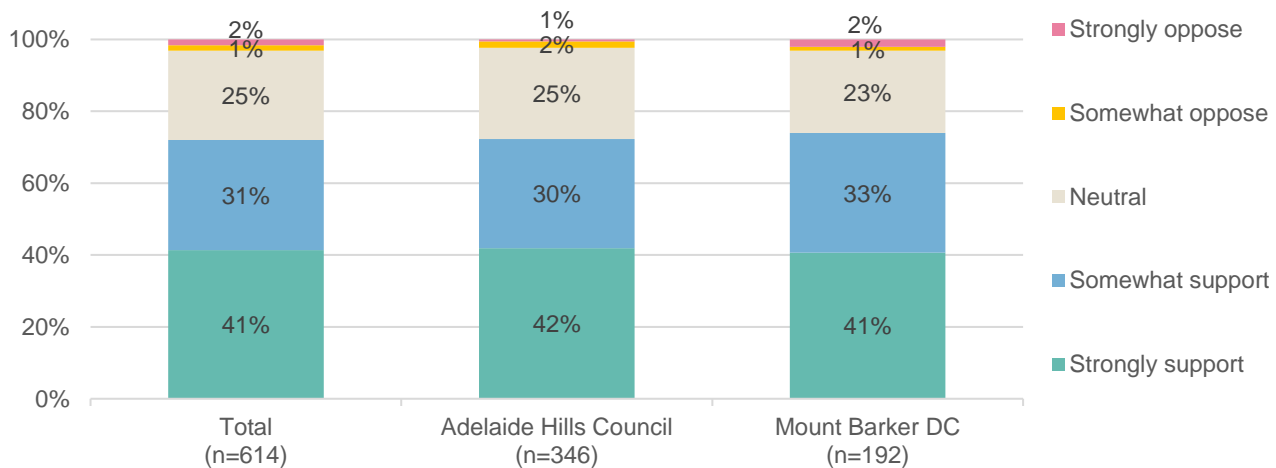


Figure 14: Level of community support for the use of RJAWS at intersections with poor geometry

Respondents were given the opportunity to provide a comment explaining their view on RJAWS. Many positive comments supported the uptake of an innovative technology and increased safety the system provides, with some having observed improvements at intersections where the technology has already been installed. Those who were opposed questioned its effectiveness or opposed speed limit reductions/changes.

"I go through the Cudlee Creek and Fox Creek intersection at least once a week and since the RJAWS has been installed I feel safer. This system needs to be rolled out to other intersections with poor visibility and geometry."

"Most people ignore it and it does not fix the basic road design problem."

"This is very effective (when it's working) as a reminder to lower speed and as a prompt to highlight dangerous intersections."

"Personal experience at Fox Creek /Cudlee Creek Rd indicates the RJAWS is a very worthwhile safety initiative."

"If you're changing the speed limit constantly people will get confused."

"Both the intersections mentioned provide really useful indicators and if data shows a reduced incidence of accidents then it makes sense to replicate elsewhere."

Safety on the South Eastern Freeway

Respondents were asked some questions specifically relating to safety on the South Eastern Freeway.

Firstly, respondents were asked how often they travel on the South Eastern Freeway. Three quarters (78%) used the freeway at least weekly, while one in ten (11%) used the freeway every day. Mount Barker DC residents were more likely than Adelaide Hills Council residents to travel on the freeway at least weekly (90% compared with 75%), reflecting their closer proximity to the freeway in most cases. Only respondents who used the freeway at least weekly were asked further questions about it.

How often do you use the South Eastern Freeway?

Base: All respondents (n=614)

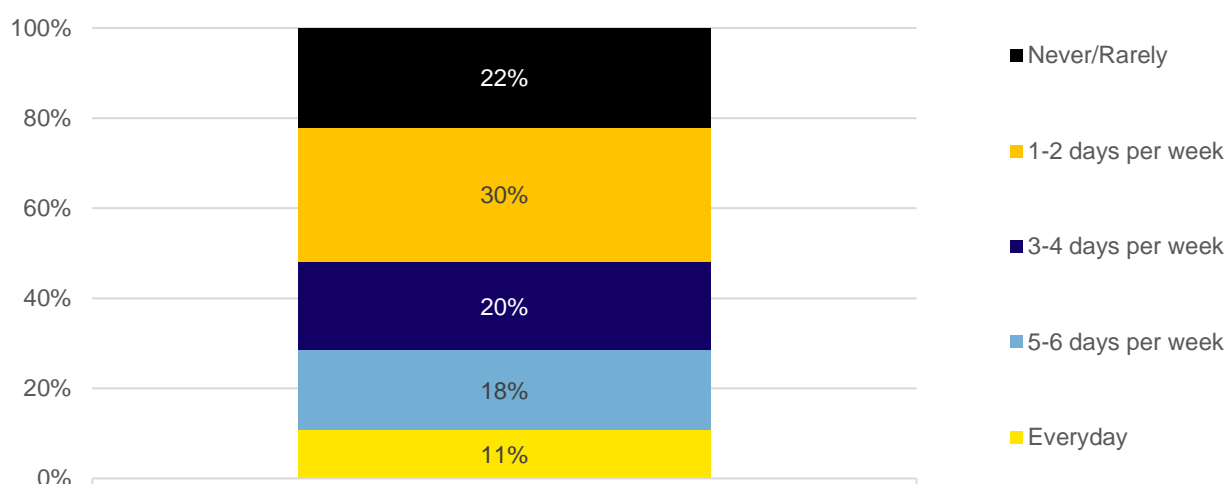


Figure 15: How often survey respondents use the South Eastern Freeway

Those who travel at least weekly on the South Eastern Freeway were asked to rate how much of an issue several safety issues are on an 11-point scale, where 0 indicated it is not an issue at all and 10 indicated it is a serious issue. When looking at the average scores for each of the road safety issues assessed, the perceived most serious issues were drivers failing to keep left unless overtaking (7.3) and drivers tailgating (7.3), followed by inattentive drivers (6.5) and difficulties entering or exiting the freeway (6.1). Heavy vehicles on the up and down track and drivers speeding were also rated as fairly serious issues (average of 5.8 in each case), whereas respondents typically did not rate speed limits, signage or road condition as a major issue on the freeway.

On average, females rated difficulties entering or exiting the freeway (6.5 compared with 5.6) and drivers speeding (6.4 compared with 5.1) as a more serious issue than males. Those aged 65 and over (6.5) were relatively unconcerned about drivers failing to keep left unless overtaking.

Based on your experience, how much of a road safety issue do you consider each of the following when driving on the South Eastern Freeway? (0=Not an issue; 10=serious issue)

Base: All who travel on the freeway every week (n=479)

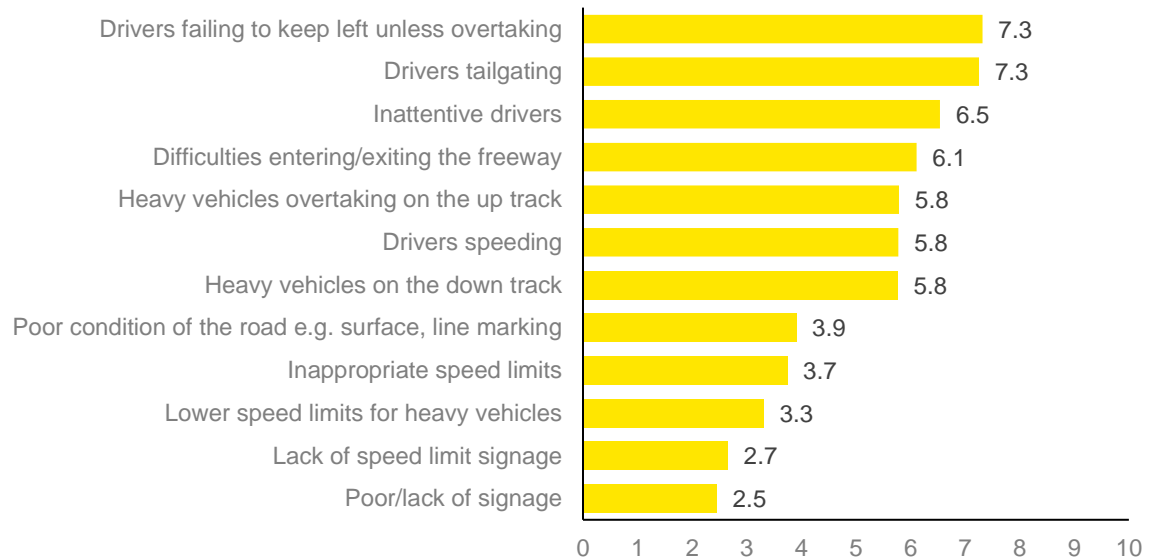


Figure 16: Biggest concerns on the South Eastern Freeway as raised by regular users

We further investigated the issue of drivers failing to keep left on the South Eastern Freeway by asking whether greater enforcement is needed for those drivers that disobey this road rule. Almost two-thirds of weekly Freeway users (64%) agreed that more enforcement was required, giving a rating of between 6 and 10 out of 10, where 10 represents strong agreement. Three in ten (31%) gave a rating of 10 out of 10, indicating strong agreement, although this fell to 19% of those aged 65 and over. A quarter (24%) of respondents disagreed that greater enforcement is needed, giving a rating of between 0 and 4 out of 10.

Do you believe greater enforcement is needed for drivers failing to keep left unless overtaking on the South Eastern Freeway?

Base: All who travel on the freeway every week (n=479)

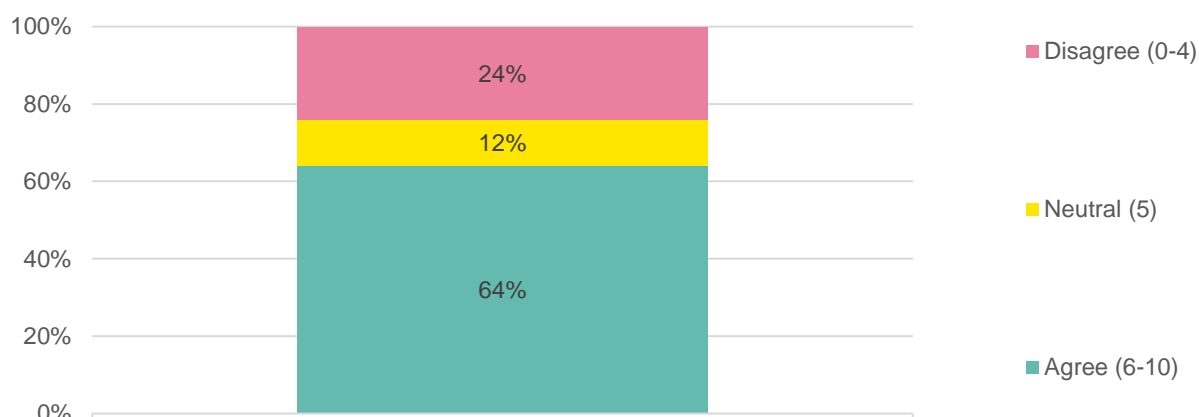


Figure 17: Community opinions regarding the current level of enforcement of the 'keep left unless overtaking' rule on the South Eastern Freeway

Speed zones and limits

Speed limits need to be set at an appropriate level for the road environment to ensure road safety while minimising journey times. However, frequent changes to speed limits cause confusion for drivers, especially if there are multiple changes in what appears to be similar driving conditions over short stretches of road.

Respondents were asked how they feel about speed zones/limits currently operating in the Adelaide Hills. Seven in ten respondents (69%) felt that improvements could be made to speed zones/limits, with the most common view being that the speed limit is too low in certain areas (45%), followed by the view that speed zones change too frequently (38%). Conversely, two in ten respondents (18%) believed that the speed limit is too high in some areas. Only 2% of respondents felt there are not enough speed zone changes.

Males were more likely than females to think that the speed limit is too low in certain areas (54% compared with 38%), as were 18-44 year olds (59%) compared with those aged 65+ (36%). Those aged 65 and over (37%) and those living in the Mount Barker DC area (36%) were significantly more likely than average to be satisfied with current speed zones/limits.

How do you feel regarding speed zones/limits in the Adelaide Hills?

Base: All respondents (n=614)

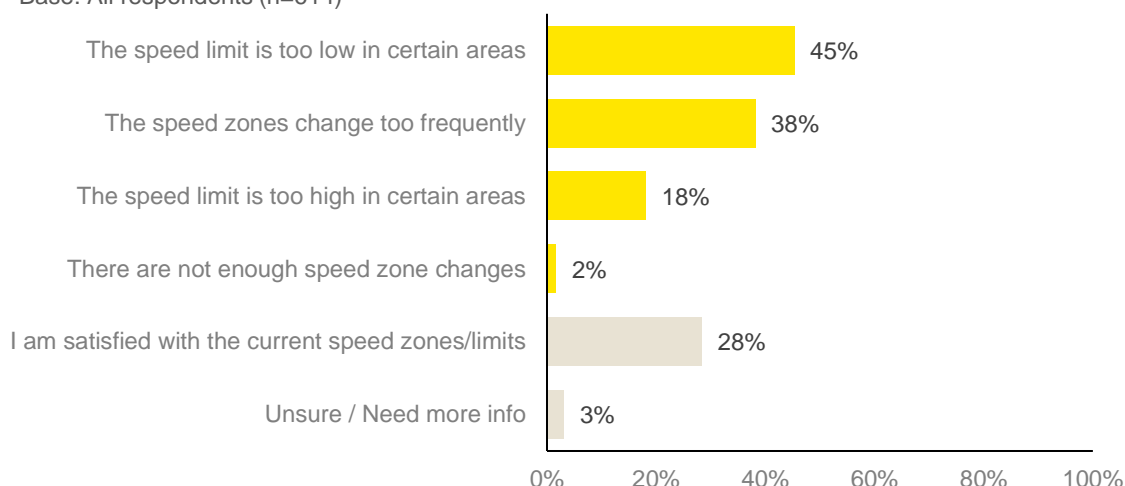


Figure 18: Community opinions regarding speed limits in the Adelaide Hills region

Respondents were asked whether there was a specific location where they thought speed zones/limits should be reviewed, and six in ten (58%) provided a suggestion. These are summarised as follows:

- a lower and more consistent speed limit on Greenhill Road and Mount Lofty Summit Road;
- a lower speed limit on Gorge Road and Battunga Road;
- a higher speed limit on Piccadilly Road; and
- a higher and more consistent speed limit on Onkaparinga Valley Road, the South Eastern Freeway and Woodside – Nairne Road.

There were also some calls for the speed limits to be reviewed with the intention of increasing the prevailing limit.

“Speed limits have been lowered and a once consistent limit is fractured. Insufficient signage causes some confusing driver behaviour.”

“All town connecting roads that have been reduced to 80km/h and the extension of 50km/h zones well past common sense.”

“80km/h is too high on winding roads with houses either side!”

Unsealed roads are subject to a default speed limit of 100km/h. However, three quarters of respondents (75%) were unaware of this, with respondents more likely to think the speed limit on an unsigned unsealed road is 60km/h (37%) or 80km/h (28%) than 100km/h (25%). Males (31%) were more likely than females (20%) to correctly state that the default speed limit on unsealed roads is 100km/h, whereas nearly half of females (44%) gave an answer of 60km/h (compared with 28% of males).

What do you believe to be the speed limit on an unsealed road that is NOT sign posted?

Base: All respondents (n=614)

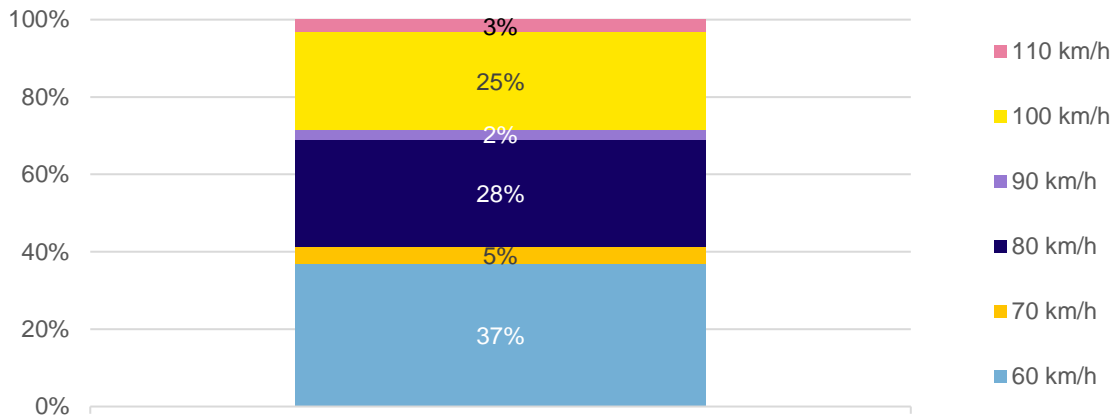


Figure 19: Speed limit that survey respondents think applies to an unsealed road that is not sign posted

A subsequent question was asked to gauge support for a blanket speed limit reduction from 100km/h to 80km/h on unsealed roads. Most respondents (57%) supported a blanket speed reduction, with three in ten (29%) opposed. Support for a default speed limit reduction on unsealed roads was highest among females (61%) and lowest among 18-44 year olds (46%), and particularly among 18-44 year old males (41%).

Would you support a blanket speed reduction to 80km/h on all unsealed roads in the region?

Base: All respondents (n=614)

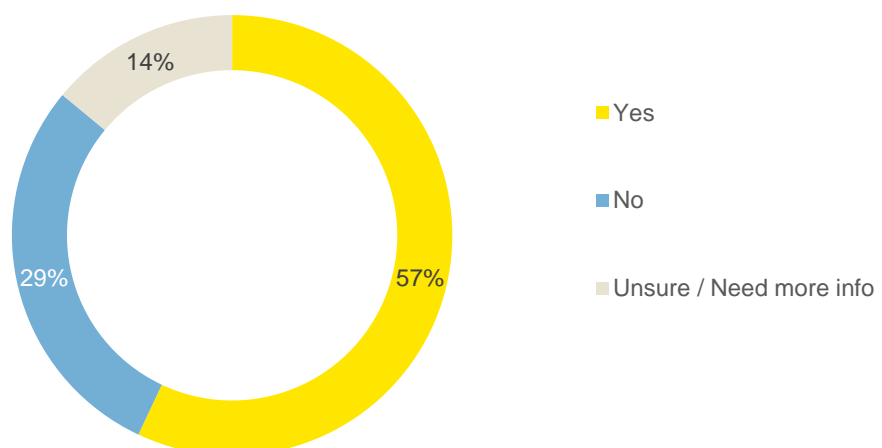


Figure 20: Level of community support for a blanket speed limit reduction to 80km/h on unsealed roads in the region

Cycling

Two in ten respondents (21%) indicated that they had ridden a bicycle in the Adelaide Hills in the past 6 months, with no significant differences by gender, age or council area. This subset of respondents were asked what they believe are the primary safety issues facing cyclists riding in the Adelaide Hills. Around six in ten indicated that the primary safety issues were sharing the road with cars (60%), a lack of dedicated cycling lanes (60%) and a lack of off-road cycling paths (58%). A third of cyclists raised the condition of the roads (36%) and speed of passing cars (35%) as a primary safety issue. Respondents were unlikely to raise sharing the road with motorcycles (8%), weather conditions (8%) or sharing the road with other cyclists (5%) as a primary safety issue. The most common issue raised by cyclists that was not included as a response option was the lack of sealed road shoulders.

From a cyclists perspective, what do you see as the primary safety issues when riding a bicycle in the Adelaide Hills?

Base: All who have cycled in the Adelaide Hills in the past 6 months (n=127)

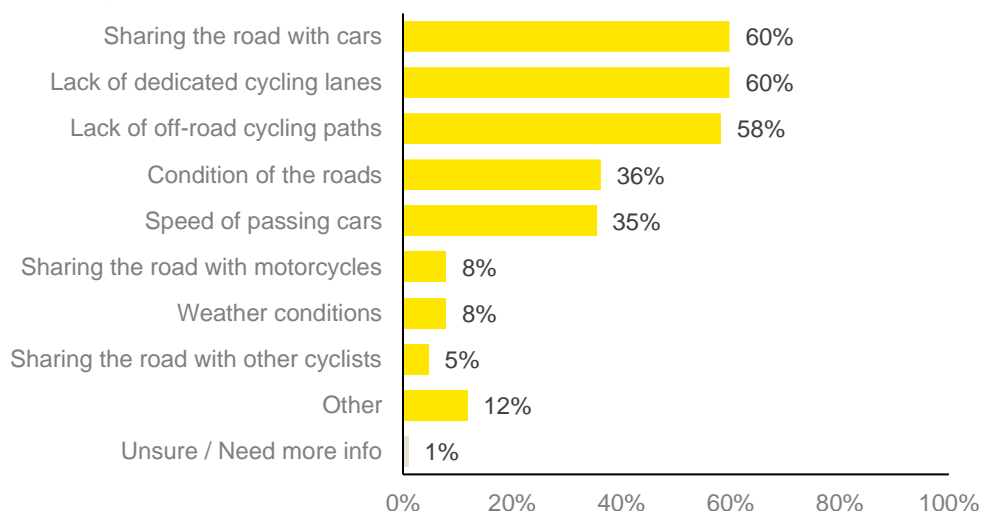


Figure 21: Primary safety issues raised by survey respondents who rode a bicycle in the six months preceding the survey

All respondents were asked their opinion on whether they felt the current road network encourages cycling in the region and whether they consider cycling in the region to be safe. Three quarters of respondents (78%) considered cycling in the Adelaide Hills to be unsafe and a majority (58%) did not believe that the network encourages cycling. Adelaide Hills Council residents were more likely than Mount Barker DC residents to consider cycling in the region to be unsafe (82% compared with 70%). Those who have cycled in the Adelaide Hills in the past 6 months were less likely to consider cycling to be unsafe (66%) compared with those who haven't (81%), reflecting that people who view an activity as unsafe are less likely to do it.

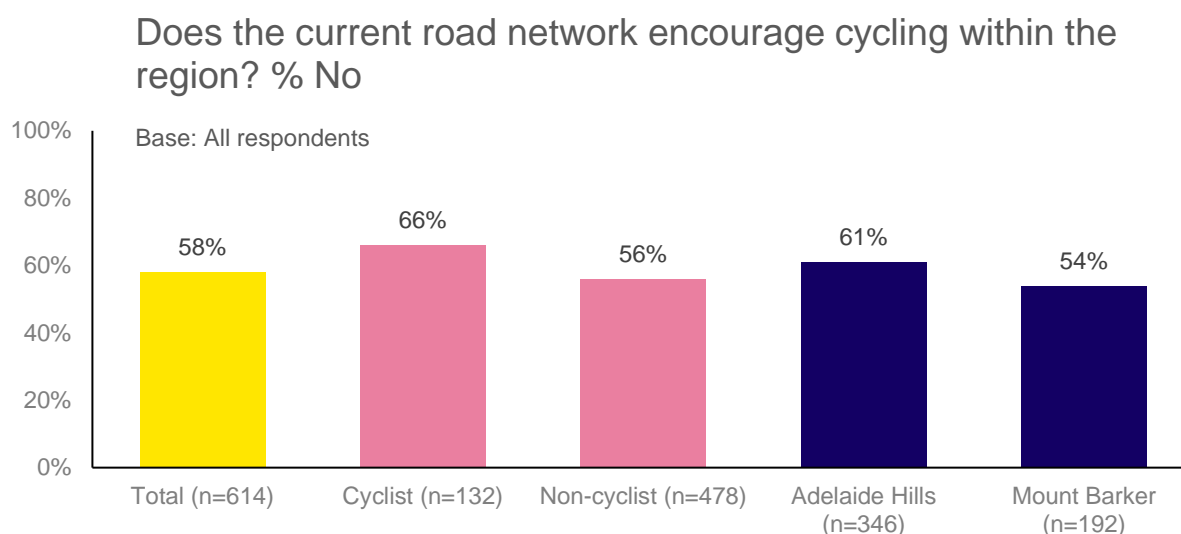


Figure 22: Percentage of survey respondents who think the road network doesn't encourage cycling in the region

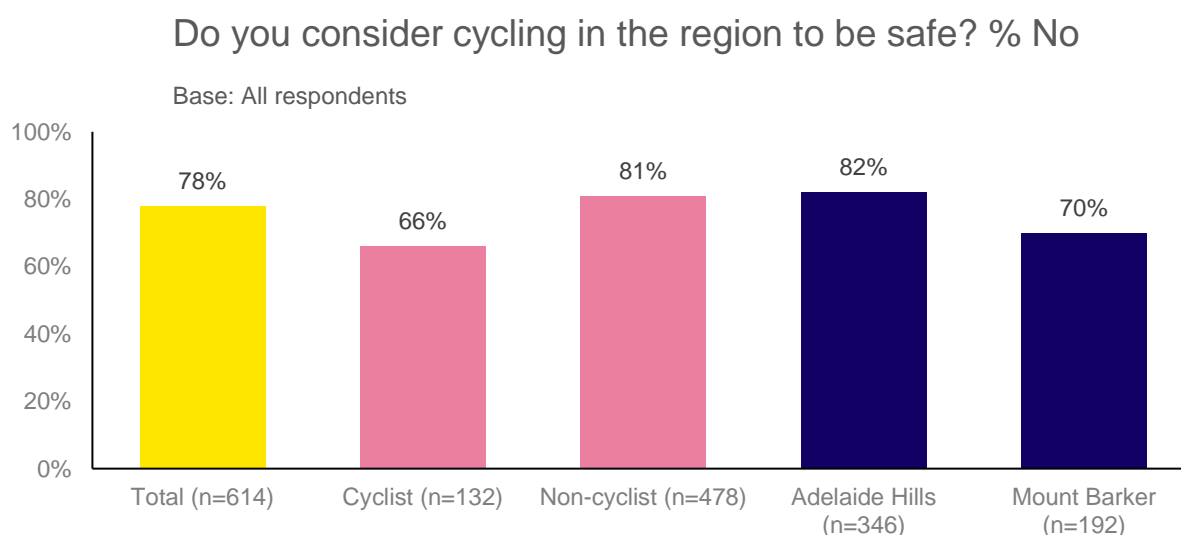


Figure 23: Percentage of survey respondents who consider cycling in the region to be unsafe

Comments relating to increasing the safety of cycling in the Adelaide Hills highlighted the importance of having dedicated bike lanes, widening roads, sealing shoulders, increasing usage of the Amy Gillett bikeway (and developing further off-road sealed cycle paths), and encouraging cyclists to ride in single file. Some respondents proposed that cycling should not be permitted on some or all Adelaide Hills roads, or that it should be restricted to certain times of day, to reduce the number of cyclists riding at dangerous locations or times.

"More separated cycle/pedestrian trails, more off-road trails and more high quality sealed shoulders/ bike lanes all creating connectivity around and between towns in the hills and down to Adelaide."

"I think there are some roads which should be closed to cyclists. Many roads are windy, narrow and passing cyclists is incredibly dangerous for everyone."

Respondents were asked their opinion on current cycling laws which require drivers to give a minimum of one metre clearance when passing a cyclist where the speed limit is 60 km/h or less, or 1.5 metres where the speed limit is over 60 km/h. Half of respondents (52%) supported these rules, while a third (33%) were opposed. Among those who have cycled in the Adelaide Hills in the past 6 months, support for minimum passing laws increases to two thirds (64%), with nearly half (45%) strongly supporting the laws.

How do you feel about the current cycling laws?

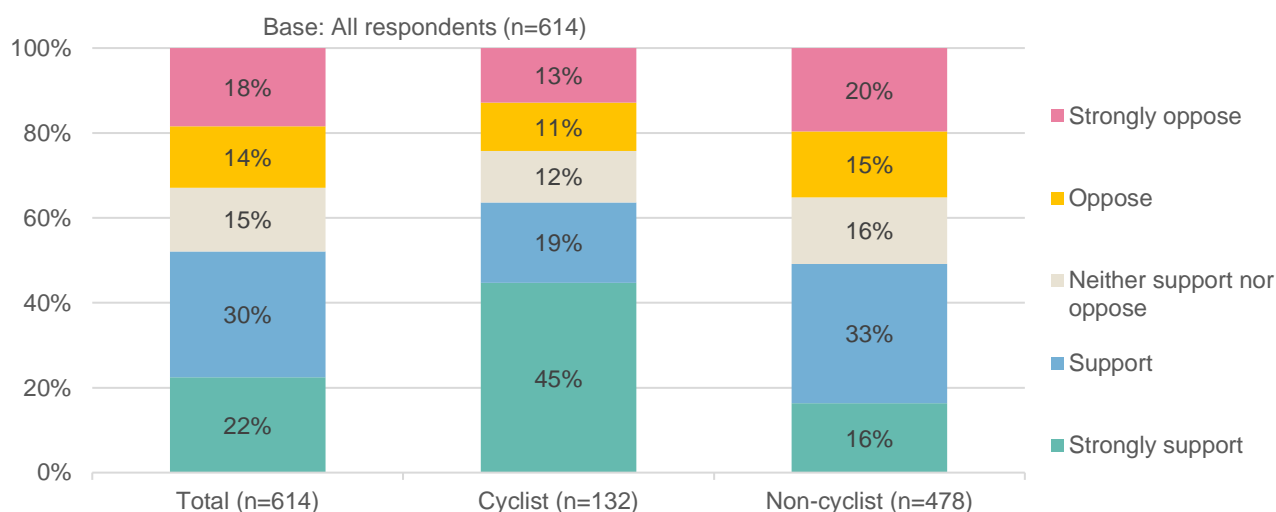


Figure 24: Level of support for current 1m/1.5m passing clearance cycle laws

Those who supported current cycling laws felt the laws provided protection that helped to keep cyclists safe, whereas those opposed to the laws felt that roads in the Adelaide Hills are too narrow and windy for these rules to be practical, particularly when cyclists ride two or more abreast. Indeed, some felt that allowing drivers to cross a solid dividing line to enable the required separation was encouraging drivers to take safety risks of their own.

“There are more cyclists in the hills every year and this rule protects the cyclist and allows the driver to overtake where safe.”

“A solid white line has a meaning, why confuse the issue with an exception? i.e. it's ok to break a rule in dangerous situations.”

On 12 October 2020, Adelaide Hills Council announced that they had received \$2.6m in federal funding to complete the Mount Torrens to Birdwood stage four section of the Amy Gillett Bikeway³. This is an important step forward in providing a continuous north-south cycle route through the Adelaide Hills region, and progresses the Adelaide Wine Capital Cycle Trail which will, if funded, provide a continuous cycle trail through South Australia's Wine regions from the Clare Valley to McLaren Vale, for which RAA is advocating for further funding.

Recommendation 1A

Provide funding to extend the Amy Gillett Bikeway from Birdwood to Mount Pleasant and from Balhannah to Hahndorf.

³ Adelaide Hills Council, 2020, Media Release 12 October 2020, \$2.6M secured for Amy Gillett Bikeway, accessed at <https://www.ahc.sa.gov.au/ahc-council/Documents/Media-Releases/COUNCIL-MEDIA-201012-2.6M-secured-to-complete-Amy-Gillett-bikeway.pdf>.

Motorcycling

One in ten respondents (11%) indicated that they had ridden a motorcycle in the Adelaide Hills in the past 6 months, increasing to 17% of males but dropping to 5% of those aged 65 and over. This subset of respondents were asked what prevents or deters them riding in the Adelaide Hills more often. Eight in ten (79%) indicated that the condition of the roads was the biggest deterrent, followed by weather conditions (54%), sharing the road with cars (34%) and sharing the road with cyclists (23%). Motorcyclists were relatively unlikely to identify lack of appropriate barrier protection (13%) or sharing the road with other motorcyclists (2%) as a deterrent.

From a motorcyclists perspective, are there any issues which prevent or deter you from riding a motorcycle more often in the Adelaide Hills?

Base: All who have ridden a motorcycle in the Adelaide Hills in the past 6 months (n=61)

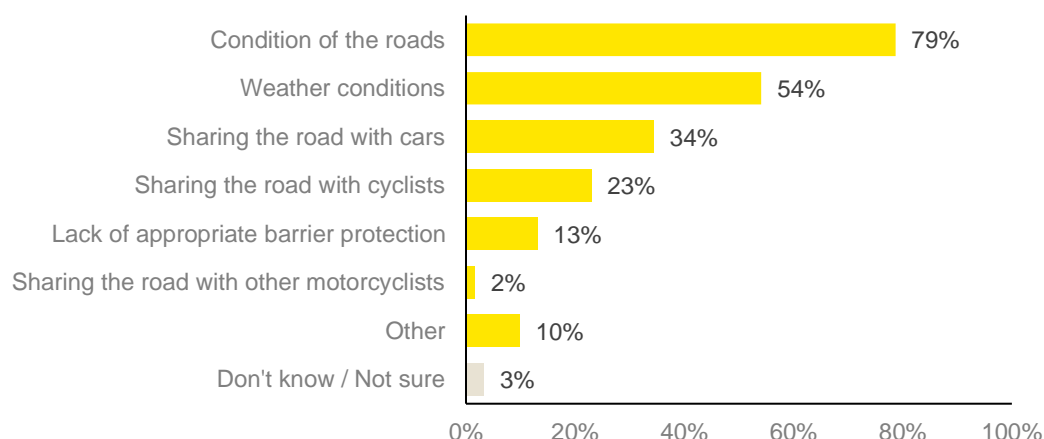


Figure 25: Issues that deter regular motorcyclists from riding more often in the Adelaide Hills region

All respondents were asked whether they consider riding a motorbike in the Adelaide Hills to be safe, with half (48%) believing that it is. This increases to 54% of males and 63% of those who have ridden a motorcycle in the past 6 months.

Do you consider riding a motorcycle in the Adelaide Hills to be safe? % Yes

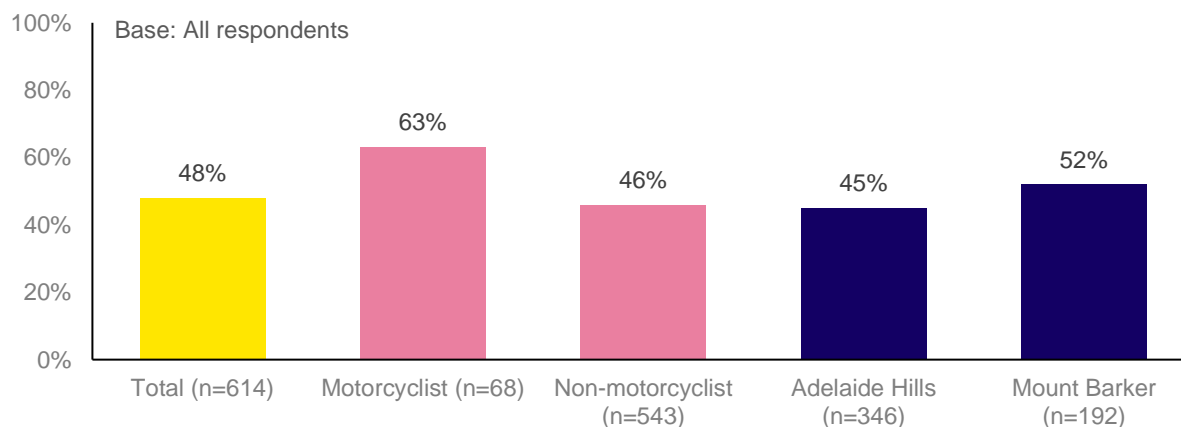


Figure 26: Percentage of survey respondents who consider riding a motorcycle in the Adelaide Hills to be safe

Comments relating to increasing the safety of motorcycling in the Adelaide Hills highlighted the importance of road maintenance, improving the road surface, ensuring motorcyclists keep to the speed limit and to the correct side of the road, and better driver and rider education.

“Make smooth, well maintained road surfaces, current bumpy roads make it easy to lose control.”

“Wider safer roads and motorcyclists riding safer i.e. not speeding and overtaking on blind corners.”

Walking

Almost all journeys involve at least some walking component to link up transport modes with each other or with the start or end destination. Walking is also a popular leisure activity and exercise for many people.

Most respondents (55%) indicated that they walk around their local neighbourhood either always (14%) or often (41%), while 15% do so rarely or never. Males (20% rarely or never) and those aged 18-44 (21% rarely or never) typically walk around their local neighbourhood less frequently than average.

How regularly do you walk around your local neighbourhood?

Base: All respondents (n=614)

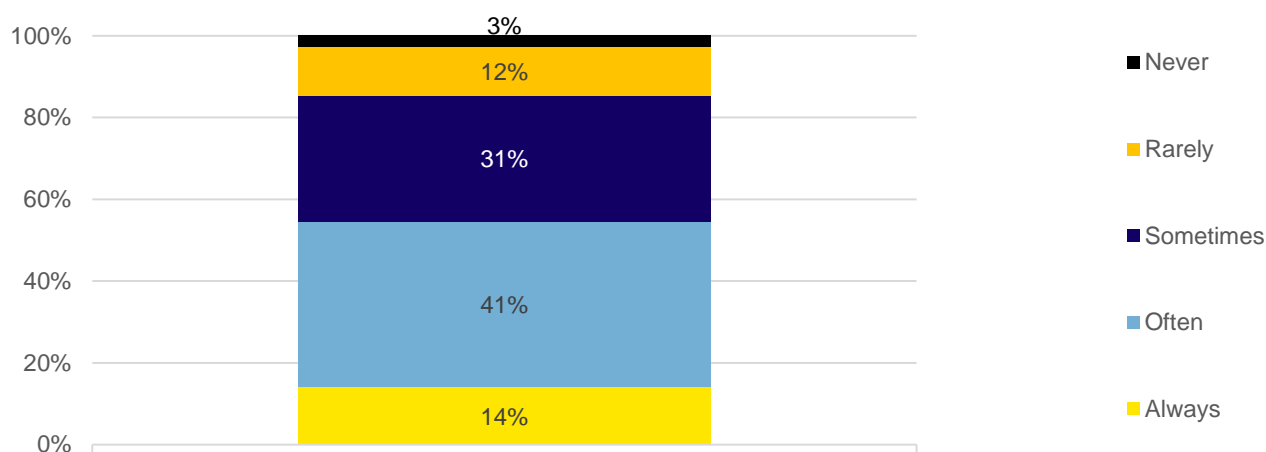


Figure 27: How regularly survey respondents walk around their local neighbourhood

The top two reasons given by those indicating they walk around their neighbourhood rarely or never (n=85) were poor footpaths (45%) and having no need to walk (35%). These were followed by safety concerns (22%), poor lighting (20%) and busy roads (18%). Overhanging vegetation and a dislike for walking (7% in each case) were not typically selected. Other reasons given for not walking in addition to the options listed included lack of footpaths, hilly terrain and lack of time.

Is there a particular reason you don't walk around your neighbourhood more often?

Base: All who rarely or never walk around their neighbourhood (n=85)

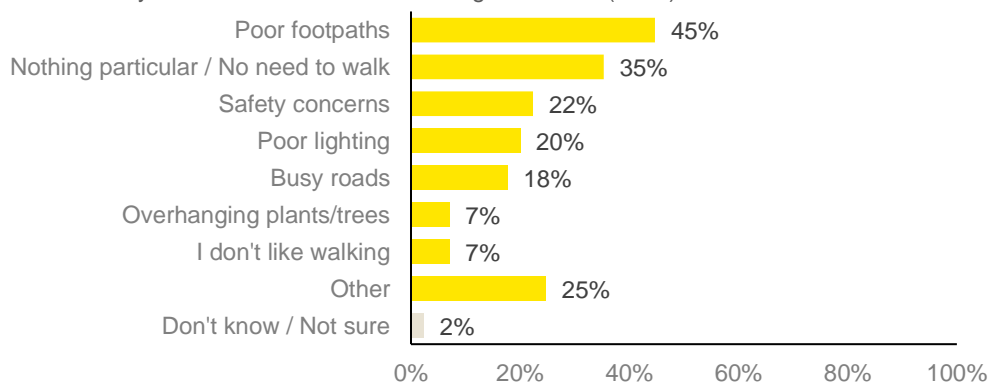


Figure 28: Reasons why survey respondents don't walk around their neighbourhood more often

Three quarters of respondents (75%) considered it safe to cross the road in the main streets of their town. The two in ten (21%) who did not consider the main streets safe to cross were asked to identify their location. Several respondents identified each of Bridgewater, Hahndorf, Mount Barker and Meadows as locations where main streets are unsafe to cross.

When considering the main streets of your town, do you consider them safe to cross?

Base: All respondents (n=614)

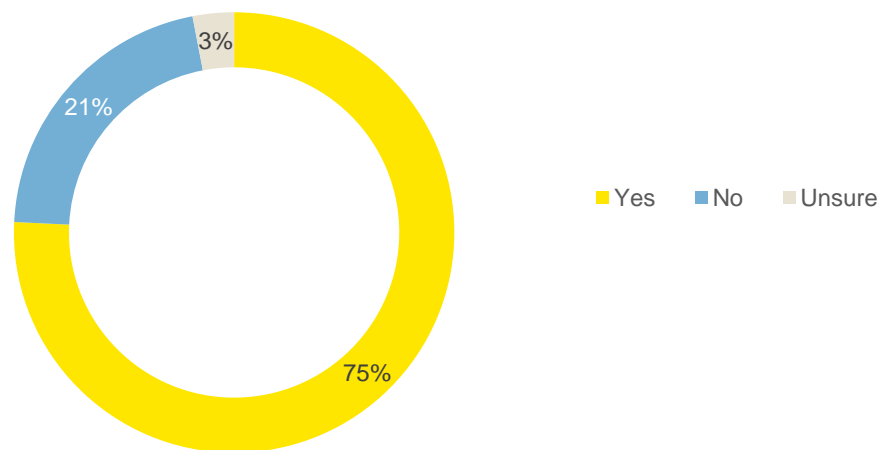


Figure 29: Percentage of survey respondents who consider the main street of their town safe/unsafe to cross

Respondents were also given the opportunity to suggest any improvements to a specific road or location which might make walking safer or more enjoyable for pedestrians. While some respondents named specific locations, many made more general suggestions such as building more footpaths and crossings, better maintaining footpaths and verges (e.g. vegetation management), widening footpaths and better street lighting. Some respondents explained that they currently have to walk on the road due to a lack of adequate pedestrian infrastructure. Suggested improvements to specific roads or locations included: a continuous footpath along Piccadilly Road; a pedestrian crossing on Crafers Main Street; better footpaths on Mount Barker Road and Old Mount Barker Road between Crafers and Bridgewater; more pedestrian crossings on Wellington Road in Mount Barker; and a pedestrian crossing on Mawson Road in Meadows.

"I live out of a township and would like to walk more around my local area but there are inadequate verges in the area making walking unsafe, there is also very limited lighting meaning that over winter the options are limited. I do see neighbours walking in the area on occasions but generally we have to walk on the road."

"More even and flatter footpaths in the town precincts; at least one footpath on the side of the road in the suburban built-up areas; more signalised crossings."

Public and community transport

Respondents were asked how often they use the Adelaide Metro bus services provided in the region, to which most indicated a low usage: Nearly half (44%) never use the services, a further quarter (26%) rarely use them and only 2% always use them.

How often do you use Adelaide Metro bus services in the Adelaide Hills?

Base: All respondents (n=612)

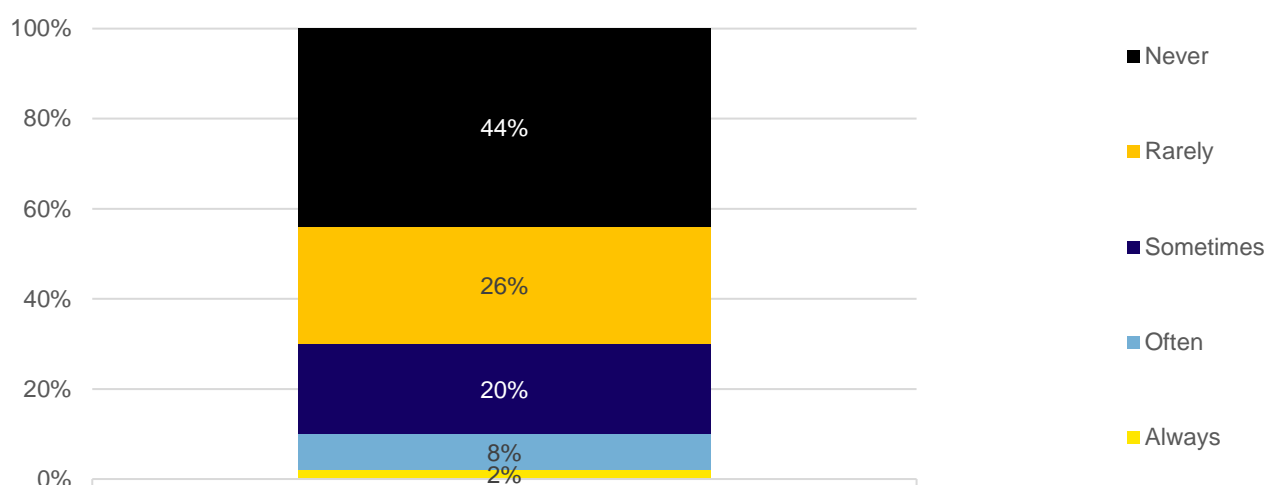


Figure 30: How regularly survey respondents use Adelaide Metro bus services in the Adelaide Hills

Those who indicated they rarely or never use Adelaide Metro bus services were asked to select the reasons why they do not use these services. The most common reasons were a preference to travel by car (44%) and that the timetable/frequency of services is not suitable (40%). One in three indicated that the closest bus stop is too far away (33%) or that the travel time is too long (32%) and three in ten indicated that they have no need to use public transport (29%). While reliability and cost did not feature prominently among the top barriers, these reasons were more likely to be raised by 18-44 year olds, along with travel time. Additional barriers raised included limited park and ride facilities, no buses in their local area and the need to take multiple services to reach their destination.

What is preventing you from using Adelaide Metro bus services in the Adelaide Hills more regularly?

Base: All who rarely or never use Adelaide Metro bus services (n=428)

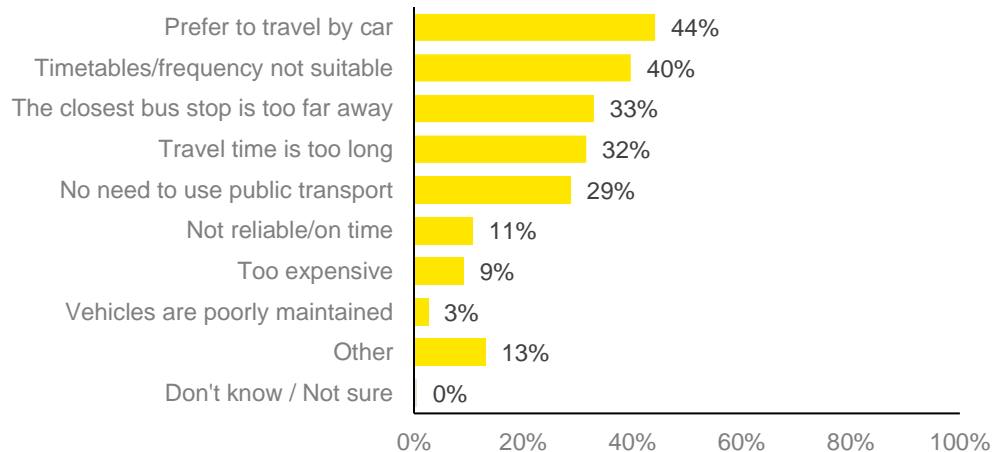


Figure 31: Reasons preventing survey respondents from using Adelaide Metro bus services in the Adelaide Hills more regularly

Two thirds of respondents (68%) did not feel that adequate alternative transport options are provided across the region to meet the needs of residents who are without access to a car. This increases to three quarters (74%) of those aged 45-64, whereas those aged 65 and over (58%) are less likely to view alternative transport options as inadequate.

Do you believe adequate alternative transport options are available in the region to be able to get around if you don't have access to a car?

Base: All respondents (n=609)

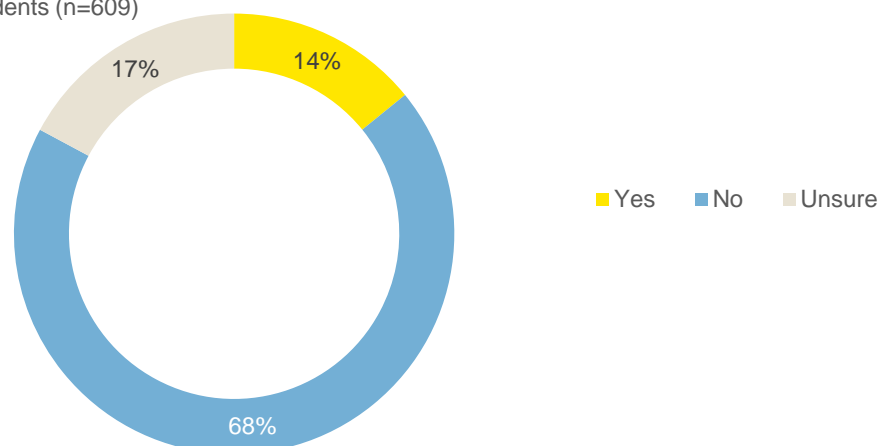


Figure 32: Percentage of survey respondents who believe alternative transport options are adequate/inadequate in the Adelaide Hills region

RAA regularly receives enquiries from members regarding the feasibility of a train service between Adelaide CBD and Mount Barker. We therefore posed a question to respondents to identify their

likelihood of utilising this service if it were available, on a 0-10 scale (where 0 = extremely unlikely and 10 = extremely likely).

A quarter of respondents (26%) indicated they would be extremely likely to use the service (10 out of 10) and half (51%) gave an answer of between 6 and 10, meaning they were more likely than not to use the service. Reflecting the location of the proposed service, likely usage was significantly higher among Mount Barker DC residents than Adelaide Hills Council residents: Four in ten Mount Barker DC residents (40%) were extremely likely to use the service and three quarters (74%) were likely to use it. A greater proportion of females (31%) than males (19%) were extremely likely to use the service.

If a passenger rail service between Adelaide and Mount Barker was available, how likely would you be to use it?

Base: All respondents (n=609)

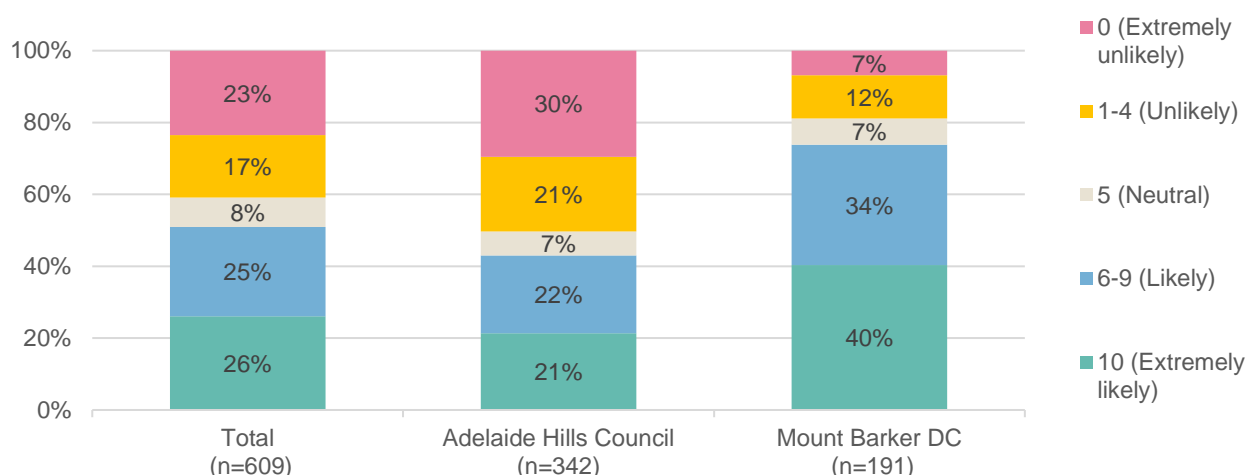


Figure 33: Likelihood that survey respondents would use a passenger rail service between Adelaide and Mount Barker

Those who indicated they would be extremely likely to use the service identified trains as a fast, comfortable and convenient way to travel, comparing favourably with bus travel. Those who were extremely unlikely to use the service typically either did not live near to Mount Barker or felt that travelling by car or bus would continue to be quicker and more convenient. Those who gave a more neutral response explained that their usage of the service would depend on cost, frequency and park and ride availability.

“It would be faster than a bus service and a more comfortable ride. Wouldn’t have to park in the city either.”

“Depends on the time it would take to get to Adelaide and the fare price.”

“Live in the wrong area to access this rail line. The CBD is closer than either Stirling or Mt Barker.”

When asked more broadly for suggestions for improving public transport services in the region, a large number of comments related to the provision of train services (particularly from Adelaide to Mount Barker, with some suggestions of it continuing to Murray Bridge or Strathalbyn), along with expanding the bus timetable to include evenings and weekends, increasing the number and frequency of bus services and creating more, and larger, park and ride facilities (particularly at

Crafer's). There were also several suggestions of utilising smaller buses on feeder routes/at off-peak times and of building weather-proof shelters at bus stops.

“Get the freight trains off the track, replace them with a modern and efficient passenger train service between Adelaide and Murray Bridge.”

“More than one bus a day to city would be good. None on weekends.”

“The Adelaide Hills can be cold and wet and better bus shelters are needed. There is poor linking transport between towns in the hills, poor geographic coverage and too few buses on existing routes to make public transport viable. More park and ride facilities are also needed.”

Community transport services are available in the Adelaide Hills for residents that need assistance with transport to medical appointments, shopping and other social outings. Half of respondents (50%) were aware of community transport options, increasing to six in ten (62%) of those aged 65 and over, but only 1% of respondents had used a community transport service in the region. Seven in ten respondents (71%) did not know enough about community transport options to judge whether they are adequate to meet the region's needs. Among those who did give an opinion, respondents were three times more likely to believe community transport options were inadequate (22%) than adequate (7%).

Are you aware of the community transport services within the Adelaide Hills?

Base: All respondents (n=609)

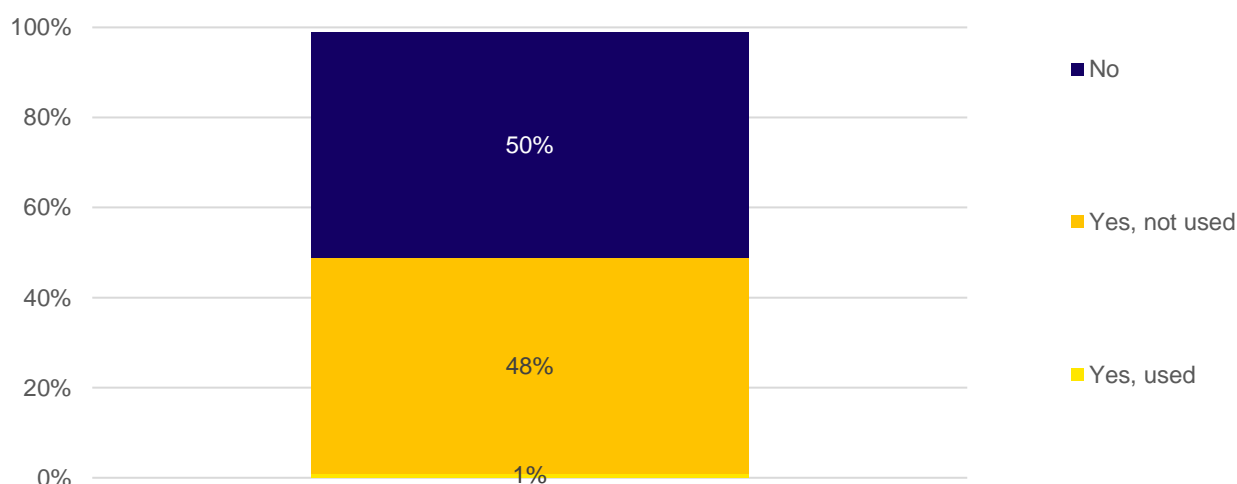


Figure 34: Level of awareness of community transport services in the Adelaide Hills region

Do you believe the community transport services offered are adequate to meet the region's needs?

Base: All respondents (n=609)

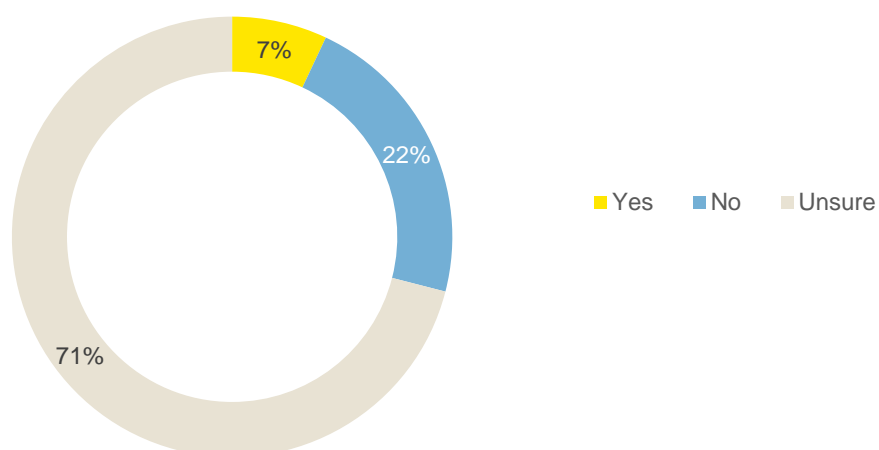


Figure 35: Percentage of survey respondents who believe community transport services are adequate/inadequate for the regions needs

On 13 January 2020, a six-month trial of an on-demand bus trial commenced within the Mount Barker area using the Keoride app. Initial uptake of this trial exceeded expectations, and the trial has since been extended. RAA support this and further on-demand bus services being implemented to provide efficient and reliable access to public transport where a dedicated bus route is not justifiable or deemed to be less efficient.

Recommendation 1B

Continue running on-demand buses in Mount Barker following the high uptake of the initial trial.

Furthermore, park 'n' ride facilities, especially north of the South Eastern Freeway are lacking. As recommended in Regional Development Australia's (RDA) *Adelaide Hills – Fleurieu Peninsula Regional Public Transport Study*⁴, a Park 'n' Ride facility should be considered at Verdun near the South Eastern Freeway interchange. This report also suggests that a local tourist shuttle bus between a new Verdun Park 'n' Ride and Hahndorf could be accommodated which would help alleviate parking and traffic issues in Hahndorf.

Recommendation 1C

Investigate a new Park 'n' Ride facility at Verdun interchange that would better serve the Northern Adelaide Hills and Hahndorf.

⁴ RDA, 2019, *Adelaide Hills – Fleurieu Peninsula Regional Public Transport Study*, prepared by GTA Consultants, accessed at < https://rdahc.com.au/wp-content/uploads/2019/04/2019-04-08_RDA_Regional_Public_Transport_Study_Final_Report-1.pdf>.

Taxi/app-based ride-sharing

The use of taxi services in the Adelaide Hills is relatively low, with around a quarter of respondents (26%) having used a taxi service in the local area over the past six months. Taxi usage is significantly higher among residents of the Adelaide Hills Council area (32%) compared with residents of the Mount Barker DC area (19%). Taxi usage drops among those aged 65 and over, with only 17% of respondents in this age group having used a taxi in the past six months.

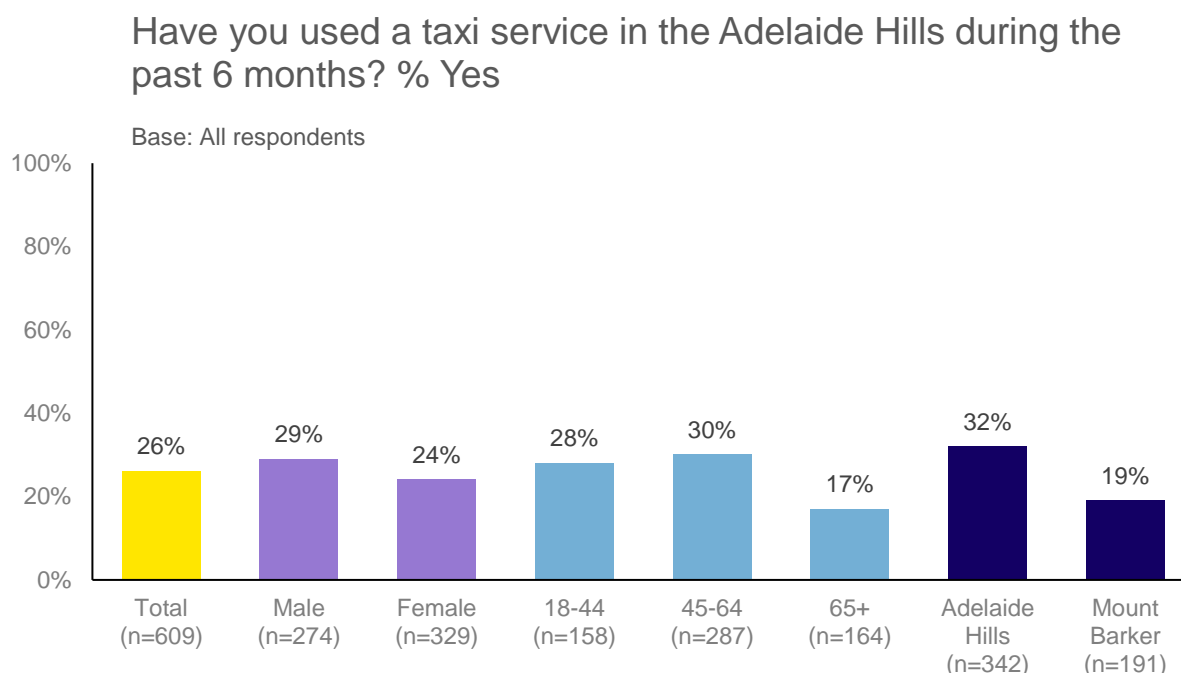


Figure 36: Percentage of survey respondents who used a taxi service in the region in the six months preceding the survey

The legalisation of app-based ridesharing services (e.g. Uber) in metropolitan Adelaide in 2017 changed the face of fare based services, and led to increased mobility options for Adelaide residents. However, at the time of this survey, rideshare companies were not allowed to operate legally in regional South Australia, including the Adelaide Hills. Regional towns often have limited alternative transport options, with little or no regular public transport, and thus ridesharing may offer a practical and convenient localised solution.

A third of respondents (34%) had used an app-based ridesharing service in the past six months, increasing to a majority (58%) of those aged 18-44 and falling to just one in ten (11%) of those aged 65 and over. A quarter of respondents (24%) indicated they had used a ridesharing service in metropolitan Adelaide, 17% interstate, 10% in the Adelaide Hills and 11% elsewhere. 18-44 year olds were significantly more likely than average to have used a ridesharing service in each of the areas. Males were more likely than females to have used a ridesharing service in metropolitan Adelaide (30% compared with 19%) and Adelaide Hills Council residents were more likely than Mount Barker DC residents to have used a ridesharing service within the Adelaide Hills (13% compared with 6%).

In the past 6 months, have you used an app-based ridesharing service in any of the following areas? % Used

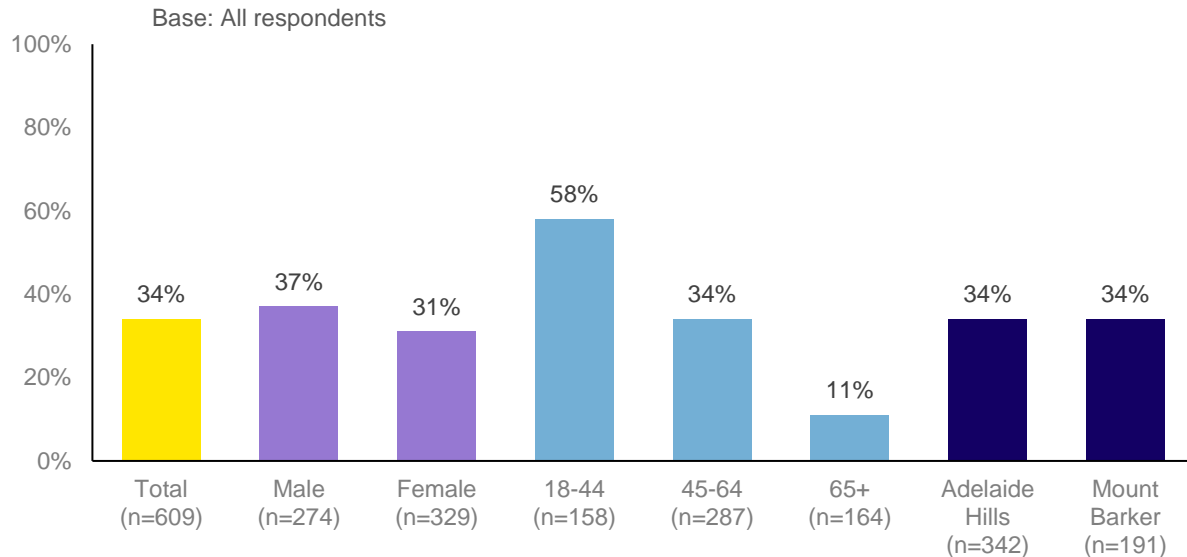


Figure 37: Percentage of survey respondents who used a ridesharing service in the region in the six months preceding the survey

Respondents were asked if they would consider using an app-based ridesharing service if it were offered in the Adelaide Hills. Nearly half (44%) indicated they would, with a further two in ten (20%) unsure. Three quarters (74%) of respondents aged 18-44 would consider using the service compared with only 17% of those aged 65+. A third (35%) of those aged 65 and over wanted more information before they could give an answer.

Would you consider using an app-based ride-sharing service if it were offered in the Adelaide Hills? % Yes

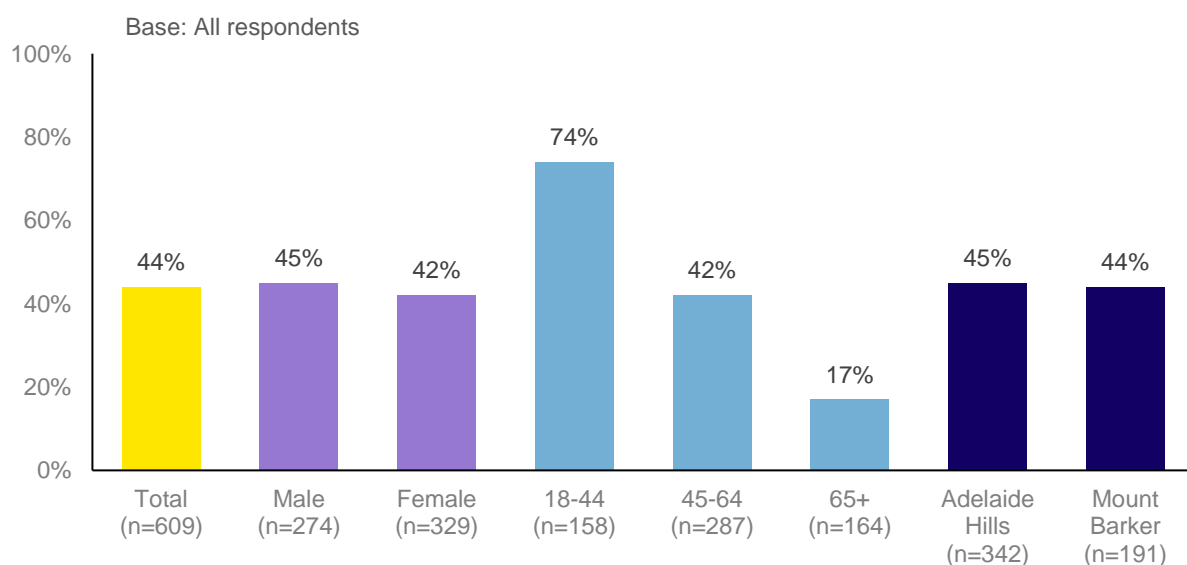


Figure 38: Percentage of survey respondents who would consider using a ridesharing service in the region if it were offered

Tourism

Adelaide Hills is popular with tourists due to its close proximity to Adelaide, nature and wildlife experiences, wineries and attractive towns (most notably Hahndorf). As of December 2019, the South Australian Tourism Commission has valued visitor expenditure in the Adelaide Hills tourism region at \$170 million, with the potential to reach \$310 million by 2030. In 2017-18, the tourism industry contributed an estimated \$251 million to the Adelaide Hills regional economy and directly employed approximately 1,300 people. 95% of Adelaide Hills visitors are domestic (57% of whom are from South Australia and 43% from interstate), with 5% international. On average, 1.4 million day trips and 194,000 overnight visits are made to the Adelaide Hills each year.

Respondents were asked a few questions in relation to increasing tourism in the Adelaide Hills. They were evenly split between those who believe the current road network in the Adelaide Hills is suitable for the number of visiting tourists (42%) and those who do not (41%), with the remaining 17% unsure.

Do you believe that the current road network in the region is suitable for the number of visiting tourists?

Base: All respondents (n=614)

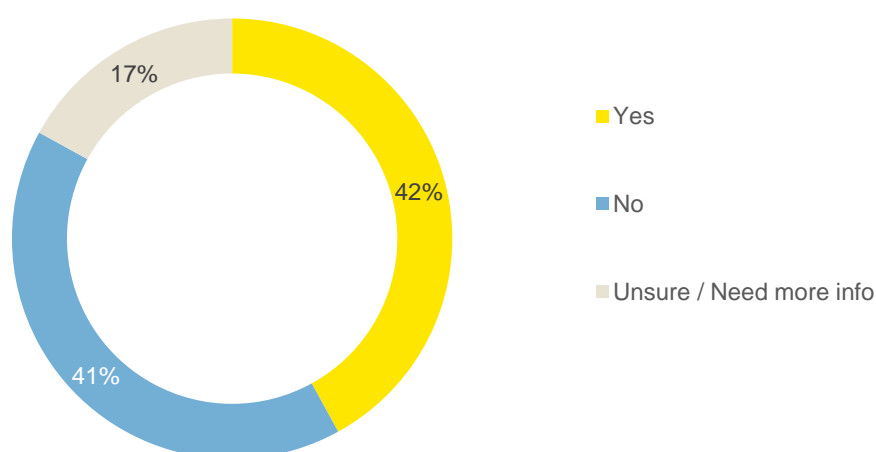


Figure 39: Percentage of survey respondents who believe the road network is suitable/not suitable for the number of visiting tourists

When asked what the barriers are to increasing tourism within the region, the top four responses (each selected by a majority of respondents) were public transport availability (65%), parking for RVs or caravans (54%), knowledge/awareness of the region (51%) and parking for cars (51%). The Adelaide Hills' proximity to Adelaide meant that accessibility of the region was least likely to be identified as a barrier (20%), although younger respondents aged 18-44 were somewhat more likely to raise this as a barrier (32%). A range of other barriers relating to tourism were also raised, including visitors/tourists lacking the skills and experience to drive on Adelaide Hills roads and a lack of cycling infrastructure.

When ranking the issues, respondents were most likely to select public transport availability (19%) as the number one barrier to increasing tourism within the region, followed by the capacity of the road network (12%) and knowledge/awareness of the region (10%). While parking featured prominently as a barrier, it was relatively unlikely to be selected as the number one barrier.

In your opinion, which of the following are barriers to increasing tourism within the region?

Base: All respondents (n=614)

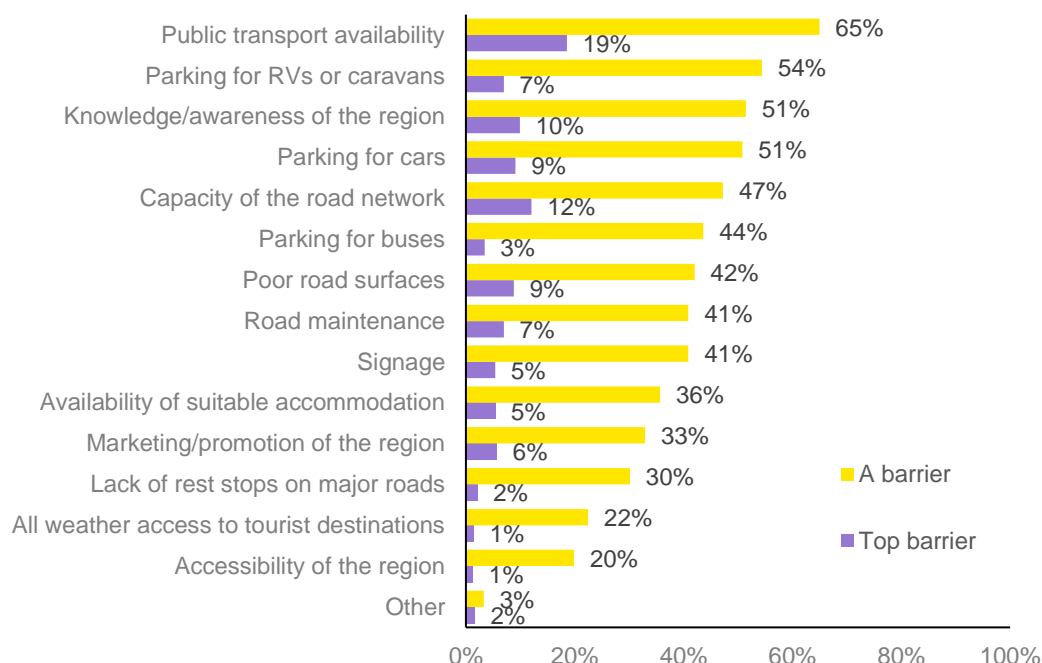


Figure 40: Perceived barriers to increasing tourism in the Adelaide Hills region

Suggestions for improvements that may enhance visitor experiences in the region included:

- more areas to pull off the road to allow faster traffic to pass particularly at scenic view points
- increasing parking availability (particularly in Hahndorf, where some called for parking to be moved away from Main Street)
- improving visitor signage (including directions to tourist attractions, as well as broader directional signage)
- better public transport (e.g. a passenger train service and buses to wineries)
- more and better tourist information centres, including a new centre in Stirling
- greater range of accommodation options (from large hotels to caravan parks)
- better marketing of local wineries and events
- better walking and cycling infrastructure linking key tourist attractions (e.g. between Crafers Park N Ride and Mount Lofty Summit)

Conversely, some respondents did not want further increases to tourism numbers in the Adelaide Hills.

“More roadside parking bays to enable viewing of scenery etc.”

“Better parking in Hahndorf, Stirling and Crafers...Better marketing of places other than Hahndorf.”

“Parking is difficult and non locals often feel nervous driving on the roads. Wineries are a key attraction, but often only available options are driving which doesn't encourage safe driving.”

“Signage so they know where to go and overtaking lanes so if someone is not familiar with the region they do not hold up traffic for 20 or 30 km.”

“Offer more cycling/walking routes that link destinations and attractions together.”

“More affordable accommodation, most of the accommodation is B&B which is not always affordable.”

The \$1m *Hahndorf Township Strategic Traffic Planning Study* has reviewed traffic and access issues in and around Hahndorf, and in the 2020-21 federal budget \$200m in funding was provided for Hahndorf Township improvements and access upgrades. The state government will provide up to \$50m funding for these upgrades taking the total to \$250m. Further details of what this upgrade includes are yet to be released, however this should allow for an upgrade of the road network to facilitate safer freight and traffic movements around Hahndorf.

Improvements that would enable this may include:

- An upgrade of the Verdun interchange to provide full access in all directions,
- Improvements to parking facilities within the Hahndorf township,
- A new Park ‘n’ ride facility in Verdun,
- An upgrade of the Mount Barker interchange

A visitor information centre could also be incorporated at Verdun as part of the Park ‘n’ Ride development, which would be easily accessible for tourists utilising a shuttle between this Park ‘n’ Ride facility and key destinations in the region such as Hahndorf. This may also serve to encourage visitors to use shuttle bus facilities rather than parking in the Hahndorf Main Street.

Recommendation 1D

Consider incorporating a visitor information centre at Verdun as part of a new park ‘n’ Ride facility.

Mount Barker District Council has completed the *Hahndorf Main Street Revitalisation Study* with an estimated cost of \$6.7m to complete streetscape upgrades included upgraded footpaths, lighting, street furniture and landscaping as well as provision for smart technology. The project is currently unfunded and subject to state or federal government committing 50% of the costs. Whilst not yet confirmed, we would expect that this to be part of the \$250m *Hahndorf Township Improvements and Access* upgrade announced as part of the October 2020-21 federal budget.

Recommendation 1E

DIT ensure that up to \$3m funding is provided towards the Hahndorf Main Street revitalisation project as part of the \$250m *Hahndorf Township Improvements and Access* upgrade, which will substantially improve street appeal and tourism attractiveness in one of South Australia’s busiest tourist destinations.

2015 – 2019 casualty crash statistics

General crash statistics

Over the five-year 2015 – 2019 analysis period, 22 fatal crashes occurred in the Adelaide Hills region. There were 225 crashes resulting in serious injuries with a further 1,113 resulting in people sustaining minor injuries.

The most common casualty crash type in the Adelaide Hills region is where a vehicle hits a fixed object, making up one third of all casualty crashes. These primarily involve a single vehicle and an object on the roadside with common examples including trees, posts and safety barriers. This crash type is more likely on narrow, curved roads such as those frequently encountered in the Adelaide Hills.

Table 4: Adelaide Hills region casualty crash types

Crash type	Number of casualty crashes	Crash severity		
		Minor	Serious	Fatal
Hit Fixed Object	454 (33%)	354	88	12
Rear End	242 (18%)	224	17	1
Roll Over	168 (12%)	137	30	1
Right Angle	145 (11%)	120	22	3
Head On	125 (9%)	88	34	3
Side Swipe	59 (4%)	48	10	1
Right Turn	42 (3%)	37	5	0
Left Road - Out of Control	32 (2%)	30	2	0
Hit Pedestrian	26 (<2%)	20	5	1
Hit Parked Vehicle	20 (<2%)	18	2	0
Hit Animal	19 (<2%)	15	4	0
Hit Object on Road	17 (<2%)	13	4	0
Other	11 (<1%)	9	2	0
Total	1360	1113	225	22

When comparing the Adelaide Hills to the rest of South Australia, the profile of crash types is more typical of a regional area as expected, with a few exceptions. Rear end crashes are more prominent due to the presence of the busy South Eastern Freeway, and large population hub in Mount Barker. Head on crashes make up a larger portion of casualty crashes in the Adelaide Hills compared to regional SA but roll over crashes are less likely to occur in the region than most of regional SA.

Table 5: Adelaide Hills region casualty crash types compared against SA casualty crash types

Crash type	Percent of casualty crashes			
	Adelaide Hills	Regional SA	Metro SA	Total SA
Hit Fixed Object	33%	31%	12%	15%
Rear End	18%	7%	33%	28%
Roll Over	12%	22%	4%	8%
Right Angle	11%	15%	20%	19%
Head On	9%	5%	2%	3%
Side Swipe	4%	4%	7%	7%
Right Turn	3%	3%	10%	9%
Left Road - Out of Control	2%	3%	<1%	<1%
Hit Pedestrian	<2%	3%	6%	5%
Hit Parked Vehicle	<2%	2%	4%	4%
Hit Animal	<2%	3%	<1%	<1%
Hit Object on Road	<2%	<1%	<1%	<1%
Other	<1%	1%	<1%	<1%

Table 6 shows the percentage of different units involved in crashes in the Adelaide Hills region, compared with regional and metropolitan South Australia. Only human-controlled units have been considered in this analysis. As a percentage of units involved in crashes, motorcycles and bicycles are substantially over-represented when compared to regional South Australia as a whole. This can be explained by the high popularity of the Adelaide Hills road network amongst cyclists and motorcyclists for recreational purposes, when compared with other regional areas.

Table 6: Units involved in crashes in the Adelaide Hills region

Unit type	Approximate percentage of units involved in crashes			
	Adelaide Hills	Regional SA	Metro SA	SA Total
Car	74%	78%	80%	80%
Motorcycle	14%	9%	4%	5%
Bicycle	6%	2%	6%	5%
Truck	3%	6%	2%	3%
Unknown/other vehicle	2%	2%	3%	3%
Pedestrian	1%	3%	3%	3%
Scooter	<1%	<1%	<1%	<1%
Bus	<1%	<1%	<1%	<1%

Motorcycle crashes

Motorcyclists are significantly overrepresented in casualty crashes in the Adelaide Hills when compared to metro SA and regional SA, making up 14% of all units involved in crashes in the region. This is compared to 9% in regional SA and 4% in metro SA.

In 2014, the State government commissioned a motorcycle road safety audit on 14 popular motorcycling roads near Adelaide⁵, with most of these roads in the Adelaide Hills region. This audit considered curves, road alignment, sight lines, pavement condition, hazards, signage and intersections, with findings used to identify high risk locations and implement network-wide safety improvements targeting motorcycle safety. This resulted in a number of important safety treatments such as safer barriers and the use of high friction road treatments at key locations.

Since 2014, motorcyclist involvement in casualty crashes has trended downwards. Data for 2019 is of concern, however, with 30 FSI (fatal or serious injury) motorcycle crashes occurring in the year, which was the highest since 2015 where 28 FSI crashes occurred.

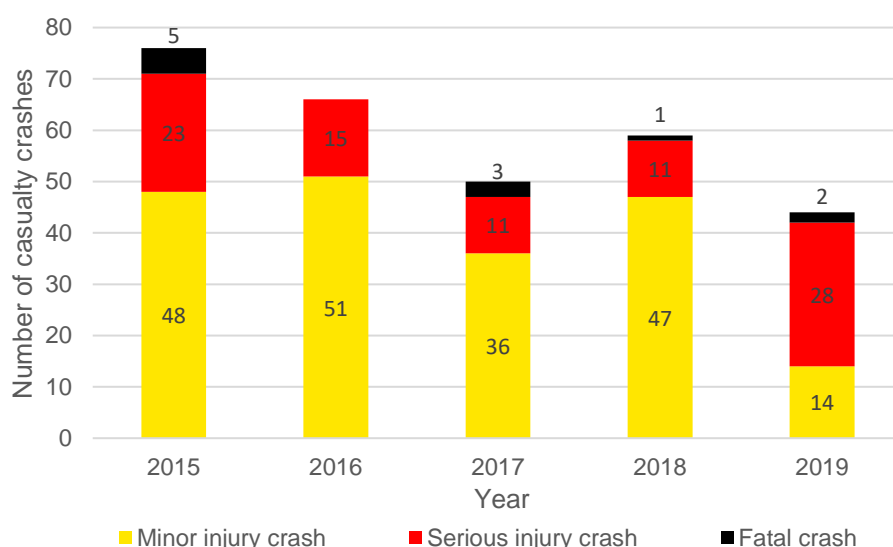


Figure 41: Motorcyclist casualty crashes in the Adelaide Hills

Cyclist crashes

Cyclists are overrepresented in casualty crashes in the Adelaide Hills when compared to regional SA and make up 6% of units involved in casualty crashes within the region. This percentage is comparable to the percentage in metro Adelaide. Crashes involving cyclists are often under reported, especially those that don't involve another cyclist or motor vehicle. The crash data analysed in this report includes only those crashes where a police report was made. For example, if a cyclist falls from their bicycle on the road and is injured, this is only included in the database if reported to police.

When comparing cyclist crashes in the Adelaide Hills with other areas of the state, there are some stark contrasts in crash severity and type. Single unit crash types⁶ are far more prominent in the Adelaide Hills, making up 49% of cyclist crashes. In contrast, these crash types make up 26% of

⁵Government of South Australia, Department of Planning, Transport and Infrastructure, Towards Zero Together, accessed at https://dpti.sa.gov.au/towardszerotogether/safe_road_users/motorcyclists

⁶ Single unit crash types include 'roll over', 'hit fixed object', 'hit animal', 'hit object on road', 'hit parked vehicle', 'left road – out of control'

regional SA cyclist crashes, 27% of city cyclist crashes and 23% of metro cyclist crashes. Conversely, right angle, right turn and side swipe crashes make up 70% of cyclist crashes in metro Adelaide, 64% of cyclist crashes in the City and 62% of crashes in regional SA whilst making up only 36% of cyclist crashes in the Adelaide Hills.

The proportion of crashes in the Adelaide Hills that involve a fatal or serious injury is consistent with the proportion across regional SA, but the proportion in the Adelaide Hills that are fatal is much lower.

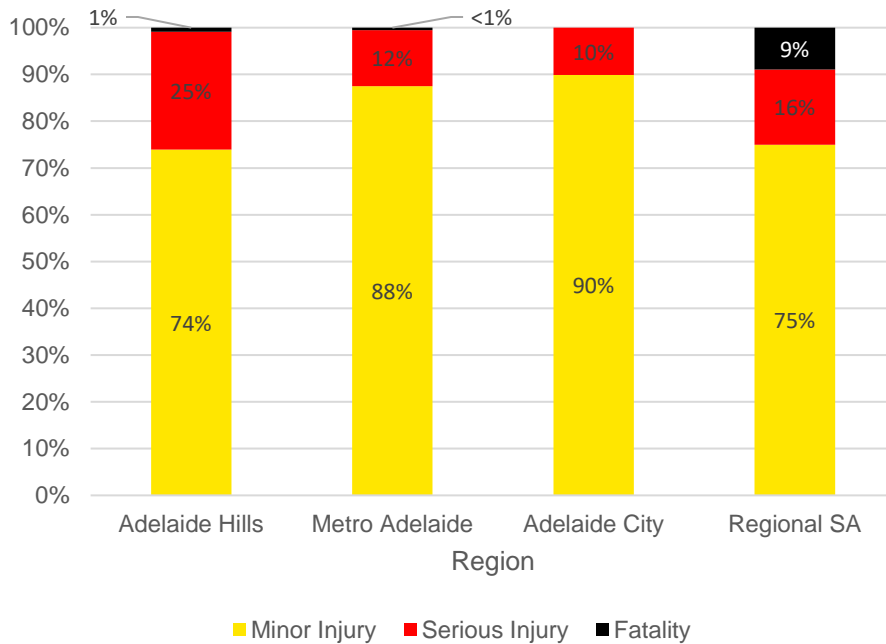


Figure 42: Cyclist casualty crash severity in the Adelaide Hills vs SA (2015-2019)

Since 2015, the average annual number of reported casualty crashes involving cyclists is 24, with no significant upwards or downwards trend over this time.

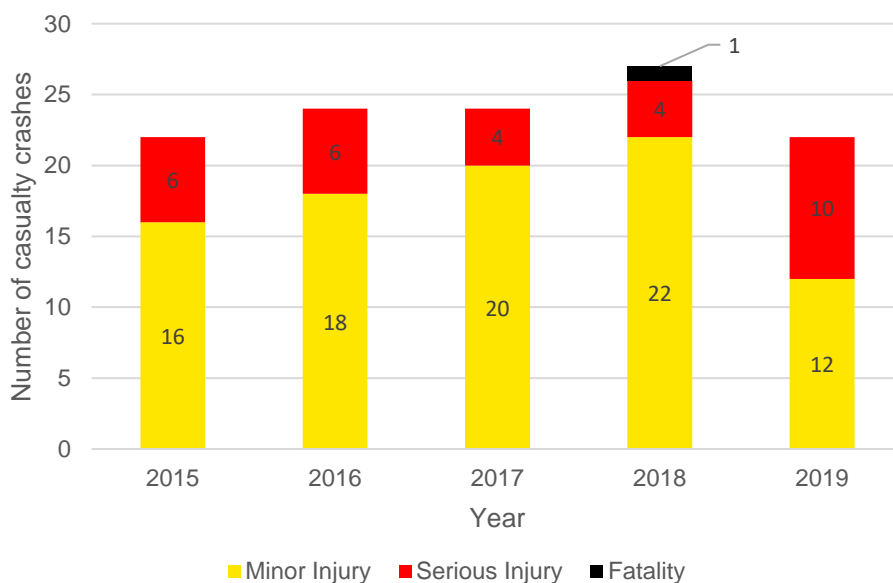


Figure 43: Annual number of cyclist casualty crashes in the Adelaide Hills region between 2015 and 2019

Site investigation details and recommendations

General and common issues across the region

Speed limits

Speed limits are a topical issue in the Adelaide Hills with mixed views in the community on whether the current limits are appropriate. Residents are generally accepting of lower speed limits on roads in their local area (e.g. “last mile”) but are less accepting of lower speed limits on roads that they use for commuting.

Research shows that reducing speed limits is a cost-effective way to improve safety on corridors where other approaches such as road realignment or widening are not viable. This is especially the case in the Adelaide Hills region where significant geographic constraints exist along most of the popular corridors. Upgrades that would allow an 80km/h or 100km/h speed limit to be safely maintained on many roads in the Adelaide Hills region would often require road widening, an increase in curve radius and substantial vegetation removal. For example, a w-beam barrier system can require up to 1m of clear space behind the barrier to allow for deflection in the case of an impact, which can often not be achieved on some routes.

Consistency of speed limits along a route is also highly important. Consolidation of speed limits across the region should be considered to reduce the number of small-increment speed limit changes and lessen confusion as to what the prevailing speed limit is, especially in built up areas. The use of ‘speed limit ahead’ signage should be expanded across the region where there are changes in speed limit on the approach to townships. A number of these locations are identified in this report.

Intersection sight distance

Poor intersection sight distance is a frequently occurring problem in the Adelaide Hills region and the financial capacity of road authorities is often limited, especially in locations that do not have a significant history of casualty crashes. Road geometry (crests/curves), surrounding geography (hills/embankments) and vegetation (trees/tall grasses) are the primary contributing factors to poor sight distance in the Adelaide Hills, with each of these posing significant financial and environmental challenges to improve.

RAA strongly supports the rollout of additional rural junction active warning systems (RJAWS) throughout the Adelaide Hills region, where other safety upgrades may not otherwise be possible. A number of example locations where this treatment may be effective are highlighted throughout this report, including at:

- the intersection of North East Road and Lower North East Road (Houghton)
- the intersection of North East Road and Houghton Hollow Road (Houghton)
- the intersection of Gorge Road and Torrens Hill Road (Cudlee Creek)
- the intersection of Gorge Road and Tippet Road (Paracombe)
- the intersection of Church Hill Road and Old Mt Barker Road (Echunga)

Recommendation 2A

Expand the use of rural junction active warning systems (RJAWS) throughout the Adelaide Hills region where other safety upgrades may not otherwise be possible.

Roadside hazards

The most frequently encountered issue in the Adelaide Hills region is the proximity of unprotected roadside hazards. Most often, this is in the form of large trees, however rock cuttings, steep embankments, drop-offs and narrow bridges all frequently expose road users to an unacceptable level of hazard.

Recommendations have been made throughout this report on almost every road reviewed to install more roadside barriers, and crash data supports this. One third of casualty crashes in the Adelaide Hills involve a collision with a fixed object, and this extends to 55% of fatal crashes. RAA recognises that the supporting posts of traditional w-beam barriers introduce a higher level of exposure to motorcyclists, which is why it is critical that motorcycle underrun protection is implemented on all safety barrier rollout in the Adelaide Hills region.

Wire rope barriers are often inappropriate for use in the Adelaide Hills region because, due to tensioning requirements, they can only be installed on large radius curves and straight sections of road. Furthermore, the posts of wire-rope barriers pose a hazard to motorcyclists, for which there are currently limited mitigation measures.

RAA proposes that a dedicated Adelaide Hills region safety barrier program be implemented with an annual funding amount which will fast-track these much-needed safety treatments across the region and act to reduce the number of lives lost and serious injuries occurring due to collisions with fixed objects. This program should be designed such that entire corridors are targeted for treatment, rather than discrete sites based on prior crash history. AusRAP star ratings should be used when prioritising corridor treatments.

Recommendation 2B

Implement a dedicated Adelaide Hills region roadside hazard mitigation program to provide corridor-wide safety upgrades based on AusRAP star ratings.

Narrow roads

Narrow roads are commonplace in the Adelaide Hills region, with sealed carriageway widths often falling below 6m. This poses a heightened risk of head-on collisions and makes overtaking cyclists particularly unsafe. Due to geographic constraints, road widening is often challenging and would require enormous expenditure to undertake on a large enough scale to make a significant impact to safety.

As a current example in metropolitan Adelaide, the addition of an extra lane on Flagstaff Road (AADT of 23,700) in Flagstaff Hill is expected to cost \$32.9m for an 800m long section. The geographic constraints for this project are similar to those faced on most roads in the Adelaide Hills region.

Audio tactile centre line markings

Motorcycle crashes in the Adelaide Hills region occur at a significantly higher rate than anywhere else in South Australia as the road network is very popular amongst recreational motorcycle riders. Audio tactile centre line markings (ATLM) have been trialled on Gorge Road since 2019 and initial signs are promising in that rider behaviour is improving due to riders selecting safer paths through corners. A review of crash data indicates that 2019 saw the lowest number of serious motorcycle crashes occurring on Gorge Road in recent history.

This treatment reduces the likelihood of crashes occurring, however has a minimal impact on the severity of crashes when they do occur. Throughout this report, RAA have recommended that ATLM centre line markings be installed on other popular motorcycle corridors, including:

- North East Road, Chain of Ponds
- Lower North East Road
- Lobethal Road
- Greenhill Road
- Strathalbyn Road

Recommendation 2C

Expand the use of ATLM centreline markings throughout the Adelaide Hills region to encourage motorcyclists to take safer paths through corners.

South Eastern Freeway

The South Eastern Freeway is a 74km long national highway forming part of the Princes Highway corridor that follows the coastline between Sydney and Port Augusta. Being a freeway, it bypasses all townships with 13 grade separated interchanges between Murray Bridge and Glen Osmond.

AADT on the South Eastern Freeway is as high as 53,000 vehicles per day between Glen Osmond and Mount Barker, with an average of about 15,000 vehicles per day between Mount Barker and Murray Bridge. Commercial vehicles make up a large percentage of traffic, at about 10% between Glen Osmond and Mount Barker, and 16% between Mount Barker and Murray Bridge.

The South Eastern Freeway is on the PBS level 2A network, meaning that the largest vehicles permitted to travel the road are 26m b-doubles, with the exception of Monarto to Murray Bridge, which is on the PBS 3A network and allows for b-triples and road trains.

Respondents to the Adelaide Hills regional road assessment survey raised concerns with the South Eastern Freeway far more than other areas of the Adelaide Hills road network. Due to this, RAA produced a separate report to address concerns with the South Eastern Freeway. This report can be downloaded from www.raa.com.au/roadsafety.

A few examples of typical survey responses are included below.

“Cars driving well below speed limit in right lane and large trucks overtaking slowly uphill with no way to overtake them.”

“Very difficult/dangerous to merge onto the freeway.”

“Heavy vehicles overtaking and losing brakes on the down track from Crafers”

“Since the developments in Mount Barker, it is a nightmare to try to use the Freeway because of the increase in traffic heading to and from the city.”

“There are reasonably frequent accidents on the SE Freeway with congestion during peak times contributed to by (1) poor 'on' ramps at Hahndorf & Stirling heading west & Crafers heading east. These have issues of not being long enough to safely reach speed to meld and poor visibility to see traffic on the SE Freeway (2) Lack of alternative transport options, particularly a train service from Mt Barker which would reduce traffic on the freeway.”

Recent announcements and major projects to improve the South Eastern Freeway include:

- (2016) \$27m Bald Hills interchange construction (completed)
- (2019) \$14.2m managed motorway project between Stirling and Crafers (commenced)
- (2019) \$250m for upgrades to the Princes Highway Corridor which includes a section of the South Eastern Freeway (announced)
- (2020) \$7.4m for 11.6km of resurfacing between Mount Barker and Callington (commenced)
- (2020) \$30m for rehabilitation and resurfacing between the Tollgate and Crafers (announced)
- (2020) \$15m for safety upgrade and refit of the Heysen Tunnels (announced)
- (2020) \$4m speed-activated signage on the steep descent into Adelaide (announced)
- (2020) \$12m for a higher capacity north-south freight route bypassing Adelaide (announced)
- (2020) \$28m in safety upgrades allocated in the October 2020/21 federal budget – no further details available at this stage (announced)

Crash history

237 casualty crashes occurred on the South Eastern Freeway or at freeway interchanges between 2015 and 2019. Of these, 152 occurred on the section within the Adelaide Hills and Mount Barker District Council boundaries (Heysen Tunnels – Callington interchange), making up more than 11% of all casualty crashes occurring in the Adelaide Hills region.

Rear-end crashes are the most common crash type on the South Eastern Freeway, and these usually occur at or near busy freeway interchanges with the most significant hotspot for rear end crashes between the Crafers and Stirling interchanges, and only 14% of rear end crashes occurred east of the Mount Barker interchange, where congestion is less of an issue.

Table 7: South Eastern Freeway casualty crash types (includes crashes at interchanges) (2015-2019)

Crash type	Number of casualty crashes	Crash severity		
		Minor	Serious	Fatal
Rear End	115	102	11	2
Hit Fixed Object	44	31	12	1
Roll Over	22	16	6	0
Side Swipe	22	17	5	0
Right Angle	15	11	1	3
Head On	5	1	2	2
Hit Parked Vehicle	4	3	1	0
Right Turn	3	3	0	0
Hit Pedestrian	2	0	2	0
Left Road - Out of Control	2	2	0	0
Other	1	1	0	0
Hit Animal	1	1	0	0
Hit Object on Road	1	1	0	0
Total	237	189	40	8

Cars are the primary unit involved in crashes on the South Eastern Freeway, however, trucks are involved in a higher percentage of crashes than the average for the Adelaide Hills region. This is because the South Eastern Freeway is the primary freight route through the region and carries a much greater volume (10-15%) of heavy vehicle traffic.

Table 8: Units involved in crashes on South Eastern Freeway (includes crashes at interchanges) (2015-2019)

Unit type	Approximate number of units
Car	366 (82%)
Truck	38 (8%)
Motorcycle	22 (5%)
Bicycle	12 (3%)
Other/Unknown	8 (2%)
Pedestrian	2 (<1%)
Bus	1 (<1%)

AusRAP star ratings

The South Eastern Freeway typically varies between a three and four-star rated road. The below example shows a section rated four stars, just east of the Bald Hills interchange in Mount Barker. The road is divided with approximately 20m separating opposing traffic, wide lanes and a wide passenger side shoulder seal.



Figure 44: Typical AusRAP star rating on the South Eastern Freeway

This section of the South Eastern Freeway could be improved to a five-star road by either removing trees within 10m of the road edges or providing barrier protection to prevent collisions with the trees. Alternatively, if the speed limit were 90km/h instead of 110km/h, this section of road would also be considered five stars.

Summary of recommendations for the South Eastern Freeway

The recommendations below were made in our *2020 South Eastern Freeway Highway Assessment*, available at www.raa.com.au/roadsafety. For more details, please view the full report.

Table 9: Recommendations for the South Eastern Freeway in RAA's 2020 South Eastern Freeway Highway Assessment

SE Freeway Report recommendation no.	Details of recommendation
Recommendation 1	To encourage operators to use Higher Productivity Vehicles (HPVs) and alternative routes to the South Eastern Freeway:
	Undertake road widening, shoulder sealing and intersection upgrades along the existing freight route between Murray Bridge and Truro, to encourage and support the safe and sustainable operations of HPVs.

SE Freeway Report recommendation no.	Details of recommendation
Recommendation 2	<p>If no alternative freight route is developed by the time the North-South Corridor is constructed:</p> <p>In the interim, undertake improvements to safety and accessibility on Cross Road, between the South Eastern Freeway and South Road, that will ensure safe travel for all road users, and sustainable travel for the freight industry. RAA considers this is an interim option only and that an alternative link must be provided to achieve a safe and sustainable connection between these two critical corridors.</p>
Recommendation 3	<p>To improve safety on the South Eastern Freeway descent:</p> <ul style="list-style-type: none"> a) Invest income generated by the Crafers and Leawood Gardens speed cameras directly into improving safety on the South Eastern Freeway. b) Upgrade signage as part of an intelligent motorway upgrade between Crafers and Glen Osmond. This includes overhead gantries, with speed limit signs for each lane to better highlight the prevailing speed limit, particularly for vehicles travelling in the centre lane that may be less likely to observe speed limit signs obscured by other vehicles. c) Consider further intelligent transport systems be considered, such as devices on the descent that can detect and display a vehicle's speed in real time. This isn't for enforcement purposes, but to direct an appropriate warning message to speeding vehicles, and direct heavy vehicles to use a safety ramp where needed. This could incorporate individual signs on a gantry above each lane, or overhead digital variable message signs located on the roadside, like those at the Crafers interchange and prior to entering the Heysen Tunnels. These signs could also be installed on the numerous bridges over the South Eastern Freeway between Crafers and Glen Osmond. d) Install additional advance warning signage, as well as a deceleration/entry lane for the truck parking area 450m west of the Heysen Tunnels. e) Install an additional safety ramp below the current lower ramp, that includes a dragnet system to stop runaway vehicles.
Recommendation 4:	<p>To improve pedestrian safety at the intersection with Portrush Road:</p> <ul style="list-style-type: none"> a) Widen pedestrian refuges and set crossings further back from the intersection where possible. b) Stagger the staged pedestrian crossings to increase the spacing between pedestrians waiting in refuges and turning vehicles. c) Fully control the slip lane from the South Eastern Freeway into Cross Road along with a review of other turn movements and signal phasing at the intersection to ensure the capacity of the left turn lane is not exceeded. If no alternative freight route is implemented before the completion of the North-South Corridor, this slip lane will need to be converted to dual lanes and reviewed again. d) Fully control the slip lane from Glen Osmond Road into Portrush Road.
Recommendation 5	<p>To improve safety and efficiency on other sections of the South Eastern Freeway:</p> <ul style="list-style-type: none"> a) Investigate and plan for the construction of a third lane between Stirling and Verdun, so plans will already be available when this section of the South Eastern Freeway reaches levels of congestion that warrant construction of an extra lane. b) install additional safety barriers to protect roadside hazards between Mount Barker and Monteith.

SE Freeway Report recommendation no.	Details of recommendation
Recommendation 6	<p>At South Eastern Freeway interchanges:</p> <ul style="list-style-type: none"> a) (Mount Osmond) Install give way signs and line marking at the intersection of the westbound off-ramp and Mount Osmond Road. b) (Stirling) Extend the eastbound Stirling on-ramp by at least 100m to allow safer eastbound access to the South Eastern Freeway from Stirling and address the poor sight distance at this location. c) (Stirling) Install give way signs and line marking at the intersection with the westbound off-ramp and Mount Barker Road in Stirling. d) (Bridgewater) Install roundabouts at the Bridgewater interchange in conjunction with a lane reduction on Carey Gully Road, in line with safe system principles. This will improve safety by reducing impact angles and conflict points. e) (Bridgewater) Extend the westbound on-ramp acceleration lane to allow more time for vehicles to safely enter the South Eastern Freeway when heading towards Adelaide. f) (Verdun) Upgrade the Verdun interchange to provide full access to and from the South Eastern Freeway in each direction. g) (Verdun) Extend the westbound acceleration lane to allow more time for vehicles to safely enter the South Eastern Freeway when heading towards Adelaide. h) (Mount Barker) Explore the feasibility of installing channelised right-turn lanes to access the freeway on-ramps from the Mount Barker interchange. i) (Mount Barker) Upgrade the southern intersection at the Mount Barker interchange, which may include a roundabout or signalisation. j) (Mount Barker) Extend the westbound acceleration lane to allow more time for vehicles to safely enter the South Eastern Freeway from Mount Barker towards Adelaide. k) (Monarto South) Install give way signs and line marking on each of the off-ramp approaches to Ferries McDonald Road. l) (Murray Bridge) Review the speed limit on Jervois Road with consideration given to applying a 60km/h speed limit between the Swanport Hotel and Irena Court.
Recommendation 7	<p>In terms of policy and regulatory improvements:</p> <ul style="list-style-type: none"> a) Further publicise that no fee is charged for extracting a heavy vehicle from the safety ramps, and that the cost of towing to a safe place is also covered by DPTI. b) Consider adopting an alternative vehicle classification to which Section 45C of the Road Traffic Act 1961 applies, for vehicles travelling on the prescribed section of the South Eastern Freeway, This will required consultation with key stakeholders including industry groups and government agencies to determine how this model could operate effectively and to ensure no unintended consequences occur as a result of any changes.

RAA considers that implementation of these recommendations is critical for improved safety on the South Eastern Freeway, and that all recommendations be strongly considered for implementation.

Recommendation 3

Adopt all recommendations of RAA's *2020 South Eastern Freeway Highway Assessment*.

Onkaparinga Valley Road

Onkaparinga Valley Road is the primary north-south arterial route through the northern Adelaide Hills region, extending 30km from Birdwood to the Verdun interchange at the South Eastern Freeway. The road passes through the townships of Mount Torrens, Charleston, Woodside, Oakbank, Balhannah and Verdun and provides essential regional access to most tourist destinations north of the South Eastern Freeway.

Average daily traffic volumes on Onkaparinga Valley Road vary between 2,500 vehicles per day near Birdwood and closer to 10,000 vehicles per day on the southern half of the road between Woodside and Verdun.

Compared to many roads in the Adelaide Hills region, Onkaparinga Valley Road traverses relatively flat terrain with very few small radii curves or steep gradients along the corridor.

Other than the South Eastern Freeway, Onkaparinga Valley Road was the most frequently nominated road in the Adelaide Hills regional community survey. A total of 19 respondents mentioned that major improvements were needed on the road, 14 mentioned issues with freight movement, and 31 suggested that there are issues with the current speed limits. Speed limits on Onkaparinga Valley Road was raised as an issue more than speed limits on any other road in the region. A selection of typical survey responses is included below.

“Speed limits between towns should be 100km/h like it used to be, not 80km/h. I would query what benefit this speed reduction has been to the road toll since it was dropped.”

“Insufficient signs for changing speed limits.”

“Speed limit is unnecessarily low (80km/h) in some sections.”

“Heavy freight is too big for the width and bends in road.”

“Between Balhannah and Woodside there are no overtaking opportunities.”

Crash history

Between 2015 and 2019, 48 casualty crashes occurred on Onkaparinga Valley Road. Almost one third of these involved vehicles hitting fixed objects, of which 50% were trees. Right angle crashes were the next most common crash type, scattered across intersections with Onkaparinga Valley Road with 75% of these crashes at intersections in townships.

Table 10: Onkaparinga Valley Road casualty crash types (2015-2019)

Crash type	Number of casualty crashes	Crash severity		
		Minor	Serious	Fatal
Hit Fixed Object	14	11	2	1
Right Angle	12	8	4	0
Rear End	7	7	0	0
Head On	5	3	2	0
Right Turn	3	3	0	0
Hit Parked Vehicle	2	2	0	0
Side Swipe	2	2	0	0
Hit Pedestrian	2	2	0	0
Hit Object on Road	1	1	0	0
Total	48	39	8	1

Recommendation 4A

Install additional safety barriers to reduce the likelihood of errant vehicles colliding with trees located within five metres of Onkaparinga Valley Road.

Cars are the primary unit involved in crashes on Onkaparinga Valley Road, making up a substantially higher percentage of units than average for the region. By contrast, motorcyclists are involved in less crashes than average for the region along this road. This may be because Onkaparinga Valley Road is a key commuter route and less popular for recreational motorcyclists.

Table 11: Units involved in crashes on Onkaparinga Valley Road (2015-2019)

Unit type	Approximate number of units
Car	67 (81%)
Motorcycle	6 (7%)
Other/Unknown	4 (5%)
Bicycle	3 (4%)
Truck	2 (2%)
Pedestrian	1 (<2%)

Road widths

Onkaparinga Road is constructed to a good geometric standard, except for the narrow bridges located at various points along the route.

Table 12: Sealed width of Onkaparinga Valley Road

Location	Lane width	Sealed shoulder width	Total seal width
NE of Ambleside Road (Balhannah)	3.4m	1.0m	8.8m
N of Woodside Road RAB (Charleston)	3.4m	1.0m	8.8m
S of Burton Road (Mount Torrens)	3.4m	0.6m / 1.0m	8.4m



Figure 45: Narrow bridges are the most substantial geometric hazard on Onkaparinga Valley Road.

Recommendation 4B

Widen bridges along the length of Onkaparinga Valley Road, with priority given to those located in the 100km/h zone between Birdwood and Charleston. This will improve safety and has the potential to allow the use of more productive freight transport by resolving some first and last mile issues now that the freight route between Mannum and Lobethal has been upgraded to allow the use of PBS level 2A vehicles.

Speed limits

Speed limits were the most common issue raised by survey respondents along the length of Onkaparinga Valley Road, with two recurring topics, namely:

- Speed limits through, and approaching, townships are inconsistent, and
- 80km/h speed limits between townships are too low.

RAA has mapped speed limits along the route, with particular focus on townships, and this has shown that there is a lack of consistency with speed limits through and approaching townships along Onkaparinga Valley Road.

Table 13: Speed limit on Onkaparinga Valley Road (from south to north)

Segment	Speed limit (km/h)*
Verdun	60 – 50 – 60
Verdun - Balhannah	80
Balhannah	60 – 50 – 60
Oakbank	60
Oakbank - Woodside	80
Woodside	50A - 50 – 60
Woodside – Charleston	80
Charleston	60 – 60A
Charleston – Mount Torrens	100
Mount Torrens	50A – 50 – 50A
Mount Torrens - Birdwood	100
Birdwood	80 – 50

*50A/60A indicates the presence of G9-79 'SPEED LIMIT AHEAD' signage prior to a speed limit reduction.

The map below depicts these speed limits and the locations of townships between Birdwood and Verdun.

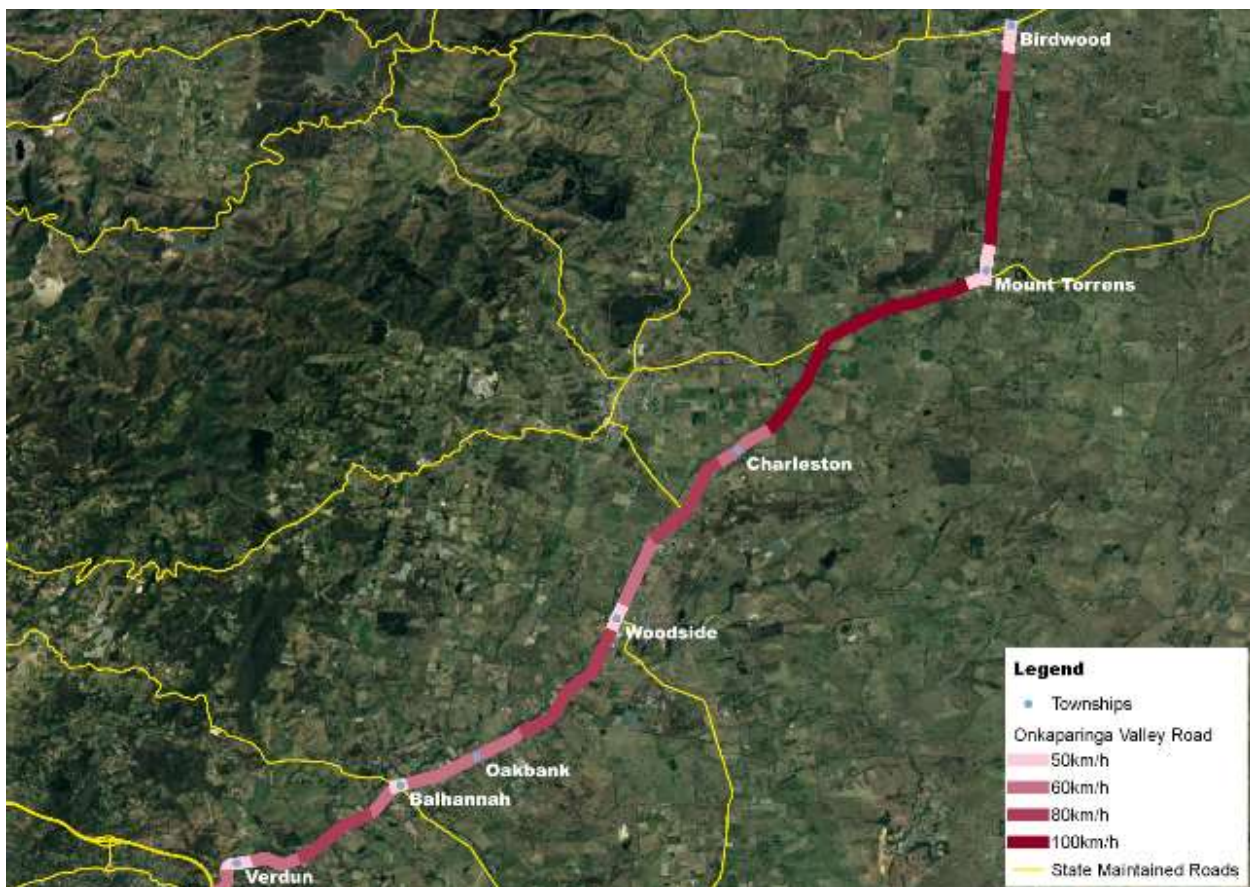


Figure 46: Map of variations in speed limit along Onkaparinga Valley Road

Consideration should be given to replacing the existing 60km/h speed limit zones with 50km/h or 80km/h zones (or a combination of both) and utilising G9-79 '50 AHEAD' signs on the approaches to 50km/h speed limits which would ultimately result in only two different speed zones between Verdun and Charleston.

Recommendation 4C

Adopt a consistent approach to speed limits on Onkaparinga Valley Road that reflects current best practice and Australian Standard 1742.4.

Some survey respondents felt that the speed limit was too low between Woodside and Oakbank and was contributing to dangerous driving and behaviours such as tailgating and risky overtaking.

RAA reviewed the 3km long stretch between Woodside and Oakbank, which was previously subject to a 100km/h speed limit before being reduced to 80km/h near the end of 2012. Seven years of crash data (to the end of 2019) is available since the change in speed limit. When comparing this data to the seven years of data prior to the speed reduction, casualty crashes were reduced by an average of 50%. There were no substantial upgrades to road infrastructure since 2006 and traffic volumes increased by approximately 30% between 2007 and 2018.

Table 14: Crash history between Woodside and Oakbank before and after the speed limit reduction

Year	Minor Injury crashes	Serious injury crashes	Fatal crashes	Total casualty crashes
2006 - 2012	8	6	2	16
2013 - 2019	8	0	0	8

As a comparison on the same road, the speed limit between Charleston and Birdwood still sits at 100km/h. Traffic volumes on this section of road increased by approximately 15% between 2007 and 2018, and the average number of casualty crashes occurring per year since 2013 has also reduced, however, not to the same extent as the section between Woodside and Oakbank.

Table 15: Crash history between Birdwood and Charleston before and after the Woodside to Oakbank speed limit reduction

Year	Minor Injury crashes	Serious injury crashes	Fatal crashes	Total casualty crashes
2006 - 2012	8	5	0	13
2013 - 2019	7	2	1	10

Considering the results of this analysis, RAA does not support increasing the speed limit from 80km/h to 100km/h on Onkaparinga Valley Road.

AusRAP star ratings

Applying the AusRAP star rating protocols to Onkaparinga Valley Road would typically result in it rated as two or three stars. The star rating example below was calculated on a section of Onkaparinga Valley Road between Woodside and Charleston and takes into account roadside hazards including trees and stobie poles. The lanes are wide, shoulder sealing is present and line marking is in good condition. When combined with the existing 80km/h speed limit, this section would be rated three stars. Installing barriers to prevent collisions with roadside hazards would increase this rating to four stars.



Figure 47: Typical AusRAP star rating on Onkaparinga Valley Road

Although road geometry is comparable, the 100km/h section between Charleston and Birdwood is only rated between one and two stars due to the increased risk at higher speed of local factors such as proximity to roadside hazards and road curvature. If an 80km/h speed limit were to be implemented on this section of road, theoretical loss of travel time per journey would be marginal at 55 seconds between Birdwood and Mount Torrens and 38 seconds between Mount Torrens and Charleston, whilst the star rating would increase to three stars on straight or gently curving road segments.

Other observations

Survey respondents also cited a lack of overtaking opportunities on Onkaparinga Valley Road, particularly between Woodside and Verdun. This section carries traffic volumes that would warrant the installation of overtaking lanes in some circumstances. The road environment between Charleston and Verdun is not suitable for overtaking lane construction, with many side roads and property access points, narrow bridges, and short 80km/h zones with lengths of 3km (Woodside – Oakbank), 2km (Balhannah – Verdun) and 2.2km (Charleston – Woodside).

Whilst the road surface was mostly in serviceable condition for the length of the road, there were some areas that require rehabilitation. Sections between Verdun and Balhannah have shallow ruts, with cracking allowing water to infiltrate the pavement which will lead to significant issues in the longer term. Undulations between Mount Torrens and Birdwood are also quite pronounced, and the surface is significantly failing in the Birdwood Township.

Recommendation 4D

Undertake pavement rehabilitation between Verdun and Balhannah, between Mount Torrens and Birdwood, and road resealing within the Birdwood township.

Intersection with Nairne Road and Tiers Road

The intersection with Nairne Road and Tiers Road in Woodside was one of the most highly raised intersections in the Adelaide Hills region, raised over 30 times by survey respondents. The Australian Government has committed \$2 million towards improving freight productivity and efficiency at the intersection with community consultation occurring in December 2019 to identify community concerns and seek feedback.

RAA provided feedback during this consultation period highlighting the key comments and concerns raised by respondents in the Adelaide Hills regional survey, as well as observations made on site. Poor sight distances were identified, exacerbated by parked vehicles on Onkaparinga Valley Road. It was suggested that signalising the intersection be considered, however that this would be challenging to achieve given the current \$2m in funding. A lower cost alternative may be to convert Onkaparinga Valley Road to a four-lane carriageway in the vicinity of the intersection which would involve removing parking to include channelised right turn lanes. Consideration of providing left turn lanes should also be considered in order to provide continuous traffic flow on Onkaparinga Valley Road.

The concept sketch below has been developed by RAA to make use of existing road space without signalisation. Further development is required to ensure pedestrian and cyclist safety as there are opportunities to provide pedestrian crossings or refuges and cycle lanes through the intersection that are not depicted in the sketch.

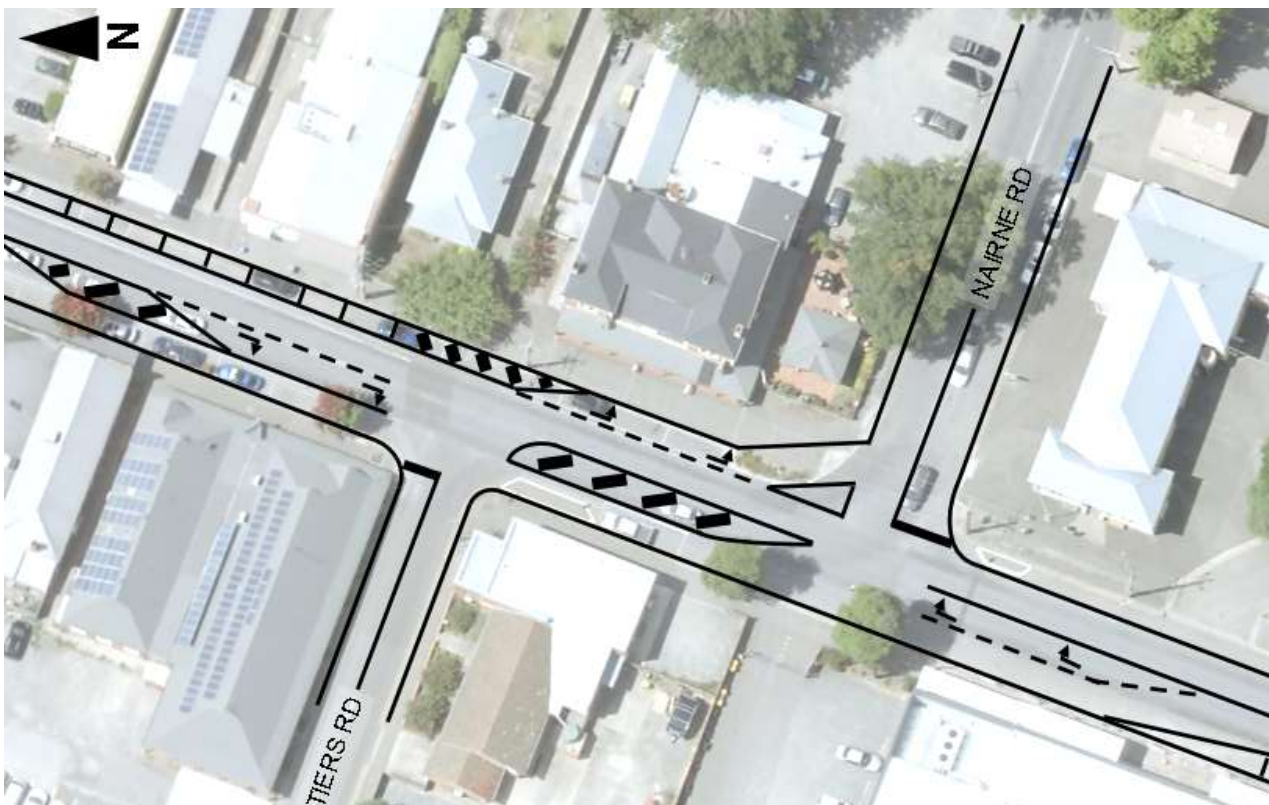


Figure 48: RAA concept sketch for un upgraded intersection with Tiers Road and Nairne Road in Woodside

Recommendation 4E

Upgrade the intersection with Tiers Road and Nairne Road in Woodside to improve safety and freight access

Summary of recommendations for Onkaparinga Valley Road

Recommendation 4A

To reduce the likelihood of vehicles hitting trees on Onkaparinga Valley Road, RAA recommends installing additional safety barriers to ensure errant vehicles cannot collide with trees located within five metres of the road.

Recommendation 4B

Widen bridges along the length of Onkaparinga Valley Road, with priority given to those located in the 100km/h zone between Birdwood and Charleston. This will improve safety and has the potential to allow the use of more productive freight transport by resolving some first and last mile issues now that the freight route between Mannum and Lobethal has been upgraded to allow the use of PBS level 2A vehicles.

Recommendation 4C

Adopt a consistent approach to speed limits on Onkaparinga Valley Road that reflects current best practice and Australian Standard 1742.4.

Recommendation 4D

Undertake pavement rehabilitation between Verdun and Balhannah, between Mount Torrens and Birdwood, and road resealing within the Birdwood township.

Recommendation 4E

Upgrade the intersection with Tiers Road and Nairne Road in Woodside to improve safety and freight access

Greenhill Road

Greenhill Road is an arterial road spanning between Wayville and Balhannah passing through Greenhill, Summertown and Uraidla. RAA only reviewed the section relevant to the Adelaide Hills which extends for approximately 20km between Burnside and Balhannah. The busiest section of the road is from east of Summertown through to Rangeview Drive, west of Uraidla, and carries 3300 – 4800 vehicles per day in what is a fairly built up environment in Summertown and Uraidla. The road carries 2500 – 3200 vehicles per day between Burnside and Uraidla, and 1700 between Uraidla and Balhannah. The road is generally narrow and windy, with a fairly steep descent between Summertown and Burnside, and it is expected that these attributes contribute to crashes occurring on Greenhill Road.

Greenhill Road was one of the most raised roads during the Adelaide Hills regional community survey, attracting 49 comments across various questions. The main themes raised in commentary regarded the narrow and windy road, poor condition of the road surface, dangerous interactions with heavy vehicles, and that the 80km/h speed limit was too high. Some typical survey responses are included below.

“80km/h is too fast on Greenhill Road through Carey Gully past houses, especially on winding sections.”

“Narrow winding road with poor visibility. I have driven around a bend to find a truck occupying my lane. Frightening!”

“The road is too narrow for large trucks, with no overtaking or pullover areas.”

“There are many houses that have driveways on Greenhill road (Greenhill community) and it is super dangerous for them to exit their driveway into an 80km/h speed zone. It should be 60km/h until the exit of Yarrabee Road onto Greenhill on Uraidla side.”

Crash history

Between 2015 and 2019, crashes where a vehicle collides with a fixed object made up 44% of all casualty crashes on Greenhill Road. The types of objects collided with include guard rails (42%) and ‘other fixed obstruction’ (46%) which does not include trees or poles but is most likely to be steep embankments and rock faces based on a review of the individual crash locations.

Table 16: Greenhill Road casualty crash types (2015-2019)

Crash type	Number of casualty crashes	Crash severity		
		Minor	Serious	Fatal
Hit Fixed Object	22	18	4	0
Roll Over	9	7	2	0
Head On	6	4	2	0
Rear End	3	2	1	0
Side Swipe	3	3	0	0
Right Angle	2	2	0	0
Hit Animal	1	1	0	0
Hit Object on Road	1	1	0	0
Other	1	1	0	0
Hit Parked Vehicle	1	1	0	0
Hit Pedestrian	1	1	0	0
Total	50	41	9	0

The table below breaks down the different unit types involved in casualty crashes on Greenhill Road between 2015 and 2019.

Table 17: Units involved in crashes on Greenhill Road (2015-2019)

Unit type	Approximate number of units
Car	43 (61%)
Bicycle	13 (19%)
Motorcycle	11 (16%)
Other	2 (3%)
Pedestrian	1 (<2%)

When looking at this data, it is evident that cyclist involvement in crashes is three times higher than average across the Adelaide Hills region, with cyclists making up 19% of units involved in crashes compared with 6% across the region. Drilling down further into the data shows that the cyclist is the responsible unit in the crash 77% of the time. This can be attributed to the fact that more than half of these crashes involve a cyclist rolling over or colliding with a fixed object. Three crashes involving cyclists also involved cars, with the car deemed to be the responsible unit in two of those crashes.

As cyclists are particularly affected by poor road surface conditions such as uneven and cracked pavement, or loose material, it is considered that a reseal of Greenhill road will reduce the likelihood of roll over and hit fixed object crashes involving a single cyclist.

A review of the number of casualty crashes per 100 million vehicle kilometres travelled highlights that the casualty crash rate is twice as high on the section between Burnside and Summertown as it is between Uraidla and Balhannah.

Road widths

Greenhill Road is generally very narrow between Burnside and Rangeview Road in Carey Gully. Measurements taken in Greenhill indicate a total seal width of less than 6 metres, which is far below the desirable geometry for a road with this volume of traffic as per *Austroads Guide to Road design*⁷.

Table 18: Sealed width of Greenhill Road

Location	Lane width	Sealed shoulder width	Total seal width
Between Burnside and Greenhill	2.7m	0.1m	5.6m
E of Carmac Road (Balhannah)	3.1m / 3.4m	1.4m / 0.8m	8.7m

Widening Greenhill Road would be extremely expensive due to the topography of the surrounding landscape. It may be possible to widen some sections locally, however widening Greenhill Road to a consistent, acceptable width would prove challenging given economic constraints.

Installing centre line ATLM as has been done on Gorge Road will deter drivers, and in particular motorcycle riders, from crossing the centre line and is a low-cost safety improvement that could be implemented almost immediately.

Recommendation 5A

Install centre line ATLM along Greenhill Road to deter drivers and motorcycle riders from crossing the centre line.

Speed limits

Greenhill Road is generally governed by an 80km/h speed limit with 50km/h zones through Summertown and Uraidla.

Table 19: Speed limit on Greenhill Road

Segment	Speed limit (km/h)
Burnside – W of Greenhill	60
W of Greenhill - Summertown	80
Summertown	60 – 50
Uraidla	50 – 50A
Uraidla – Balhannah	80
Balhannah	50A – 50

*50A indicates the presence of G9-79 'SPEED LIMIT AHEAD' signage prior to a speed limit reduction.

Numerous survey respondents called for the speed limit to be reduced for safety reasons on Greenhill Road. A reduction in the speed limit to 60km/h would be the lowest cost option to improve safety and would potentially reduce the number of drivers trying to travel at speeds which

⁷ Austroads, 2016, *Guide to Road Design Part 3: Geometric Design*, pp48, www.austroads.com.au.

compromise safety on such a busy route. The current 80km/h limit is not practical for most of Greenhill Road west of Summertown.

Theoretically, if a driver could maintain 80km/h for the entire 5.17km 80km/h zone between Burnside and Summertown, the loss in travel time works out to be 1 minute and 17 seconds, assuming it is also possible to maintain 60km/h for the entire section. In practice, however, it is not possible to maintain 80km/h or even 60km/h for the entire length due to the curvilinear alignment of the road. RAA conducted a series of travel time tests, with the results of these tests included in the following tables.

Table 20: 80km/h zone travel time test between Burnside and Summertown (length: 5170m)

Test number	Speed limited	Direction of travel	Total travel time	Average speed
1	80km/h	EB	5m30s	56km/h
2	80km/h	WB	5m20s	58km/h
3	60km/h	EB	5m44s	54km/h
4	60km/h	WB	5m48s	54km/h

Table 21: 80km/h zone travel time test between Uraidla and Balhannah (length: 8420m)

Test number	Speed limited	Direction of travel	Total travel time	Average speed
1	80km/h	EB	7m21s	69km/h
2	80km/h	WB	7m20s	69km/h
3	60km/h	EB	8m39s	58km/h
4	60km/h	WB	8m54s	57km/h

Table 22: 80km/h zone travel time test between Hallett Road and Onkaparinga Valley Road (length: 19800m)

Test number	Speed limited	Direction of travel	Total travel time	Average speed
1	80km/h	EB	20m58s	57km/h
2	80km/h	WB	20m34s	58km/h
3	60km/h	EB	22m16s	53km/h
4	60km/h	WB	22m37s	53km/h

The maps in Figure 49 and Figure 50 plot the travel speeds side by side for the two 80km/h zones on Greenhill Road.

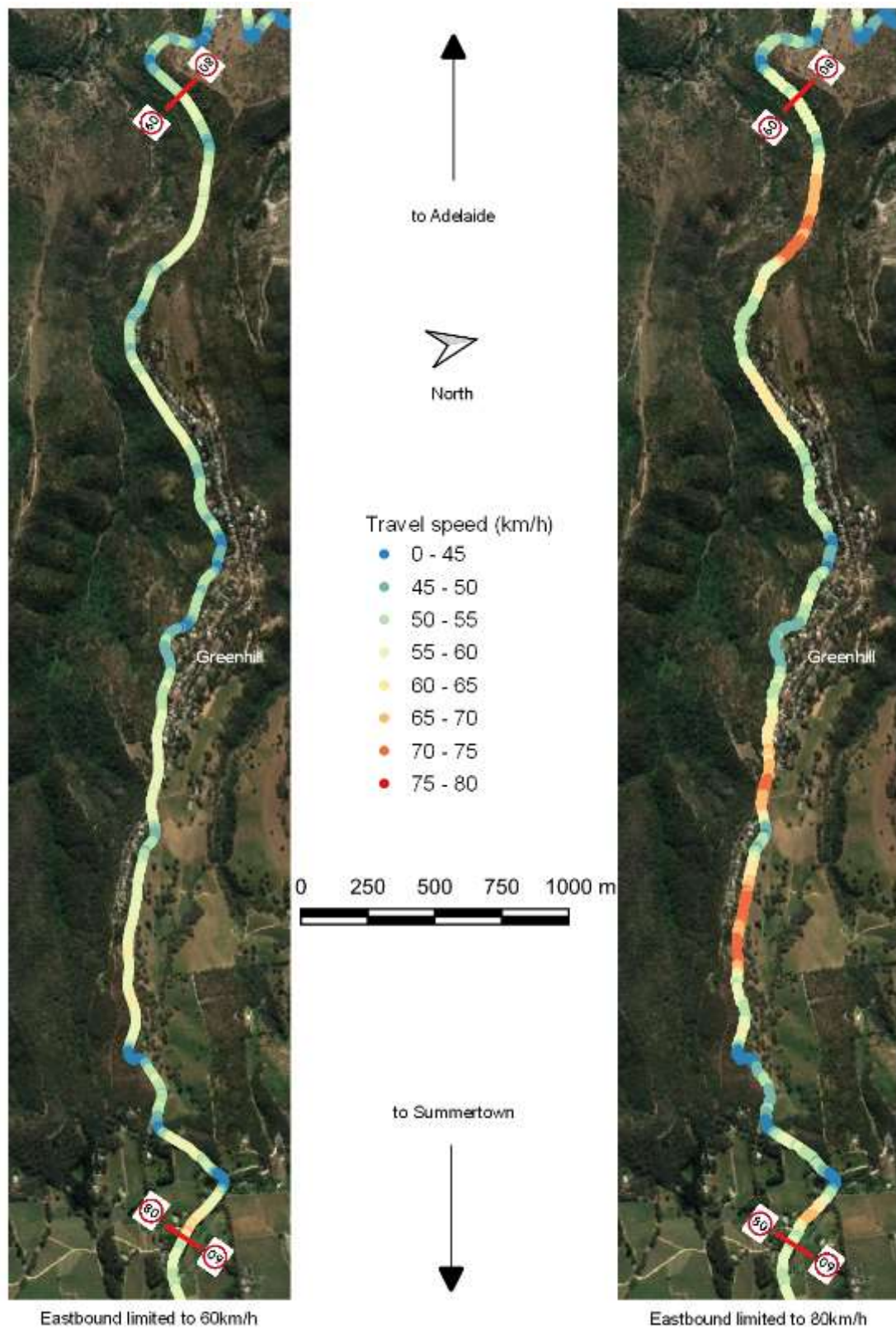


Figure 49: 80km/h vs 60km/h zone actual travel speed comparison between Burnside and Summertown

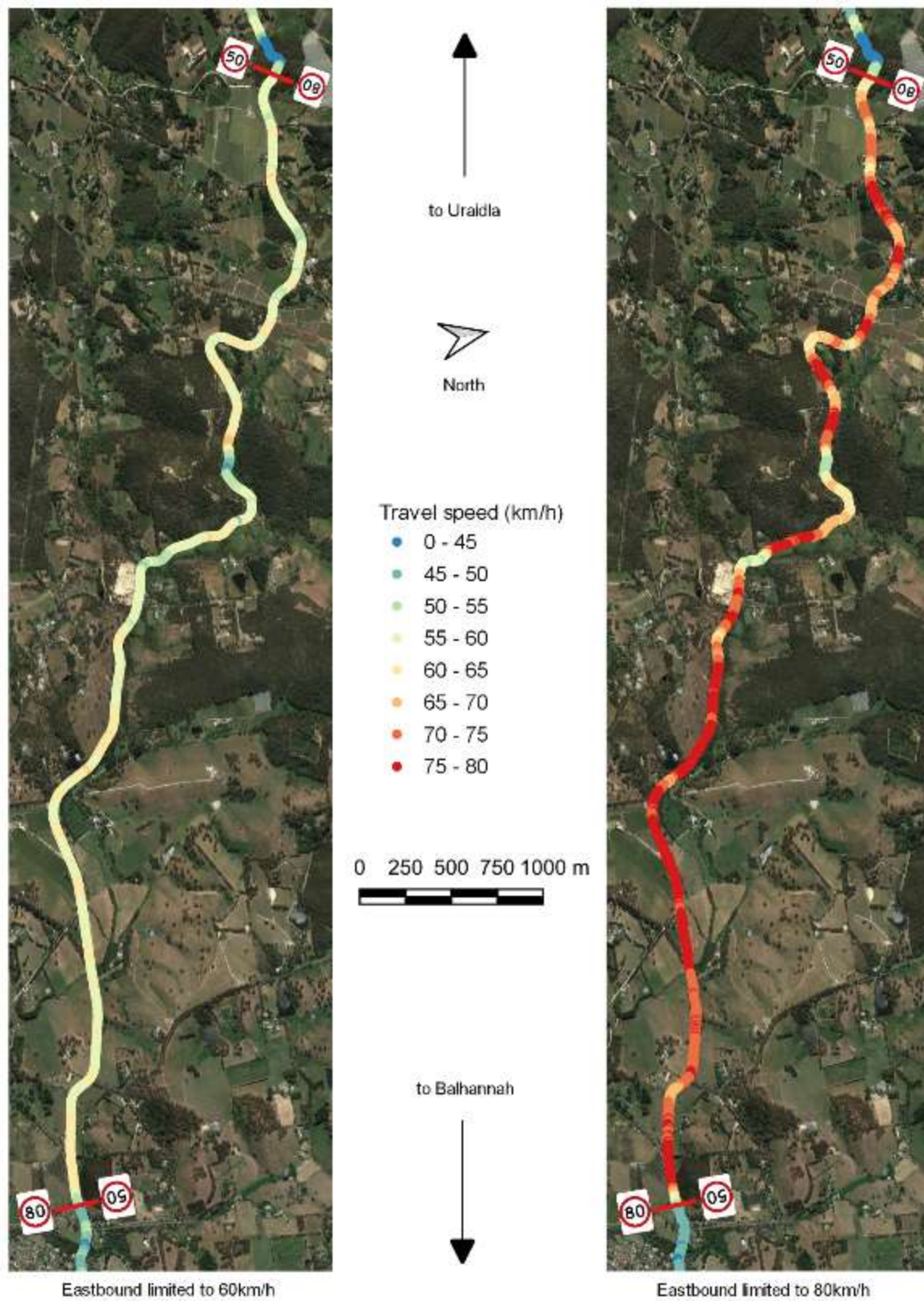


Figure 50: 80km/h vs 60km/h zone actual travel speed comparison between Uraidla and Balhannah

The results from the maps above were reflective of all trials. Notably, the survey team was required to undertake several extra trials in order to complete an unobstructed pass of Greenhill Road due to slower travelling vehicles, buses, or trucks. The prevalence of slow-moving traffic along Greenhill Road further highlights the unsuitability of the higher speed limit.

Due to the results of the above testing and other factors including poor geometry, high traffic volumes, frequent bus, freight and cyclist use, frequent and concealed property access points and substandard side road intersections, RAA recommends that the speed limit on Greenhill Road between Burnside and Summertown be reviewed with consideration of applying a 60km/h limit.

Overall, if a 60km/h limit were to be introduced between Burnside and Summertown, RAA would expect travel times increase by between 15 and 30 seconds, which is considered acceptable given the enhancement this will make to safety.

Recommendation 5B

Review the speed limit on Greenhill Road between Burnside and Summertown with consideration given to adopting a 60km/h speed limit which will have minimal impact on regular travel times on this section of Greenhill Road.

AusRAP star ratings

Applying the AusRAP star rating protocols to Greenhill would typically result in it rated as one star, which is the lowest possible rating. The star rating example below was calculated on a section of Greenhill Road between Burnside and Summertown and takes into account hazards including narrow lanes, blind corners and the vertical rock face on the road shoulder. Although barrier protection is installed on one side of the road to protect vehicles from traversing the embankment and line marking is in satisfactory condition, shoulder sealing is marginal. When combined with the existing 80km/h speed limit, this section would be rated one star.



Figure 51: Typical AusRAP star rating on Greenhill Road, west of Summertown

Reducing the speed limit to 60km/h is the most cost-effective way to improve the star rating and would give the pictured section a three star rating and curves with similar geometry a two star rating. In contrast, to maintain the 80km/h speed limit and achieve the same increase in star rating by implementing infrastructure upgrades will require:

- Straight sections: each lane to be widened by 600mm minimum (total 1.2m road width increase)
- Curves: lane widening as above, but also 1m shoulder sealing and centre line ATLM
- excavating the vertical rock face by more than 2m (up to 5m on curves)
- barrier protection in front of the vertical rock face

Other observations

Between Burnside and Summertown, the road surface of Greenhill Road is in poor condition and in need of maintenance, particularly around curves where aggregate loss and polishing occurs to create an uneven and slippery surface. These defects are less prominent, but also exist on curves between Uraidla and Balhannah. Localised resealing around curves exhibiting pavement failures should be undertaken along the whole corridor with consideration given to a full reseal between Burnside and Summertown.



Figure 52: Deteriorated centre line marking and failing pavement on Greenhill Road

Recommendation 5C

Undertake resealing around curves exhibiting pavement failures along the whole corridor with consideration given to a full reseal between Burnside and Summertown.

Summary of recommendations for Greenhill Road

Recommendation 5A

Install centre line ATLM along Greenhill Road to deter drivers and motorcycle riders from crossing the centre line.

Recommendation 5B

Review the speed limit on Greenhill Road between Burnside and Summertown with consideration given to adopting a 60km/h speed limit which will have minimal impact on regular travel times on this section of Greenhill Road.

Recommendation 5C

Undertake resealing around curves exhibiting pavement failures along the whole corridor with consideration given to a full reseal between Burnside and Summertown.

Mount Barker Road

Mount Barker Road extends for approximately 14km, running adjacent to the South Eastern Freeway between Stirling and Mount Barker. Mount Barker Road passes through Aldgate, Bridgewater and Hahndorf and allows commuters from nearby towns to reach such towns without using the South Eastern Freeway.

Average daily traffic volumes on Mount Barker Road vary between 3,000 vehicles per day near Bridgewater and close to 14,000 vehicles per day at the south-eastern end of the road, near Mount Barker.

The most significant issues raised related to the section through the Hahndorf Town centre, and in particular with regard to heavy vehicle movements. Survey respondents also raised issues with cyclist safety, poor road surface and poorly signposted speed limits.

“Between Stirling and Aldgate there is no lighting at night, no cycle lane, it’s a recreational bike riders favourite road and they need to be safe.”

“Rough uneven road surface, gravel runs onto road during rain making it slippery, lack of signage for speed limits.”

“In Hahndorf, trucks are too large, hitting cars, risk for pedestrians, noise pollution.”

“50km/h is not really necessary as traffic tends to be slower as it is. Residential side streets are OK but for the main road is not an issue being a flat 60km/h throughout. It is very easy to miss speed limit changes as they are poorly posted with one sign only indicating speed limit.”

“Need a Hahndorf bypass so heavy vehicles can avoid using the Main Street + need upgrade to freeway on/off at Verdun so traffic can go both directions.”

Mount Barker District Council has completed the *Hahndorf Main Street Revitalisation Study* with an estimated cost of \$6.7m to complete streetscape upgrades included upgraded footpaths, lighting, street furniture and landscaping as well as provision for smart technology. The project is currently unfunded and subject to state or federal government committing 50% of the costs. Whilst not yet confirmed, we would expect that this to be part of the \$250m *Hahndorf Township Improvements and Access* upgrade announced as part of the October 2020-21 federal budget, which will primarily address movement in and around Hahndorf.



Figure 53: Frequent heavy vehicle movements along Mount Barker Road in Hahndorf are of high concern

Crash history

Between 2015 and 2019, 65 casualty crashes occurred on Mount Barker Road. Of those, 11 (17%) resulted in serious injury, with the remaining resulting in minor injury.

Most casualty crashes (70%) occurred on the built up and busiest sections of Mount Barker Road in Stirling, Aldgate, Bridgewater, Hahndorf and Totness.

Table 23: Mount Barker Road casualty crash types (2015-2019)

Crash type	Number of casualty crashes	Crash severity		
		Minor	Serious	Fatal
Rear End	19	17	2	0
Right Angle	12	9	3	0
Hit Fixed Object	8	6	2	0
Side Swipe	7	6	1	0
Hit Pedestrian	6	4	2	0
Head On	6	5	1	0
Hit Parked Vehicle	3	3	0	0
Roll Over	2	2	0	0
Hit Animal	1	1	0	0
Hit Object on Road	1	1	0	0
Total	65	54	11	0

Cars are the primary unit involved in crashes on Mount Barker Road, making up three quarters of units involved in crashes on the road.

Crashes involving pedestrians occurred more frequently on Mount Barker Road than typical for the Adelaide Hills Region with seven casualty crashes involving pedestrians occurring between 2015 and 2019. This is largely due to the popularity of Hahndorf as a tourist town best explored on foot. Five of the seven pedestrian crashes on Mount Barker Road occurred within the built-up area of Hahndorf.

Cyclist crashes are most prominent along the popular strip between Stirling and Aldgate, with five of eight occurring on this section. Most of these occurred within the more built up sections of Stirling and, as such consideration should be given to extending the existing cycle lane in Stirling through to Aldgate. The existing cycle lane is less than 200m in length commencing at Pomona Road and terminating at the signalised pedestrian crossing.

Table 24: Units involved in crashes on Mount Barker Road (2015-2019)

Unit type	Approximate number of units
Car	97 (76%)
Bicycle	8 (6%)
Pedestrian	7 (6%)
Motorcycle	7 (6%)
Other/Unknown	3 (2%)
Bus	3 (2%)
Truck	2 (<2%)

Recommendation 6A

Explore opportunities to extend the existing Stirling cycle lane through to Aldgate. As a minimum a cycle lane should be provided where carriageway width allows, as there are some potential bottlenecks along the route.

Road widths

Road width between Totness and Hahndorf is generally satisfactory with lanes wider than three metres and one metre wide sealed shoulders along most of the length. The pavement is wider around curves which allows additional space for larger vehicles to manoeuvre.

Whilst the lane width is narrower between Verdun and Bridgewater, road widening works are difficult in this section due to the steep cross section of the verge. Similarly, between Bridgewater and Stirling, the risks associated with the narrower carriageway width are somewhat offset by the 60km/h speed limit rather than 80km/h as per other sections of Mount Barker Road.

Speed limits

Mount Barker Road is characterised by four different speed limits. Hahndorf and Stirling both have 40km/h speed limits in their busy pedestrian precincts. Aldgate and Bridgewater have 50km/h town centre speed limits, with roads connecting townships posted at either 60km/h or 80km/h.

Table 25: Speed limits on Mount Barker Road

Segment	Speed limit (km/h)
Stirling	40
Stirling - Aldgate	60
Aldgate	50
Aldgate – Bridgewater	60
Bridgewater	50
Bridgewater – Hahndorf	80 – 60 – 80 – 60
Hahndorf	40 – 50
Hahndorf – Mt Barker	80
Mt Barker	60

The speed limit between Bridgewater and Hahndorf is perhaps the most difficult for a driver to keep track of, with four changes in under four kilometres. Whilst the 60km/h and 80km/h zones are warranted if each were to be considered in isolation, when travelling the corridor between Hahndorf and Bridgewater, it is confusing for the speed limit to change this frequently.



Figure 54: Variation in speed limits on Mount Barker Road between Bridgewater and Hahndorf

Recommendation 6B

Review speed limits between Bridgewater and Mount Barker with an aim to reduce the number of changes required.

AusRAP star ratings

Mount Barker road would typically be rated two stars in the sections governed by an 80km/h speed limit as pictured below. The star rating example below was calculated on a section of Mount Barker Road between Bridgewater and Verdun and considers factors including trees in close proximity to the road edges, narrow shoulders and a good clear zone on one side of the road.



Figure 55: Typical AusRAP star rating on Mount Barker Road (Photo taken between Hahndorf and Bridgewater)

This section could be improved to a three star rating by simply installing a w-beam safety barrier with motorcycle underrun protection. Reducing the speed limit to 60km/h would have a similar impact on star rating. However, the surrounding road environment is not conducive to a 60km/h speed limit and RAA considers infrastructure improvements to be more effective on this section.

Other observations

Roadside hazards are prominent along sections of Mount Barker Road, particularly between Verdun and Bridgewater, where a narrow road cross section and curving alignment increases the risk of collisions with roadside vegetation, when compared to other sections of the road.

The road surface between Mount Barker and Hahndorf shows signs of deterioration with cracking and rutting prominent, particularly around back to back opposing curves where load shifting in heavy vehicles can create additional stress on the pavement and subgrade materials. Bleeding in the wheel paths is also prominent, which can cause ponding in wet weather and reductions to skid resistance.

Recommendation 6C

As a minimum, repair localised failures between Mount Barker and Hahndorf, but consider a full reseal for this section.

Traffic in Hahndorf

Traffic issues in Hahndorf were one of the highest raised issues in the regional community survey. Survey responses highlighted concerns held by residents that included large freight using Mount Barker Road through Hahndorf, high traffic volumes, difficulties for pedestrians crossing the road and a lack of parking facilities. Freight through the main street of Hahndorf was the most frequently raised of these concerns, with some typical responses included below.

“It is plain ridiculous that heavy vehicles must travel the Hahndorf main street as no bypass exists.”

“Street is too narrow for large trucks going from the Barossa Valley to McLaren Vale.”

“Far too narrow for large trucks AND roadside parking.”

“Traffic flow issues when heavy vehicles are negotiating this stretch at busy times due to width of vehicles and road space given the amount of parking.”

“Overcrowding, road too narrow, trucks competing with pedestrians, parked cars and other vehicles.”

“Visitors get confused that they can't head back out to the freeway and get to Mt Barker, there is no 'on' ramp, they end up doing U turns at emergency accesses on the freeway and at the Bridgewater overpass.”

The \$1m *Hahndorf Township Strategic Traffic Planning Study* has reviewed these issues, and in the 2020-21 federal budget \$200m in funding was provided for Hahndorf Township improvements and access upgrade. It is also expected that the state government will provide up to \$50m funding for these upgrades. Further details of what this upgrade includes are yet to be released, however this should allow for an upgrade of the road network to facilitate safer freight and traffic movements around Hahndorf.

Improvements that would enable this may include:

- An upgrade of the Verdun interchange to provide full access in all directions,
- Improvements to parking facilities within the Hahndorf township,
- A new Park 'n' ride facility in Verdun incorporating a visitor information centre,
- An upgrade of the Mount Barker interchange

This should also tie in with the Hahndorf Main Street Revitalisation project, managed by Mount Barker District Council and estimated to cost \$6.7m.

These studies and RAA's associated recommendations are discussed further in the Tourism section of this report, under Discussion and survey analysis.

Summary of recommendations for Mount Barker Road

Recommendation 6A

Explore opportunities to extend the existing Stirling cycle lane through to Aldgate. As a minimum a cycle lane should be provided where carriageway width allows, as there are some potential bottlenecks along the route.

Recommendation 6B

Review speed limits between Bridgewater and Mount Barker with an aim to reduce the number of changes required.

Recommendation 6C

As a minimum, repair localised failures between Mount Barker and Hahndorf, but consider a full reseal for this section.

Lobethal Road

Lobethal Road is a state-maintained road extending for 21km between Norton Summit and Lobethal via Ashton, Basket Range and Lenswood. Lobethal Road is characterised by challenging horizontal geometry with a significant number of sharp substandard curves through hilly terrain.

Traffic volumes vary across sections of the road but typically sit between 1,000 and 2,000 vehicles per day. More than 3,000 vehicles travel the section near Norton Summit and as few as 390 travel the section between Basket Range and Ashton. Whilst the road provides the most direct route between Lobethal and Adelaide, it is often avoided by tourists and locals alike who favour the South Eastern Freeway, Greenhill Road or North East Road depending on their destination. It is, however, very popular with recreational cyclists and motorcyclists. Lobethal Road serves an important role in the local industry and is central to freight operations involving local orchards with fruit such as cherries, apples and grapes all grown widely in Lenswood and Basket Range.

Lobethal Road received numerous mentions in the Adelaide Hills regional community survey, with most of these centred around dangerous freight interactions and challenges for trucks to traverse the narrow and winding geometry. Some typical responses are included below.

“Corners are too tight, and the road is too narrow to get a truck around without impinging on other lane.”

“Limited passing opportunities and impatient drivers taking passing risks.”

“Very windy and tight. Some trucks too large.”

“Very windy road with 80km/h speed limit.”

Crash history

Between 2015 and 2019, 43 casualty crashes occurred on Lobethal Road. Roll over crashes are the most common crash type with hotspots for these crashes in Basket Range (in the vicinity of Basket Range Road) and Lenswood (in the vicinity of Coldstore Road). 79% of these rollover crashes involved a motorcyclist, with the remaining 21% involving a cyclist.

Hit fixed object and head-on crashes are other commonly occurring crash types on Lobethal Road.

Table 26: Lobethal Road casualty crash types (2015-2019)

Crash type	Number of casualty crashes	Crash severity		
		Minor	Serious	Fatal
Roll Over	14	11	3	0
Hit Fixed Object	9	6	3	0
Head On	8	5	2	1
Right Angle	5	4	1	0
Left Road - Out of Control	2	2	0	0
Side Swipe	2	1	1	0
Right Turn	1	1	0	0
Rear End	1	1	0	0
Other	1	1	0	0
Total	43	32	10	1

Motorcycles are significantly overrepresented in crashes on Lobethal Road, making up 46% of units involved in crashes compared to the Adelaide Hills Region overall where motorcycles make up approximately 14% of all units involved in crashes. Cyclists are also overrepresented, making up 15% of units involved in crashes compared with an average of about 6% for the Adelaide Hills Region.

Table 27: Units involved in crashes on Lobethal Road (2015-2019)

Unit type	Approximate number of units
Motorcycle	28 (46%)
Car	22 (36%)
Bicycle	9 (15%)
Truck	1 (<2%)
Bus	1 (<2%)

Of the 28 motorcycles involved in crashes on Lobethal Road, 82% of these were attributed to the motorcycle rider. This is influenced by the fact that 64% of motorcycle crashes are single vehicle crash types (roll over, hit fixed object, left road – out of control). Motorcycle riders were deemed the responsible unit in 70% of crashes involving other units, with one of the key statistics being that motorcycle riders were the responsible unit in each of the six head on crashes involving motorcycles.

Given this data and the fact that head on crashes are far more likely to have serious or even fatal consequences, installation of audio tactile centre lines should be a high priority treatment for Lobethal Road. This has shown to be effective in the Gorge Road trial and should be expanded to include Lobethal Road and other popular motorcycling routes.

Recommendation 7A

Following on from the success of the Gorge Road trials, install ATLM centreline markings along Lobethal Road to encourage motorcycle riders to adopt a safer path around curves and reduce the likelihood of head on crashes occurring.

Road widths

Lane widths on Lobethal road are generally consistent at approximately three metres wide for most of the route, with very narrow (0.1-0.2m) sealed shoulders allowing painted edge lines to be present for the majority of the route. On sharp curves through Basket Range edge lines have been omitted or painted on only one side of the road to provide for slightly wider lanes around curves, but this does not realistically translate to additional road space in most cases.

RAA considers the use of edge lines important to assist motorists in identifying the edge of the road, particularly at night or in or adverse weather. These should be painted on both sides of the road through Basket Range.

Recommendation 7B

Install edge lines on both sides of Lobethal Road through Basket Range.

Speed limits

Speed limits on Lobethal Road are consistent, with 60km/h limits through townships and 80km/h limits between townships. In practice, 80km/h is mostly unachievable for the seven-kilometre section west of Ashton through to Deviation Road, with an average speed recorded by the survey team of 43km/h in free-flowing traffic. Crash data also shows this section to be the riskiest along Lobethal Road, with a very high casualty crash rate of 165 casualty crashes per 100 million vehicle kilometres travelled (100m vkt) in contrast to the already high rate of 100 casualty crashes per 100m vkt along the entirety of Lobethal Road. If the safety upgrades RAA are proposing for Lobethal Road are not undertaken, or do not reduce the number of casualty crashes occurring, a lower speed limit may need to be considered.

Table 28: Speed limits on Lobethal Road

Segment	Speed limit (km/h)
Norton Summit	60
Norton Summit – Ashton	80
Ashton	60A – 60 – 60A
Ashton – Lenswood	80
Lenswood	60
Lenswood – Lobethal	80

To create consistency with signage and improve compliance with the 60km/h speed limit in Lenswood and Norton Summit, RAA recommends installing '60 AHEAD' signs on approaches to both townships.

Recommendation 7C

Install '60 AHEAD' signs on approaches to 60km/h zones through Norton Summit and Lenswood.

AusRAP star ratings

Lobethal Road is typically rated as one star, although the straight, open sections are potentially two stars depending on the local roadside environment. Lobethal Road traverses challenging terrain, and infrastructure safety treatments such as local road widening, and shoulder sealing are generally not possible.



Figure 56: Typical AusRAP star rating on Lobethal Road

The most effective way to improve star rating on the section pictured above would be to provide motorcycle friendly safety barriers on both sides of the road to protect against stobie poles and trees on one side, and the rollover risk on the other side. This treatment would improve the star rating to three stars. However, if barriers were only provided on one side of the road, the star rating would remain at one star unless further safety improvements were made.

Whilst a reduced speed limit can sometimes be the most cost effective way to increase star rating from one star to three stars, in the case above the road would still only be rated two stars should the speed limit be changed from 80km/h to 60km/h without any complementary infrastructure upgrade.

Other observations

As observed on other narrow, windy roads in the Adelaide Hills, pavement failures are most prominent on approaches to, and around curves. The image below depicts aggregate loss and a cracked/delaminating road surface. Whilst these defects cause not much more than discomfort for drivers (and potential loss of traction in severe cases), motorcycle and bicycle riders are far more likely to lose control when traversing these uneven pavements. Considering the popularity of Lobethal Road amongst motorcycle and bicycle riders, pavement rehabilitation around curves should be a priority project along Lobethal Road to ensure safety of motorcycle and bicycle riders.



Figure 57: Aggregate loss and cracking/delamination are safety issues for motorcycle and bicycle riders

Recommendation 7D

Undertake localised resealing around curves exhibiting pavement failures.

Roadside hazards between Lobethal and Lenswood are frequently exposed and include trees, stobie poles and vertical rock faces within 1 – 2m of the road edges. Whilst safety barrier protection is utilised more extensively west of Lenswood, unprotected trees and stobie poles are still present. RAA welcomes and congratulates the government on the investment made into barrier protection along Lobethal Road in the past decade, which has, and will continue to reduce road trauma. However, there is opportunity for further investment into this life saving treatment between Lobethal and Ashton that should strongly be considered to improve safety on Lobethal Road.

Recommendation 7E

Remove roadside hazards and/or install additional barrier protection between Lobethal and Ashton.

At the time of RAA's initial assessment, leaf litter was scattered heavily along the road edges, which gave the appearance of narrower lanes, causing drivers to travel closer to the centre line. This could also pose a skid resistance hazard for cyclists and motorcyclists. Furthermore, this may deter cyclists from riding close to the road edges, making it more difficult for drivers to overtake cyclists safely. This was typically only an issue in sections with heavy roadside vegetation through Forest Range and Basket Range (Lenswood – Ashton)



Figure 58: Leaf litter narrows the visual width of Lobethal Road

Whilst street sweeping isn't typically undertaken on roads such as Lobethal Road, it may be worth considering a strategy of periodic review and sweeping on an ad hoc basis to ensure the full road width is available to all road users.

Recommendation 7F

Consider a street sweeping strategy along Lobethal Road involving periodic review and sweeping on an ad hoc basis to ensure full road width is available to all road users.

Summary of recommendations for Lobethal Road

Recommendation 7A

Following on from the success of the Gorge Road trials, install ATLM centreline markings along Lobethal Road to encourage motorcycle riders to adopt a safer path around curves and reduce the likelihood of head on crashes occurring.

Recommendation 7B

Install edge lines on both sides of Lobethal Road through Basket Range.

Recommendation 7C

Install '60 AHEAD' signs on approaches to 60km/h zones through Norton Summit and Lenswood.

Recommendation 7D

Undertake localised resealing around curves exhibiting pavement failures.

Recommendation 7E

Remove roadside hazards and/or install additional barrier protection between Lobethal and Ashton.

Recommendation 7F

Consider a street sweeping strategy along Lobethal Road involving periodic review and sweeping on an ad hoc basis to ensure full road width is available to all road users.

North East Road/Torrens Valley Road

North East Road is a state maintained arterial road linking Adelaide's north eastern suburbs and the northern Adelaide Hills region. The official name for the road is North East Road between Tea Tree Gully and the intersection with Gorge Road in Chain of Ponds, with the road continuing as Torrens Valley Road between Chain of Ponds and Mount Pleasant. The road is also often referred to as Adelaide to Mannum Road. For the purposes of this Regional Road Assessment, the 35km route was reviewed between Haines Road in Tea Tree Gully and Cricks Mill Road (Williamstown Road) in Mount Pleasant.

The route is critical to the northern Adelaide Hills region, passing through Inglewood, Gumeracha, Birdwood and Mount Pleasant and serving communities in Houghton, Paracombe, Kersbrook and Cudlee Creek, whilst providing a vital link to Adelaide for communities in the Murraylands and Southern Barossa Valley.

Daily traffic volumes vary substantially along North East Road, with up to 7,000 vehicles using the route between Tea Tree Gully and Inglewood, almost 5,000 between Inglewood and Chain of Ponds, almost 3,000 between Chain of Ponds and Gumeracha, more than 2,000 between Gumeracha and Birdwood and up to 3,000 between Birdwood and Mount Pleasant.

There were several survey responses relating to North East Road, with many of these relating to intersections including at Houghton Hollow Road, Lower North East Road and South Para Road, which are discussed in more detail later in this section. Other comments typically related to dangerous driver behaviour, speed limits, or hazards related to heavy vehicles using the road. Typical survey responses include:

"Trucks and buses cross the centre lines on corners. Have had multiple near miss incidents."

"Speed limit needs to be reduced to 70km/h."

"Chain of Ponds section is nowhere wide enough, and people are driving too fast."

"Speed, drivers testing their (lack of skill) at high speed on a shared road, winding roads, driver inattention, road surface, lack of overtaking turnouts."

An upgrade to the intersection with North East Road and South Para Road has been announced, which will involve installing a left turn lane onto South Para Road to serve this high-volume turn movement into Kersbrook and the Southern Barossa Valley.

In recent years, pavement rehabilitation works have been undertaken on various sections between Tea Tree Gully and Chain of Ponds, as well as installation of additional safety barrier including motorcycle underrun protection on the popular motorcycling route.

Crash history

North East Road has a poor crash history with 131 casualty crashes occurring on the road between Tea Tree Gully and Mount Pleasant between 2015 and 2019. When looking at the human impact of these crashes, this equates to the loss of more than one life per year, as well as almost 8 serious injuries, and more than 25 minor injuries every year, or an average of one death or serious injury occurring on the road every 11 days. Economically, this level of trauma costs the state more

than \$15m annually based on Austroads 'willingness to pay' average crash cost estimates (converted to 2019 dollar values)⁸.

Table 29: North East Road casualty crash types (2015-2019)

Crash type	Number of casualty crashes	Crash severity		
		Minor	Serious	Fatal
Hit Fixed Object	65	49	15	1
Head On	22	11	9	2
Roll Over	12	9	2	1
Rear End	12	12	0	0
Hit Object on Road	5	3	2	0
Side Swipe	4	3	0	1
Right Turn	3	3	0	0
Left Road - Out of Control	3	3	0	0
Right Angle	2	0	1	1
Hit Animal	2	2	0	0
Other	1	1	0	0
Total	131	96	29	6

Cars and motorcycles are the primary unit types involved in crashes on North East Road.

Table 30: Units involved in crashes on North East Road (2015-2019)

Unit type	Approximate number of units
Car	128 (71%)
Motorcycle	40 (22%)
Truck	5 (3%)
Bicycle	3 (<2%)
Other/Unknown	3 (<2%)
Bus	1 (<2%)
Scooter	1 (<2%)

When reviewing the location of these motorcycle crashes, 70% (28) of all motorcycle crashes occurred on the nine-kilometre long section between Paracombe Road and Gorge Road (26% of total road length reviewed).

The casualty crash rate per 100 million vehicle kilometres travelled (100m vkt) allows for comparison between different sections of the road based on recent crash data, traffic volume estimates and length.

⁸ Austroads, 2015, *Guide to Road Safety Part 8: Treatment of Crash Locations*, pp51, www.austroads.com.au

Table 31: Casualty crash rate per 100m vkt for various sections of North East Road (2015-2019)

Section	Casualty crashes*	Casualty crashes per 100m vkt
Haines Rd (TTG) – Paracombe Rd (Inglewood)	34	50
Paracombe Rd (Inglewood) – Randell Terrace (Gumeracha)	70	81
Randell Terrace (Gumeracha) – Onkaparinga Valley Road (Birdwood)	15	51
Onkaparinga Valley Road (Birdwood) – Williamstown Rd (Mt Pleasant)	15	38
North East Road (Haines Rd, TTG – Williamstown Rd, Mt Pleasant)	131	57 [#]

*crashes occurring at the intersection of two sections are counted in both sections.

[#]this is a weighted average and considers that different sections have different lengths and traffic volumes.

This shows that approximately 57 casualty crashes occur per 100m vkt on North East Road and highlights that the worst section is between Inglewood and Gumeracha. When looking at this in further detail, two sections are of higher concern, and should be a priority for safety upgrades. These sections are:

- Paracombe Road - South Para Road, 82 casualty crashes per 100m vkt,
- South Para Road – Gorge Road, 117 casualty crashes per 100m vkt.

Of the 70 casualty crashes occurring between Inglewood and Gumeracha, more than half (37) were due to vehicles colliding with fixed objects. 51% of crashes with a fixed object involved a guard rail, 44% involved an 'other fixed obstruction' (usually steep vertical embankments/rock faces) and 14% involved a tree (note that percentages add up to more than 100% because some crashes involved more than one roadside object). Head on (10) and roll over (8) crashes were the next most common crash types, with two thirds of all crashes involving only a single vehicle on this section of North East Road.

Motorcycles make up a higher percentage (32%) of units involved in crashes on this section of North East Road compared to the remainder of the road, where they make up 22% of units on average. 40% of these motorcycle crashes involve a collision with a fixed object, and 20% involve a head-on collision with another vehicle.

Table 32: Units involved in crashes on North East Road between Inglewood and Gumeracha (2015-2019)

Unit type	Approximate number of units
Car	56 (59%)
Motorcycle	30 (32%)
Truck	5 (5%)
Bicycle	2 (2%)
Scooter	1 (<2%)
Other/Unknown	1 (<2%)

Further barrier installations are required between Inglewood and Gumeracha and it is critically important that all new barriers are fitted with motorcycle underrun protection and all existing barriers have this retrofitted given that there were six serious injury crashes involving motorcycles and guard rails in this section between 2015 and 2019.

To date, DIT have completed installation of a commendable amount of motorcycle underrun protection in high risk locations, and it is important that this effort is continued in the interests of motorcycle rider safety.



Figure 59: Exposed hazards are still present in high risk locations between Inglewood and Gumeracha

Recommendation 8A

Install additional barrier protection between Inglewood and Gumeracha given the high rate of crashes involving fixed objects. It is critically important that all new barriers are fitted with motorcycle underrun protection and all existing barriers have this retrofitted.

Furthermore, ATLM centrelines should be installed between Paracombe Road and Gorge Road to deter motorcycle riders from crossing the centreline, which has been shown to be effective at improving motorcycle rider road positioning on Gorge Road.

Recommendation 8B

Install ATLM centrelines between Paracombe Road and Gorge Road.

Despite a low overall crash rate between Birdwood and Mount Pleasant, another troublesome section for crashes is the three-kilometre 100km/h zone just east of Birdwood. Between 2015 and 2019, 12 out of 15 casualty crashes between Birdwood and Mount Pleasant occurred within the 100km/h section, with one resulting in a fatality, two resulting in serious injuries and nine in minor injuries. Only 40% of this section is controlled by a 100km/h speed limit, with the remainder controlled by an 80km/h speed limit. An average of 77 casualty crashes occurred per 100m vkt on the 100km/h section in contrast to an average of 17 for the 80km/h section.

Ten of these twelve casualty crashes involved a single vehicle, with seven of these involving a vehicle hitting a fixed object, being a tree in three cases and a guard rail in four cases. Motorcycle riders were involved in half of the 12 crashes, with only one motorcycle crash involving more than one vehicle. The map below shows the locations of casualty crashes that occurred between Birdwood and Mt Pleasant between 2015 and 2019.



Figure 60: Location of casualty crashes between Birdwood and Mt Pleasant (2015-2019)



Figure 61: Exposed roadside hazards between Birdwood and Mt Pleasant

Whilst the road has acceptable geometry and is mostly in good condition, with sealed shoulders and some barrier protection, further motorcycle friendly barrier protection is required between Birdwood and Randell Road. A reduced speed limit should also be considered on this short section of Torrens Valley Road due to its continued poor crash history.

Recommendation 8C

Install additional motorcycle friendly barrier protection on the 3km section east of Birdwood to Randell Road.

Road widths

North East Road is mostly built to a better geometry than many other roads in the Adelaide Hills region. Lanes exceeding 3.1m in width with sealed shoulders are provided wherever possible, except for sections through Chain of Ponds where vertical rock faces and steep drop offs make road widening challenging, both from a practical and economic standpoint.

Road cross section measurements were only taken east of Gumeracha due to the winding road geometry and risks associated with measuring width between Tea Tree Gully and Gumeracha.

Table 33: Sealed width of North East Road

Location	Lane width	Sealed shoulder width	Total seal width
W of Kenton Hill Rd (Gumeracha)	3.5m	0.1m	7.2m
W of Fox Rd (Birdwood)	3.5m	0.1m	7.2m
W of Griggs Rd (Mt Pleasant)	3.3m / 3.4m	1.0m / 1.3m	9.0m

Speed limits

Speed limits are mostly consistent along the length of North East Road/Torrens Valley Road with 80km/h applied between townships, and 50km/h through townships. The exception to this is the 3km long 100km/h zone east of Birdwood through to Randell Road, and the 1km long 60km/h zone on the southwestern entrance to Mount Pleasant (the north-eastern entrance is 50km/h).

When asked about locations where speed limits should be reviewed, four survey respondents commented that the 80km/h speed limit on North East Road was too high, with one respondent suggesting that it was too low east of Inglewood.

Table 34: Speed limit on North East Road

Segment	Speed limit (km/h)
Tea Tree Gully	60
Tea Tree Gully - Inglewood	80
Inglewood	50
Inglewood – Gumeracha	80
Gumeracha	50
Gumeracha – Birdwood	80
Birdwood	50
Birdwood – Mt Pleasant	80 – 100 – 80
Mt Pleasant	60 – 50

As most speed limit changes into townships are by 30km/h, it is critical that road users are provided with enough advance warning of the upcoming speed limit change. Currently there is no advance warning signage of upcoming speed limit reductions along North East Road. RAA suggests that 'speed limit ahead' signage be installed on each approach to Inglewood, Gumeracha, Birdwood and Mt Pleasant.

Recommendation 8D

Install 'speed limit ahead' signage on each approach to Inglewood, Gumeracha, Birdwood and Mt Pleasant.

As shown in the ‘crash history’ section, there is a significant crash issue between Birdwood and Randell Road, and as such a lower speed limit should be considered for the current 100km/h zone just east of Birdwood due to this.

Recommendation 8E

Consider an 80km/h speed limit on the 3km section east of Birdwood to Randell Road.

AusRAP star ratings

AusRAP star ratings vary substantially on North East Road, with most sections rated between one and three stars. The section pictured below is one of the better sections of the road, located just west of Mount Pleasant where lanes and shoulders are wide on a straight, well maintained road.

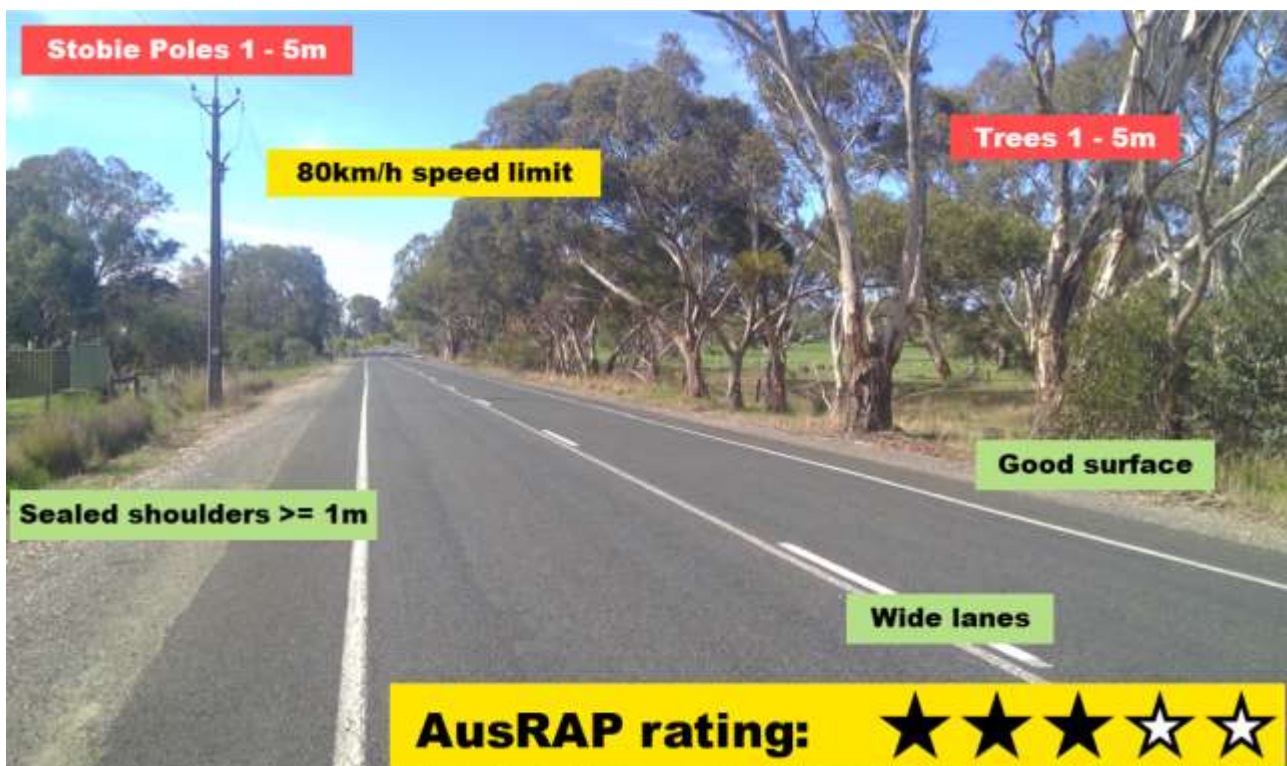


Figure 62: AusRAP star rating just west of Mount Pleasant

This section would be rated four stars if barriers were installed to protect against collisions with fixed objects, and five stars if an audio tactile edge line were to be installed in conjunction with barriers.

In contrast, the section pictured below is in Chain of Ponds and rated only one star due to hazards near the road, blind corners and sharp curvature.



Figure 63: AusRAP star rating in Chain of Ponds

Roads with sharp curvature (radius 200m-400m, driven between 40km/h and 70km/h) or very sharp curvature (radius <200m, driven at <40km/h) are challenging to increase star rating on without reducing speed limits. For example, the road pictured above would be rated three stars if it were a straight section of road or two stars if it were moderately curving (radius 400m-800m, driven at 70-100km/h).

Installing a motorcycle friendly crash barrier to protect the vertical rock face in this location would increase the star rating to two stars, and widening lanes would achieve a three star rating – although the latter of these treatments is not practical without significant earthworks and environmental disruption.

Other observations

North East Road is generally in serviceable condition, however, there are pavement failures including cracking and delamination on several curves between Inglewood and Gumeracha, most noticeably between South Para Road and Gorge Road. Localised resealing of these defects should be undertaken given the risk this poses to destabilising a motorcycle or bicycle riders and the high popularity of the route amongst these road users.



Figure 64: Pavement failures just east of South Para Road

Recommendation 8F

Undertake pavement rehabilitation on curves between South Para Road and Gorge Road to reduce risk to motorcycle and bicycle riders.

Whilst there are many small bridges and culverts along the route, some pose a higher safety risk due to their narrow width and position within unintuitive sequences of curves. The Gumeracha Bridge (near the intersection with Gorge Road) and the Blumberg Bridge (just west of Birdwood) should both be considered for widening to improve safety, particularly for interactions involving freight vehicles.

Recommendation 8G

Widen bridges along the route, in particular the Gumeracha Bridge (near the intersection with Gorge Road) and the Blumberg Bridge (just west of Birdwood).

Intersection with Houghton Hollow Road

The Y-intersection with Houghton Hollow Road was raised by several survey respondents due to its poor sight distance and high vehicle speeds. The intersection is controlled by a stop sign and a review of sight distance indicates that this is a warranted treatment as sight distance is very poor due to the vertical and horizontal alignment of North East Road.

A review of crash data indicates that no casualty crashes occurred at the intersection between 2015 and 2019 involving a vehicle turning from Houghton Hollow Road. RAA considers this intersection a good candidate for a rural junction active warning system (RJAWS), which would reduce the speed limit on North East Road temporarily when a vehicle is about to enter the road from Houghton Hollow Road.

Recommendation 8H

Install a rural junction active warning system (RJAWS) at the intersection with Houghton Hollow Road to account for very poor sight distance.

This intersection is located 600m from the intersection with North East Road and Lower North East Road, which would also benefit from a RJAWS treatment. Therefore it may be more practical to extend the 50km/h Inglewood speed limit by about 1.6km to cover these two intersections or utilise the RJAWS over the two intersections and a distance of about 800m. A concept for the latter of these options is discussed below in the section about the Lower North East Road intersection.

Intersection with Lower North East Road

The T intersection with Lower North East Road in Houghton was raised by numerous survey respondents in the regional community survey. Sight distance at this location is very poor, with a blind corner to the north and a crest to the south, both of which significantly impair sight distance when turning from Lower North East Road onto North East Road. Similarly, visibility of the side road intersection is poor from both approaches on North East Road. AADT for this section of Lower North East Road is 800 vehicles per day, which indicates approximately 400 daily turning movements occur from Lower North East Road onto North East Road (assuming evenly distributed flow).



Figure 65: Poor sight distance at the intersection of North East Road and Lower North East road

Between 2015 and 2019, two casualty crashes resulting in minor injuries occurred at this intersection. One of these involved a vehicle turning right onto Lower North East Road and being hit from behind, and the other involved a vehicle on Lower North East Road colliding with a fixed object near the intersection. Only the first of these crashes could relate to potential sight distance issues, but it is unknown whether driver inattention or speed were also contributing factors.

RAA acknowledges that road alignment contributes to this poor sight distance and significant road realignment works cannot be justified given the low crash history and relatively low traffic volumes. This intersection is therefore considered a good candidate for installation of a rural junction active warning system (RJAWS), which would reduce the speed limit on North East Road temporarily when a vehicle is about to enter the road from Lower North East Road.

Recommendation 8I

Install a rural junction active warning system (RJAWS) at the intersection with Lower North East Road to account for very poor sight distance.

This intersection is 600m from the intersection with North East Road and Houghton Hollow Road, which would also benefit from a RJAWS treatment and, as such it may be more practical to extend the 50km/h Inglewood speed limit by about 1.6km to cover these two intersections or utilise the RJAWS over the two intersections and a distance of about 800m. This would involve the central variable speed limit signs (VSLS) being used as either an '80' or '50' sign, depending on the traffic conditions at the time. A 50km/h zone extended across both intersections would only exist when there are vehicles entering at both intersections, which is considered the least likely of four possible binary conditions.

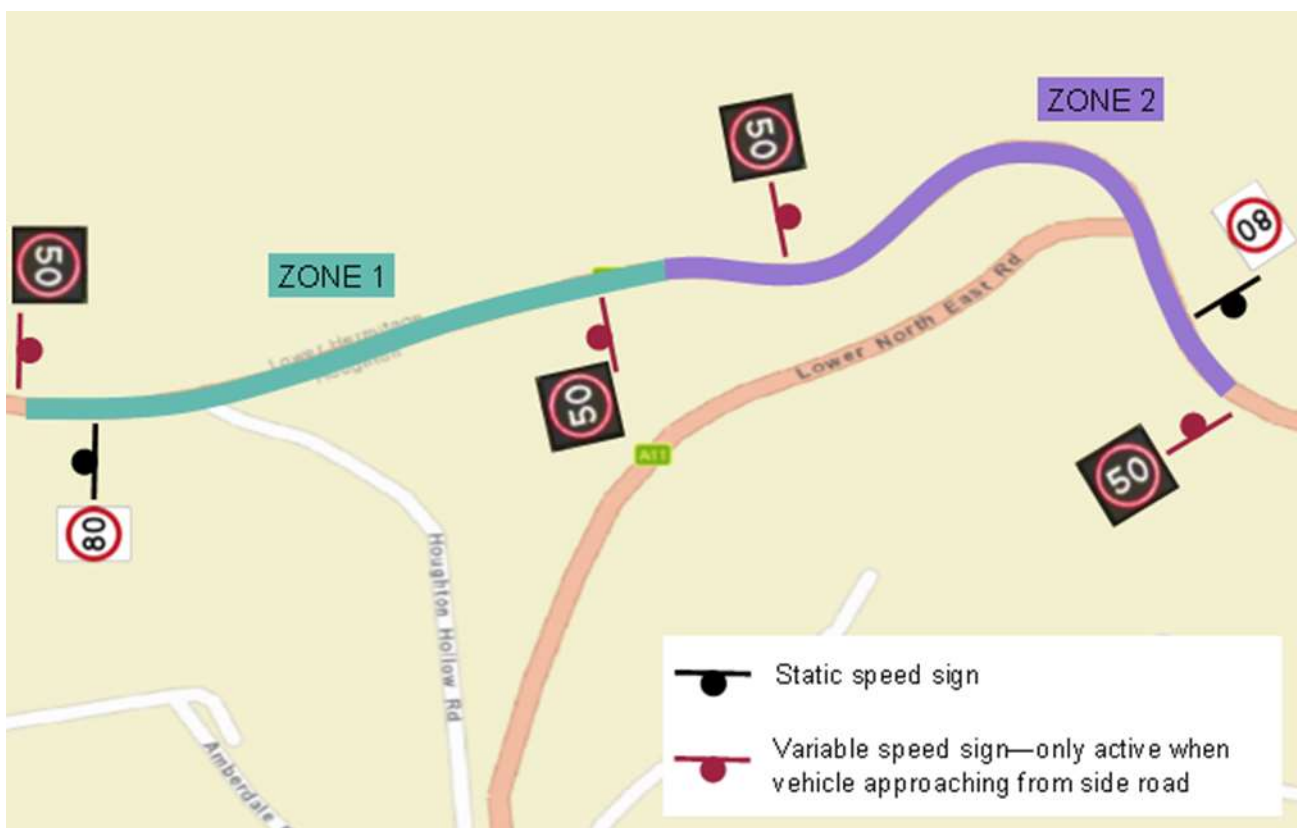


Figure 66: Example RJAWS sign layout for North East Road in Houghton

Intersection with South Para Road

The intersection with South Para Road, south of Kersbrook has been a source of frustration for RAA members for some time, with it being voted in the top 10 risky intersection in RAA's 2017 risky roads survey. This was despite the intersection being upgraded to improve delineation and reinforce the existing give way priorities.

DIT announced a further upgrade of this intersection that will involve the installation of a left turn deceleration lane onto South Para Road and has noted that right turning traffic will be required to

give way to left turning traffic following the upgrade⁹. This project is expected to commence in the first quarter of 2021, as announced by the Minister for Infrastructure and Transport on 11 October 2020¹⁰.

Vehicles standing to turn right (and queueing behind a vehicle turning right) on the North East Road carriageway are currently at very high risk of a rear end collision due to road alignment and geographical sight distance obstructions. It is critical that any upgrade considers the potential implications of this and addresses the need for a right turn lane onto South Para Road. As a minimum, widening of the south eastern shoulder should be undertaken to allow trailing vehicles to pass a right turning vehicle. Improvements to sight distance to right turning vehicles should also be considered, or a reduced speed limit on the approach to account for this poor sight distance as the least preferred option.

Between 2015 and 2019, three casualty crashes occurred at this intersection, with one of these tragically resulting in a fatality. While RAA considers the proposed treatments unlikely to treat the three casualty crash types that occurred, it is still considered a beneficial safety upgrade. One of these crashes involved a collision with a fixed object near the intersection, one involved a rear end collision on South Para Road, and the other was a right turn crash where a vehicle turning right onto South Para Road collided with through traffic on North East Road.

Notwithstanding, the intersection is busy, with poor alignment and sight distance issues creating a high-risk environment. The proposed upgrade will still provide a substantial boost to road safety in the vicinity, provided issues with vehicles turning right onto South Para Road are also resolved.

Recommendation 8J

Ensure that sight distance and potential queueing issues for southwest bound traffic is resolved as part of the proposed South Para Road and North East Road upgrade.

⁹ DIT, 2020, Department of Infrastructure and Transport, South Australian Government, *North East Road and South Para Road Junction Upgrade*, accessed at <https://www.dit.sa.gov.au/infrastructure/road_projects/north_east_road_and_south_para_road_junction_upgrade>

¹⁰ Government of South Australia, 2020, Media releases, Corey Wingard MP, *Tidal wave of construction and 1300 jobs heading for South Australia*, accessed at <<https://www.premier.sa.gov.au/news/media-releases/news/tidal-wave-of-construction-and-1300-jobs-heading-for-south-australia>>.

Summary of recommendations for North East Road/Torrens Valley Road

Recommendation 8A

Install additional barrier protection between Inglewood and Gumeracha given the high rate of crashes involving fixed objects. It is critically important that all new barriers are fitted with motorcycle underrun protection and all existing barriers have this retrofitted.

Recommendation 8B

Install ATLM centrelines between Paracombe Road and Gorge Road.

Recommendation 8C

Install additional motorcycle friendly barrier protection on the 3km section east of Birdwood to Randell Road.

Recommendation 8D

Install 'speed limit ahead' signage on each approach to Inglewood, Gumeracha, Birdwood and Mt Pleasant.

Recommendation 8E

Consider an 80km/h speed limit on the 3km section east of Birdwood to Randell Road.

Recommendation 8F

Undertake pavement rehabilitation on curves between South Para Road and Gorge Road to reduce risk to motorcycle and bicycle riders.

Recommendation 8G

Widen bridges along the route, in particular the Gumeracha Bridge (near the intersection with Gorge Road) and the Blumberg Bridge (just west of Birdwood).

Recommendation 8H

Install a rural junction active warning system (RJAWS) at the intersection with Houghton Hollow Road to account for very poor sight distance.

Recommendation 8I

Install a rural junction active warning system (RJAWS) at the intersection with Lower North East Road to account for very poor sight distance.

Recommendation 8J

Ensure that sight distance and potential queueing issues for southwest bound traffic is resolved as part of the proposed South Para Road and North East Road upgrade.

Gorge Road

Gorge Road is a regional arterial road, extending 21km between Athelstone and Chain of Ponds, via Cudlee Creek. AADT for Gorge Road is relatively low, with an average of 550 vehicles daily travelling between Athelstone and Torrens Hill Road at Paracombe. East of Torrens Hill Road, volumes increase to 1,500 daily vehicles through to Cudlee Creek where 3,200 vehicles travel between Tippet Road and Cudlee Creek Road. The link between Cudlee Creek Road and North East Road is the quietest section of Gorge Road, with 340 vehicles travelling this section daily.

Three key issues raised by survey respondents were freight interactions, speed limits and safety at intersections – namely Torrens Hill Road in Paracombe and Tippet Road in Cudlee Creek. Some typical responses are included below:

“Impossible to do 80km/h safely between Torrens Hill Road and Cudlee Creek.”

“It is very tight in some sections, so trucks are quite often on the wrong side of the road.”

“Large heavy trucks travelling above the speed limit – particularly in the early morning.”

“80km/h along Gorge Rd east of Torrens Hill Rd is excessive. Too many vehicles attempt to stay on 80km/h and cross over the white unbroken centre line. Visitors to the area frequently travel lower than 80km/h which causes frustration amongst drivers who wish to travel at the speed limit. A reasonable compromise would be to lower the speed limit to 60km/h.”

“There is no rational justification for the 70km/h speed limit. The road geometry and crash barriers are basically the same in both sections but DPTI dropped speed limit in 1991 at request of SAPOL so motorcycles could be booked for speeding.”



Figure 67: Freight interactions on Gorge Road leave no margin for error

Crash history

Casualty crashes where a vehicle collides with a fixed object make up almost 50% of all casualty crashes with half of these fixed objects being guard rails. The majority of other fixed objects (47%) are defined as 'other fixed obstruction', which usually indicates a vertical cutting such as a rock face along Gorge Road.

Table 35: Gorge Road casualty crash types (2015-2019)

Crash type	Number of casualty crashes	Crash severity		
		Minor	Serious	Fatal
Hit Fixed Object	30	28	2	0
Roll Over	12	11	1	0
Head On	9	7	1	1
Rear End	5	3	1	1
Hit Animal	2	2	0	0
Other	2	1	1	0
Left Road - Out of Control	2	0	2	0
Hit Parked Vehicle	1	1	0	0
Right Angle	1	1	0	0
Total	64	54	8	2

The table below highlights the types of units involved in crashes on Gorge Road between 2015 and 2019.

Table 36: Units involved in crashes on Gorge Road (2015-2019)

Unit type	Approximate number of units
Car	43 (52%)
Motorcycle	32 (39%)
Bicycle	4 (5%)
Other/Unknown	2 (2%)
Scooter	1 (<2%)

Motorcycles are over-represented in crashes on Gorge Road and were determined to be responsible for the crash in 81% of motorcycle crashes, with the majority being single vehicle crashes (hit fixed object, roll over). Motorcycle crashes have declined in recent years following the introduction of motorcycle safety treatments including motorcycle underrun protection on barriers and audio tactile centre lines in 2019. The initial results of these treatments on motorcycle crashes is promising, with the lowest number of annual motorcycle crashes recorded in recent history in 2019. RAA will continue to monitor crash trends on Gorge Road.

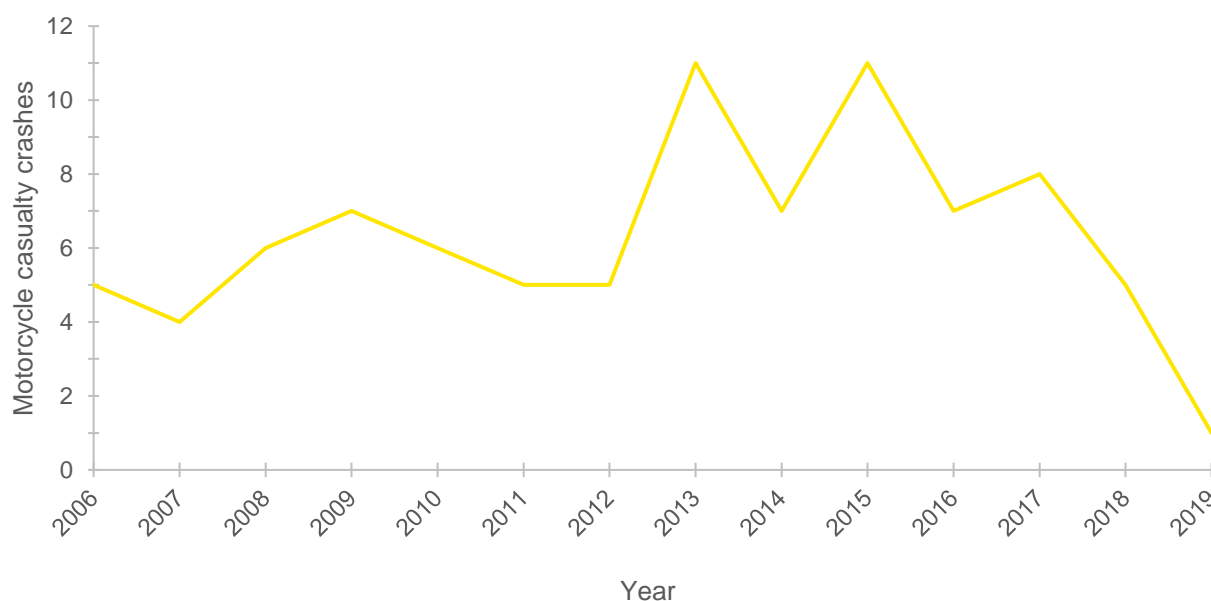


Figure 68: Annual number of motorcycles involved in casualty crashes on Gorge Road between 2006 and 2019

Given the low traffic volumes on Gorge Road, 2015 – 2019 casualty crash rates remain a concern, with the average number of crashes per 100 million vehicle kilometres travelled (100m vkt) sitting at 190, and as high as 276 between Athelstone and Torrens Hill Road.

Table 37: Casualty crashes per 100m vkt on Gorge Road

Section	Casualty crashes*	Casualty crashes per 100m vkt
Athelstone – Torrens Hill Rd (Paracombe)	31	276
Torrens Hill Rd (Paracombe) – Tippet Road (Cudlee Creek)	22	178
Tippet Road (Cudlee Creek) – Cudlee Creek Rd (Cudlee Creek)	8	104
Cudlee Creek Rd (Cudlee Creek) – North East Rd (Chain of Ponds)	3	125
Athelstone – Chain of Ponds	64	190 [#]

*crashes occurring at the intersection of two sections are counted in both sections.

[#]this is a weighted average and considers that different sections have different lengths and traffic volumes.

Road widths

The width of Gorge Road varies substantially across its length. Measuring a cross section was determined to be unsafe for most sections of Gorge Road, however one measurement was taken at a point between Corkscrew Road and Torrens Hill Road. This measurement is not typical of the width of all sections of Gorge Road and is substantially wider than most of the road.

Table 38: Sealed width of Gorge Road

Location	Lane width	Sealed shoulder width	Total seal width
Between Corkscrew Road and Torrens Hill Road	3.2 / 3.3m	0.3m	7.1m

Many sections are narrow where there is insufficient space in the road reserve to widen the road due to restraints posed by rock faces and the banks of the River Torrens. Barrier systems may be appropriate to further reduce exposure to hazards.



Figure 69 Example of a narrow section of Gorge Road with insufficient barrier protection

Recommendation 9A

Install additional roadside barriers along Gorge Road to reduce exposure to roadside hazards.

Speed limits

The speed limit on Gorge Road is 70km/h for about 5 kilometres through to the intersection with Batchelor Road in Castambul. From this point, the speed limit remains at 80km/h except for two 60km/h speed limits in Cudlee Creek (divided by a 1km long 80km/h section)

Table 39: Speed limits on Gorge Road

Segment	Speed limit (km/h)
Athelstone - Castambul	70
Castambul – Cudlee Creek	80
Cudlee Creek	60 – 80 – 60
Cudlee Creek – Chain of Ponds	80

The 1km long 80km/h section in Cudlee Creek also covers the intersection of Tippet Road, which has poor sight distance. Whilst a treatment such as RJAWS would improve safety at the intersection, it may be more effective to permanently reduce the speed limit to 60km/h for this section of Gorge Road. A review of crash history indicates that 12 casualty crashes occurred on this short section of road between 2015 and 2019. This intersection is discussed in further detail in the 'other observations' section of this report.

Speed limits on Gorge Road may need to be reconsidered due to the difficulties and constraints faced with making significant upgrades to enhance the safety of existing infrastructure. This would provide an incremental increase in AusRAP star rating and reduction in crash likelihood.

AusRAP star ratings

Most sections of Gorge Road with sharp curves or exposed hazards near either side of the carriageway are rated one star under AusRAP star rating protocols. These hazards present high risk and a high likelihood of serious crashes occurring. In the 70km/h zone, some of these sections would be rated two stars, but only where the curvature is rated as 'straight' or 'moderate' (curve radius 400m-800m). Some sections of Gorge Road contain safety barriers on both sides of the carriageway and may be rated between two and three stars depending on the curvature and speed limit of the road in the vicinity.



Figure 70: One of the better AusRAP star ratings on Gorge Road

The pictured section would be rated one star if the 80km/h speed limit were returned, or if it included any curves with a radius less than 400m, which applies to most curves on Gorge Road. Conversely, it would be rated three stars if barriers were provided on both sides of the carriageway, or if the speed limit were 60km/h.

Other observations

ATLM has recently (February 2019) been installed along the centre line of Gorge Road in an effort to deter motorcycle riders from crossing the centreline. Initial results have shown that motorcycle behaviour has improved, with riders taking safer lines around curves. Early crash data shows a reduction in motorcycle crashes in 2019, but data over several years needs to be considered before any conclusive outcomes are made.

The road surface is mostly in serviceable condition, except for localised pavement within the 80km/h zone dividing Cudlee Creek.

Recommendation 9B

Undertake localised pavement rehabilitation in the 80km/h zone dividing Cudlee Creek.

On the approach to the intersection with North East Road, stop signs are located mid-way around a blind curve. Whilst there is a single 'stop sign ahead' advisory sign, this gives no indication as to how far away the intersection is. Distance plates are critical because the stop signs at the intersection itself are not visible until a point 25m from where a driver is required to stop.

Recommendation 9C

Duplicate and enlarge existing W3-1 'stop sign ahead' sign on the approach to the intersection with North East Road. Supplementary '140m' distance plates should also be added to the sign array to advise of the distance to intersection, which is still unseen until approximately 25m before the stop sign.



Intersection with Torrens Hill Road

Survey respondents were concerned with sight distance at the intersection with Torrens Hill Road in Paracombe and identified the impact that travel speed has on sight distance and driver reaction times. Some responses regarding this intersection include:

"Vehicles heading east along Gorge Rd not slowing down when approaching blind intersection of Torrens Hill Rd."

"Coming from Paracombe is a gamble every time you pull out."

"Blind corner for traffic trying to cross over the Gorge Road with cars travelling at speed coming from the west."

RAA considers this intersection a prime candidate for a rural junction active warning system (RJAWS). This system has been trialled effectively nearby (Cudlee Creek Road) and would act to reduce travel speeds on Gorge Road only when a vehicle is about to enter from Torrens Hill Road.

Recommendation 9D

Install a rural junction active warning system (RJAWS) at the intersection with Gorge Road and Torrens Hill Road to account for very poor sight distance.

Intersection with Tippet Road

Survey respondents were also concerned with sight distance at the intersection with Tippet Road in Cudlee Creek. Tippet Road intersects Gorge road between a series of reverse curves in an 80km/h zone. Concerns were received regarding both the intersection and the 80km/h speed limit between the two 60km/h Zones in Cudlee Creek

“Poor line of sight from all directions and 80km/h speed limit is too high for this intersection.”

“Impossible to do 80km/h safely between Torrens Hill Road and Cudlee Creek.”

RAA considers this intersection a good candidate for a rural junction active warning system (RJAWS), however note that it is within a 1,200m long 80km/h zone and if an RJAWS were to be active, there could be as many as three speed limit changes within 1,200m which is not desirable. As such, reducing the speed limit to 60km/h may be more practical in this location, which will improve safety at both the intersection and along this section of Gorge Road.

Recommendation 9E

Consider installing a rural junction active warning system (RJAWS) at the intersection with Gorge Road and Tippet Road to account for very poor sight distance, however a reduced speed limit may be more practical in this location.

Summary of recommendations for Gorge Road**Recommendation 9A**

Install additional roadside barriers along Gorge Road to reduce exposure to roadside hazards.

Recommendation 9B

Undertake localised pavement rehabilitation in the 80km/h zone dividing Cudlee Creek.

Recommendation 9C

Duplicate and enlarge existing W3-1 ‘stop sign ahead’ sign on the approach to the intersection with North East Road. Supplementary ‘140m’ distance plates should also be added to the sign array to advise of the distance to intersection, which is still unseen until approximately 25m before the stop sign.

Recommendation 9D

Install a rural junction active warning system (RJAWS) at the intersection with Gorge Road and Torrens Hill Road to account for very poor sight distance.

Recommendation 9E

Consider installing a rural junction active warning system (RJAWS) at the intersection with Gorge Road and Tippet Road to account for very poor sight distance, however a reduced speed limit may be more practical in this location.

Nairne Road

Nairne Road is a regional arterial road connecting Woodside and Nairne, carrying up to 4600 vehicles per day between the two towns over a distance of about 10km. Survey responses mostly referred to the speed limit on Nairne Road, with suggestions that it should return to 100km/h following a recent reduction to 80km/h. Some typical comments received are included below.

“80km/h all the way is too slow causing fatigue, boredom and distraction.”

“Speed limit should be increased from Nairne to Woodside.”

“Should be 90km/h, not 80km/h (was 100km/h).”

“I understand the necessity to lower the speed limit along this road from 100km/h, but it should have been lowered to 90km/h. I think 80km/h is too low and the road can accommodate vehicles travelling at 90km/h.”

There were a significant number of mentions for the intersection with Old Princes Highway in Nairne, which is discussed at the end of this section. There were also a significant number of mentions for the intersection with Onkaparinga Valley Road and Tiers Road in Woodside, which is discussed in the Onkaparinga Valley Road section of this report.

Crash history

Between 2015 and 2019, 11 casualty crashes occurred on Nairne Road between Woodside and Nairne. This includes six crashes at the crossroad intersection with Riverview Road/Pfeiffer Road (Inverbrackie), two crashes in the built-up area of Nairne, and one in the built-up area of Woodside. This means that only two casualty crashes occurred on high-speed midblock sections of the road.

Table 40: Nairne Road casualty crash types (2015-2019)

Crash type	Number of casualty crashes	Crash severity		
		Minor	Serious	Fatal
Right angle	7	6	1	0
Hit fixed object	2	2	0	0
Head on	1	1	0	0
Rear End	1	1	0	0
Total	11	10	1	0

Cars were the only unit involved in crashes between 2015 and 2019 along Nairne Road.

Table 41: Units involved in crashes on Nairne Road

Unit type	Approximate number of units
Car	21 (100%)

Road widths

Nairne Road is generally a suitable width given the current speed limit and traffic volumes. Lane widths are approximately 3.2 metres wide, with shoulder seal width varying between 0.5m and 1.5m. Sections with narrow shoulder seal are mostly due to the installation of guard rails approximately 1m from road edges. Guard rails have been installed near road edges to avoid the otherwise necessary removal of roadside vegetation.

Speed limits

The previous 100km/h zone extended for less than four kilometres between a point 400m south of Murray Road and a point 250m north of Murdoch Hill Road, with the remaining 6.5km subject to a speed limit of 80km/h or 50km/h (Woodside and Nairne). The current speed limit is consistent with most arterial roads in the Adelaide Hills with an 80km/h speed limit applicable to the entire length other than the built-up sections that are subject to the default 50km/h.

Table 42: Speed limits on Nairne Road

Segment	Speed limit (km/h)
Woodside	50
Woodside - Nairne	80
Nairne	50

RAA does not support increasing this speed limit as a standalone project as this would cause the current three to four-star rated road to reduce to two stars or lower in sections, and subsequently increase the likelihood and severity of casualty crashes occurring.

In order for speed limits to return to 100km/h, further investment into the corridor to maintain its three to four-star rating would be required. This would include treatments such as road and shoulder widening, further barrier protection or hazard removal and median treatments such as wire rope barrier or wide centre lines.

AusRAP star ratings

Straight sections of Nairne Road would typically be rated as four stars under AusRAP star rating protocols, with most curves rated three stars. The section pictured below exhibits moderate lane width, clear delineation and narrow sealed shoulders. Barriers are present on both sides of the road, however, are close to the road edges in order to minimise vegetation removal. Given the 80km/h speed limit, this is sufficient to achieve a four-star rating.



Figure 71: Typical AusRAP star rating on Nairne Road

Re-introducing the 100km/h speed limit would cause this rating to reduce to three stars in the pictured section, and two stars or lower on sections with exposed hazards or curves.

Other observations

Nairne Road is in good condition, with good delineation and barrier use along the corridor. There are still several exposed hazards along the road, but those in high-risk locations are protected by barriers. Additional use of motorcycle friendly barriers would be preferable, however Nairne Road poses a lower risk to motorcyclists in comparison to many others in the region, where this treatment should be prioritised.

Intersection with Nairne Road (Woodside Road) and Old Princes Highway

The intersection with Nairne Road (called 'Woodside Road' through Nairne) and Old Princes Highway in Nairne was the most raised intersection in the Adelaide Hills regional community survey, receiving 50 mentions. This placed the intersection only behind the South Eastern Freeway and Onkaparinga Valley Road in terms of the total number of mentions. The primary issues raised at this intersection relate to traffic build up, particularly along Woodside Road during peak periods.

Survey feedback was split between suggesting a roundabout and suggesting traffic signals, and ultimately both options could alleviate traffic issues at this site. Some typical survey responses are included below.

“Poor traffic control and ill placed traffic lights/crossing.”

“Intersections have no traffic management system. Limited visibility causes huge issues pulling out into oncoming traffic with traffic build up. Both intersections desperately need lights or roundabouts to better control the flow of traffic.”

“Can take 15 minutes to get through the intersection in peak hour”

“This is a very busy intersection, especially at school drop off and pick up times. It is a T-junction and to turn right, drivers have to take risks. It is unsafe and a major intersection, and has always been an issue that needs to be addressed ASAP with traffic lights.”

RAA’s Safety and Infrastructure team conducted multiple site inspections in November and December 2019 to gain an understanding of traffic conditions during peak periods and with a focus on school drop-off and pick-up periods. Throughout the community consultation stages, RAA submitted commentary highlighting the feedback and opinions received from RAA members and other local residents in the Adelaide Hills regional community survey and the results of our site investigations.

This feedback indicated that a four-way roundabout incorporating Saleyard Road would be the preferred option, and that further exploration into a signalised Woodside Road approach be undertaken. This would prevent Woodside Road traffic from entering the roundabout only when traffic queues extend beyond a pre-determined length. Examples of this treatment already exist in South Australia, at the intersection with Copper Coast Highway and Yorke Highway in the Yorke Peninsula and at the intersection with Old Belair Road and Blythwood Road in Torrens Park.

RAA also supported signalisation of the intersection should various factors render a roundabout infeasible.

In March 2020, preliminary planning undertaken by DPTI identified a four-way single lane roundabout as the preferred solution. At the time of writing this report, no detailed design had been completed, and RAA will continue to monitor progress on this important initiative.

Recommendation 10A

Install a roundabout at the intersection of Nairne Road (Woodside Road) and Old Princes Highway in Nairne.

Summary of recommendations for Nairne Road

Recommendation 10A

Install a roundabout at the intersection of Nairne Road (Woodside Road) and Old Princes Highway in Nairne.

Long Valley Road

Long Valley Road is a regional arterial road extending for 15km between Wistow and Strathalbyn, and primarily serves to connect Mount Barker and Strathalbyn. Approximately 6,900 vehicles travel the corridor each day.

There were 12 mentions of Long Valley Road in the regional community survey with most of these relating to issues with congestion. There were five responses indicating that speed limits needed to be reviewed on Long Valley Road, with one suggesting the current 100km/h speed limit is too high, one in support of the current speed limit or increasing to 110km/h, and one raising the short section of 80km/h at the Gemmels level crossing. The remaining two comments did not outline their preference or suggestions for a speed limit but did suggest it should be reviewed.

“Potholes, lack of overtaking opportunities, high traffic volumes particularly during peak times, needs dual lanes.”

“Many small roads intersect along it with poor visibility because of crests and bends.”

“100km/h to 80km/h for short stretch before rail crossing on south bound lane only is not necessary.”

In August 2020, works on a \$6 million upgrade of Long Valley Road commenced jointly funded by the Australian and South Australian Government's *Targeted Road Safety Works Program*. This upgrade will include shoulder sealing, intersection treatments, road widening in key areas, safety barrier installation, upgraded signage and removal of vegetation to improve visibility.

Further to this, an additional overtaking lane is slated for installation in 2021 as part of a package of 14 overtaking lane installations across South Australia.

This review was undertaken prior to any works being carried out, and these announced projects should substantially address the primary issues on Long Valley Road. RAA is intending to review the corridor again in 2021 following the completion of these upgrades.

Crash history

Between 2015 and 2019, 29 casualty crashes occurred on Long Valley Road resulting in the loss of three lives as well as six serious injuries and 30 minor injuries. Collisions with fixed objects and head on collisions with other vehicles are the most common and severe casualty crash types occurring on the road. Six of eight casualty crashes involving a collision with a fixed object involved a tree, whilst only two involved guardrails, highlighting the need for additional barrier protection along this corridor.

Table 43: Long Valley Road casualty crash types (2015-2019)

Crash type	Number of casualty crashes	Crash severity		
		Minor	Serious	Fatal
Hit Fixed Object	8	5	3	0
Head On	7	4	1	2
Rear End	7	7	0	0
Right Angle	3	3	0	0
Roll Over	2	2	0	0
Side Swipe	1	1	0	0
Left Road - Out of Control	1	1	0	0
Total	29	23	4	2

As Long Valley Road is primarily a commuter corridor between Mount Barker and Strathalbyn, it is not surprising that cars were the predominant unit involved in crashes on Long Valley Road, making up 96% of units involved in crashes.

Table 44: Units involved in crashes on Long Valley Road (2015-2019)

Unit type	Approximate number of units
Car	47 (96%)
Motorcycle	2 (4%)

Road widths

Generally, Long Valley Road has a satisfactory road width, however, localised shoulder widening near minor side road intersections would be a welcome improvement. Shoulders are sealed for the entire length of road mostly to a width of approximately one metre, however there are localised sections with a narrow shoulder seal that are being widened as part of the 2020 \$6 million upgrade.

Speed limits

The speed limit on Long Valley Road is 100km/h, except for the level crossing located in Gemmels, where it was reduced to 80km/h in 2017 as part of DIT's Railway Crossing Safety Improvement Program along with 12 other level crossings across South Australia. This speed limit only applies in the southbound direction, as the northbound overtaking lane ends shortly before the level crossing, and a speed limit reduction at the end of an overtaking lane has the potential to cause more issues than it aims to resolve.

Table 45: Speed limits on Long Valley Road

Segment	Speed limit (km/h)
Wistow – Gemmels level crossing	100
Gemmels level crossing (southbound only)	80
Gemmels level crossing – Strathalbyn	100
Strathalbyn	80 – 60 – 50

AusRAP star ratings

Most sections of Long Valley Road would be rated at least two stars under AusRAP star rating methodology. Sharper curves could be rated as one star depending on factors such as the proximity of roadside hazards and intersections. It is worth noting that in the image below, although the star rating is calculated to be two stars, it is very close to the minimum requirements for three stars.



Figure 72: Typical AusRAP star rating on Long Valley Road

Treatments that would improve this section of road to three stars include edge or centreline ATLM, protecting the upwards slope with a barrier to reduce rollover risk, or installing a wide centre line (0.3m – 1.2m). A wire rope centre barrier would take the star rating to four stars, as would the application of an 80km/h speed limit. Given the history of high severity head on crashes occurring on Long Valley Road, consideration should be given to treatments such as this to separate opposing traffic flows.

Recommendation 11A

Consider dividing treatments such as a wire rope centre barrier to separate opposing traffic flows on Long Valley Road and reduce the likelihood of head on crashes occurring.

Other observations

Although barrier protection (some with motorcycle under run protection) is prominent along this corridor, exposed roadside trees are still found recurrently near the road edges. Additional barrier protection is being provided as part of the 2020 \$6 million upgrade, and RAA will review the corridor again in 2021 upon completion of these upgrades.

The condition of the pavement is mostly satisfactory, apart from some minor undulations and bumps in localised areas.

The image below highlights the typical geometry of Long Valley Road and the proximity of exposed trees along the corridor. This section would be considered two stars under the AusRAP star rating methodology, and safety barriers would improve this to three stars.



Figure 73: Cross section just south of Wistow with sealed shoulders, adequate carriageway width and exposed trees.

RAA welcomes the announcement to install an additional overtaking lane between Wistow and Strathalbyn, which is being completed in 2021 as part of a package of 14 overtaking lanes across South Australia. RAA will continue to monitor progress on this important upgrade. It is important that design work and timely implementation of this project occur to improve safety by providing additional safe overtaking opportunities on this high-risk section of road.

Recommendation 911B

Install the additional overtaking lane, originally announced in 2019, within the 2020/21 financial year.

Summary of recommendations for Long Valley Road

Recommendation 11A

Consider dividing treatments such as a wire rope centre barrier to separate opposing traffic flows on Long Valley Road and reduce the likelihood of head on crashes occurring.

Recommendation 11B

Install the additional overtaking lane, originally announced in 2019, within the 2020/21 financial year.

Lower North East Road

Lower North East Road is a state maintained arterial road extending from Glynde in Adelaide's northeast to Houghton in the eastern Adelaide Hills. The steep, winding 6km section between Perseverance Road in Vista and North East Road in Houghton was reviewed. Whilst about half of this length falls within the City of Tea Tree Gully, it was raised frequently by Adelaide Hills community survey respondents and serves as an important link into the Adelaide Hills region.

Traffic volumes between Vista and Paracombe Road are about 2,500 vehicles per day, with more than 5% of these vehicles being commercial vehicles. 1,700 vehicles use the section between Paracombe Road and Houghton each day.

Most survey respondents highlighted hazards they had experienced due to heavy vehicles using Lower North East Road, with comments regularly providing detail about near misses.

"Every day is a near miss with trucks coming on the wrong side of the road or poor overtaking of bicycles".

"Bicycles and trucks should not be allowed to use this road. It is so easy to drive around the corner at the speed limit and then have to slam on the brakes because there is a cyclist. As for trucks, the road is too narrow, and they can't stay on their side of the road, so it puts anybody who uses this road in danger."

"Lower the 80km/h speed limit to 60km/h."



Figure 74: Narrow lanes, blind corners and steep embankments are typical on Lower North East Road

Crash history

Between 2015 and 2019, 19 casualty crashes occurred on this section of Lower North East Road. Vehicles colliding with fixed objects made up many of these crashes with 45% of these fixed objects being trees and 27% being guard rails.

Table 46: Lower North East Road casualty crash types (2015-2019)

Crash type	Number of casualty crashes	Crash severity		
		Minor	Serious	Fatal
Hit Fixed Object	11	10	1	0
Roll Over	6	4	2	0
Head On	1	1	0	0
Rear End	1	1	0	0
Total	19	16	3	0

Cars were the dominant vehicle types involved in crashes on Lower North East Road, however, motorcycles and bicycles are also highly represented in the statistics.

Table 47: Units involved in crashes on Lower North East Road (2015-2019)

Unit type	Approximate number of units
Car	13 (62%)
Motorcycle	5 (24%)
Bicycle	3 (14%)

The casualty crash rate between Vista and Houghton is relatively high, with about 70 casualty crashes occurring for every 100 million vehicle kilometres travelled.

Due to the high incidence of crashes involving fixed objects, further guard rail treatments are required on Lower North East Road to reduce the likelihood of these crashes resulting in serious injury or worse. As this road is a popular motorcycle corridor, audio tactile centre lines should also be considered to encourage motorcyclists to utilise safer lines through corners.

Recommendation 12A

Further barrier installation along Lower North East Road to reduce exposure to roadside hazards.

Recommendation 12B

Install audio tactile centreline along Lower North East Road to encourage motorcycle riders to adopt a safer path around curves.

Road widths

No formal width measurements were taken due to the hazards associated with taking cross sectional measurements on this section of Lower North East Road. However, the total sealed carriageway width is estimated to be less than 6m wide at points between Perseverance Road and Paracombe Road. North of Paracombe Road, the carriageway becomes wider, with one metre sealed shoulders installed.

Given the road is not only a freight corridor but is also popular amongst cyclists, it is highly desirable that this width is increased where possible.

Recommendation 12C

Explore the feasibility of widening Lower North East Road between Perseverance Road and Paracombe Road.

Speed limits

Lower North East Road is controlled by an 80km/h speed limit, with the speed reduced to 50km/h in Houghton.

Table 48: Speed limits on Lower North East Road

Segment	Speed limit (km/h)
Vista - Houghton	80
Houghton	50

No advance warning of the speed reduction is signposted, and this would assist at improving awareness and compliance with the 50km/h speed limit in Houghton.

Recommendation 12D

Install '50 AHEAD' signage prior to the introduction of the 50km/h speed limit in Houghton.

AusRAP star ratings

Between Perseverance Road and Paracombe Road, Lower North East Road is rated one star due to its tight curvature, narrow lanes, proximity to roadside hazards, and the 80km/h speed limit. Road widening and barrier protection may increase this star rating to two stars, however the most cost-effective way to increase this rating would be to reduce the current speed limit which can often face opposition from road users. If the safety upgrades RAA are proposing for Lower North East Road are not undertaken, or do not reduce the number of casualty crashes occurring, a lower speed limit may need to be considered.

Between Paracombe Road and Houghton, the road is straighter, flatter, and wider, however exposed roadside hazards are still near the road edges. The star rating of this section varies between two and three stars depending on curvature and proximity to exposed hazards.

Other observations

Whilst relatively old, the road surface is mostly in serviceable condition with only minor localised defects observed that would have little impact on road safety. The centreline has deteriorated, and many of the yellow centreline RRPM's have become dislodged over time.

Recommendation 12E

Refresh centreline markings and reinstall yellow centreline RRPM's that have been dislodged.

Warning signage is generally appropriate, with multiple truck and cyclist warning signs on the ascent and descent.

The KPMG GlobeLink scoping study referred to a 'short north' route through the Adelaide Hills and linking with Grand Junction Road as an alternative freight route to the South Eastern Freeway into Adelaide, however the current alignment of Lower North East Road is totally inadequate to carry high volumes of freight and would require an extensive upgrade in order to be considered safe for

this purpose. Furthermore, the average downgrade is comparable to that of the South Eastern Freeway and there is a risk that the current issues on the South Eastern Freeway would also be experienced on Lower North East Road and Grand Junction Road.

The intersection of Lower North East Road and North East Road has been reviewed in the North East Road section of this report.

Summary of recommendations for Lower North East Road

Recommendation 12A

Further barrier installation along Lower North East Road to reduce exposure to roadside hazards.

Recommendation 12B

Install audio tactile centreline along Lower North East Road to encourage motorcycle riders to adopt a safer path around curves.

Recommendation 12C

Explore the feasibility of widening Lower North East Road between Perseverance Road and Paracombe Road.

Recommendation 12D

Install '50 AHEAD' signage prior to the introduction of the 50km/h speed limit in Houghton.

Recommendation 12E

Refresh centreline markings and reinstall yellow centreline RRPM's that have been dislodged.

Mount Lofty Summit Road

Mount Lofty Summit Road is a state government-maintained road extending for 6km between Greenhill Road at Summertown and the South Eastern Freeway interchange at Crafers. The road traverses steep terrain on both ends, and plateaus at Mount Lofty summit. Mount Lofty Summit Road is a key destination for tourists to the Adelaide Hills region, with beautiful scenery and providing access to very popular destinations including Mount Lofty Summit lookout, Mount Lofty Botanical Gardens, Cleland Conservation Park and several popular restaurants.

Average daily traffic volumes range between 2900 vehicles per day in Crafers, 1600 vehicles per day between Crafers and Mount Lofty Summit, and only 950 vehicles per day between Mt Lofty Summit and Greenhill Road.

Mount Lofty Summit Road was raised several times throughout the regional community survey, with all feedback in relation to the 80km/h speed limits and the risks associated with this. Some typical survey responses are included below.

“80km/h zone where hidden driveways are on a blind corner.”

“What on earth is the reason for 80km/h at the congested bottom of this section of road?”

“Currently 80km/h. Far too high for this winding road with minimal guardrails. It has frequent cycle traffic as well as pedestrians with no footpath, and wildlife. Unfortunately, a significant number of motorists seem to regard 80km/h as a goal rather than a maximum. In addition to a lower speed limit, driver education is needed.”

Crash history

Between 2015 and 2019, 29 casualty crashes occurred on Mount Lofty Summit Road, with more than 90% of these resulting in minor injuries. ‘Hit fixed object’ crashes were the most commonly occurring crash type on the road, with trees (53%) and ‘other fixed obstructions’ (35%) the most common objects collided with. Other fixed obstruction generally refers to vertical cuttings or rock faces.

Table 49: Mount Lofty Summit Road casualty crash types (2015-2019)

Crash type	Number of casualty crashes	Crash severity		
		Minor	Serious	Fatal
Hit Fixed Object	12	12	0	0
Head On	6	6	0	0
Roll Over	4	4	0	0
Rear End	2	1	1	0
Right Angle	1	1	0	0
Hit Object on Road	1	0	1	0
Side Swipe	1	1	0	0
Left Road - Out of Control	1	1	0	0
Other	1	1	0	0
Total	29	27	2	0

Whilst cars are the predominant road users involved in crashes, 40% of crashes involve vulnerable road users in motorcycle and bicycle riders who are at far greater risk of sustaining serious or fatal injuries as a result of a crash.

Table 50: Units involved in crashes on Mount Lofty Summit Road (2015-2019)

Unit type	Approximate number of units
Car	23 (58%)
Motorcycle	12 (30%)
Bicycle	4 (10%)
Other/Unknown	1 (<3%)

Most crashes occurred on the three kilometre section between Mt Lofty Summit and Greenhill Road, where a casualty crash rate of almost 348 crashes per 100 million vehicle kilometres travelled makes this one of the riskiest road sections in the Adelaide Hills.

Road widths

Mount Lofty Summit Road is relatively wide between Crafers and Mount Lofty Summit, with wide (1.2m) sealed shoulders provided on the ascent between Crafers and Summer Hill Drive. Narrow sealed shoulders are provided between Summer Hill Drive and Mount Lofty Summit, and no sealed shoulders between Mount Lofty Summit and Greenhill Road. The section between Mount Lofty Summit and Greenhill Road is very narrow, with lanes as narrow as 2.4m and a sealed width varying between 5m and 6m.

Table 51: Sealed width of Mt Lofty Road

Location	Lane width	Sealed shoulder width	Total seal width
N of Owens St	2.4m / 2.8m	N/A	5.2m
N of Sprigg Rd	3.2m / 2.7m	N/A	5.9m
S of Greenhill Rd	3.3m	0.2m	6.8m

The surrounding land is very steep and has dense vegetation, which would make road widening exceptionally difficult and expensive to undertake. Given the low traffic volumes, the expense would be difficult to justify and alternative treatments to road widening should be considered.



Figure 75: Comparison of different cross sections on Mount Lofty Summit Road

Speed limits

The speed limit on Mount Lofty Summit Road is 80km/h, except for a 1.5km long 60km/h section between the Mount Lofty Botanic Garden and Mount Lofty Summit.

Table 52: Speed limits on Mt Lofty Summit Road

Segment	Speed limit (km/h)
Crafers	60
Crafers – Summer Hill Drive	80
Summer Hill Drive – Mt Lofty Summit	60
Mt Lofty Summit – Greenhill Rd	80

Of highest concern to RAA is the section between Greenhill Road and Mount Lofty Summit, currently subject to an 80km/h speed limit. This section is very narrow, has tight geometry and exposed roadside hazards for the entire three-kilometre length. Furthermore, this section is popular amongst recreational cyclists, and has multiple pedestrian crossing points, often at locations that offer poor visibility to both pedestrians and road traffic. A reduction in speed limit to at most 60km/h along this section of Mount Lofty Summit Road will reduce vehicle travel speeds, reaction and stopping distances in an emergency stopping situation and impact forces in the event a crash occurs. RAA considers significant road widening on this section to be largely impractical due to the dense vegetation and steep surrounding terrain.

The speed limit on other sections of Mount Lofty summit road should be reviewed at the same time with corridor-wide consolidation of speed limits in mind.

Recommendation 13A

Reduce the speed limit on Mount Lofty Summit Road to 60km/h between Greenhill Road and Mount Lofty Summit

AusRAP star ratings

Between Greenhill Road and Mount Lofty Summit, Mount Lofty Summit Road is rated one star due to factors including high speed limit, roadside hazards and narrow lanes. The section between Crafers and Mount Lofty Summit is rated three to four stars and is a good example of a high standard road in the Adelaide Hills, however, there is rarely enough space to construct a road to this geometry. The section pictured below is between Greenhill Road and Mount Lofty Summit.



Figure 76: Typical AusRAP star rating on Mount Lofty Summit Road between Greenhill Road and Mount Lofty Summit

Improving one of these factors in isolation is unlikely to generate a significant increase in star rating, as even a 50km/h speed limit will result in a one star rating on curves with radius less than 400m, which accounts for most curves on Mt Lofty Summit Road. Improving the road condition and skid resistance with a reseal would increase the star rating to two stars on these curves. When undertaken in conjunction with a speed limit reduction and barrier installations, the star rating would increase to three stars.

Other observations

As discussed, the corridor is incredibly narrow with insufficient clearance to significantly widen the carriageway. Roadside hazards are continuously present on both sides of the carriageway and pose a significant risk in run off road crash types. Additional safety barriers are required to reduce the exposure to roadside hazards along the corridor.

Recommendation 13B

Install motorcycle friendly barriers between Greenhill Road and Mount Lofty Summit.

Mount Lofty Summit road is significant for cyclists as it links the Crafers Bikeway to the summit of Mount Lofty which is a popular and challenging recreational cycling route. Due to the steep gradients, cyclists ascending the hill often do so at very low speeds. In addition, shoulders between Crafers and Summer Hill Drive are very rough and should be resealed and marked as a cycle lane, especially on the uphill section heading away from the Crafers township. More frequent street

sweeping would also be required as the shoulder is currently covered with debris from surrounding trees and not suitable for cycling.

Recommendation 13C

Consider extending the Crafers Bikeway to Mount Lofty Summit, and as a minimum, reseal road shoulders between Crafers and Summer Hill Drive and mark these shoulders as a cycle lane to encourage/mandate use by cyclists.

Whilst there is no width for a cycle lane between Mount Lofty Summit and Greenhill Road, RAA suggest that the current cyclist warning signage be reviewed, and additional signage installed to further emphasise the presence of cyclists travelling the route. As previously recommended, a lower speed limit will also serve to increase the safety of cyclists using the road.

Recommendation 13D

Review and install additional cyclist warning signage on Mount Lofty Summit Road.

The pavement condition is relatively poor between Mount Lofty Summit and Greenhill Road, and resealing should be undertaken which will improve safety for cyclists and motorcyclists that frequent this road.

Recommendation 13E

Reseal Mount Lofty Summit Road between Greenhill Road and Mt Lofty Summit.

Pedestrian crossing points between Mount Lofty Summit and Greenhill Road are poorly delineated and are not clearly visible to approaching traffic due to both the horizontal and vertical road alignment, as well as surrounding vegetation. Whilst a speed limit reduction will make a positive improvement to safety at these points, vehicle speeds are still likely to exceed those that the human body can withstand in a crash. Pedestrian crossing points should be reviewed with a focus on improved visibility of pedestrians crossing and waiting to cross.

Recommendation 13F

Review pedestrian crossing points with a focus on improved visibility of pedestrians crossing and waiting to cross Mount Lofty Summit Road.



Figure 77: Pedestrian crossing point near Mt Lofty Summit obscured by horizontal and vertical road geometry

Summary of recommendations for Mount Lofty Summit Road

Recommendation 13A

Reduce the speed limit on Mount Lofty Summit Road to 60km/h between Greenhill Road and Mount Lofty Summit

Recommendation 13B

Install motorcycle friendly barriers between Greenhill Road and Mount Lofty Summit.

Recommendation 13C

Reseal shoulders between Crafers and Summer Hill Drive and mark these shoulders as a cycle lane to encourage/mandate use by cyclists.

Recommendation 13D

Review and install additional cyclist warning signage on Mount Lofty Summit Road.

Recommendation 13E

Reseal Mount Lofty Summit Road between Greenhill Road and Mt Lofty Summit.

Recommendation 13F

Review pedestrian crossing points with a focus on improved visibility of pedestrians crossing and waiting to cross Mount Lofty Summit Road.

Strathalbyn Road

Strathalbyn Road is a state maintained arterial road extending for about 35km between Aldgate and Strathalbyn. The road passes through Mylor, Biggs Flat, Echunga, Flaxley and Macclesfield with varying traffic volumes. The busiest section is between Echunga and Aldgate with traffic volumes of 1,500-1,800 vehicles per day, whereas the section between Echunga and Strathalbyn only carries 600-1000 vehicles per day.

While the road did not receive many comments from respondents to the regional community survey, RAA nonetheless reviewed the road due to its importance in the Adelaide Hills road network. Survey responses raised concerns with the pavement condition and drainage, as well as a lack of overtaking opportunities and inappropriate speed limits.

“Uneven surface, poor road drainage, often covered with silt and gravel after rain.”

“Lack of overtaking lanes.”

“Limit is 80km/h which is unnecessarily low for a relatively open road in a rural area.”

Crash history

Between 2015 and 2019, 43 casualty crashes occurred on Strathalbyn Road. Single vehicle crashes are the most frequent, with hit fixed object and roll over crashes making up 56% of all crashes on Strathalbyn Road.

Table 53: Strathalbyn Road casualty crash types (2014-2018)

Crash type	Number of casualty crashes	Crash severity		
		Minor	Serious	Fatal
Hit Fixed Object	17	12	5	0
Roll Over	7	6	1	0
Rear End	5	4	1	0
Right Angle	5	5	0	0
Side Swipe	2	2	0	0
Hit Object on Road	2	1	1	0
Other	2	1	1	0
Right Turn	1	1	0	0
Head On	1	0	1	0
Hit Animal	1	1	0	0
Total	43	33	10	0

Cars and motorcycles are the primary units involved in crashes. More than three quarters of motorcycle crashes involve only a single motorcycle, and mostly involve a collision with a fixed object or a roll over. Furthermore, 13 of the motorcycle crashes occurred between Flaxley and Strathalbyn, where traffic volumes are lowest. Given this, installation of centre line ATLM as has been done on Gorge Road will deter motorcycle riders from crossing the centre line and encourage safer paths through corners and is a low-cost safety improvement that could be implemented almost immediately.

Recommendation 14A

Install centre line ATLM along Strathalbyn Road between Flaxley and Strathalbyn to deter motorcycle riders from crossing the centre line in this high-risk location.

Table 54: Units involved in crashes on Strathalbyn Road (2014-2018)

Unit type	Approximate number of units
Car	37 (64%)
Motorcycle	17 (29%)
Bicycle	3 (5%)
Unknown vehicle	1 (<2%)

On average, the crash rate of Strathalbyn Road is lower than many roads in the Adelaide Hills region, with 53 casualty crashes occurring for every 100 million vehicle kilometres travelled (100m vkt). When split into sections, the crash rate between Aldgate and Macclesfield is 35 casualty crashes per 100m vkt, whilst the crash rate between Macclesfield and Strathalbyn is almost five times higher with 166 casualty crashes occurring per 100m vkt, indicating that improvements between Macclesfield and Strathalbyn may be more justified than along other sections of the corridor.

Road widths

Strathalbyn Road is quite narrow with lanes typically 3m wide or narrower. Shoulders are sealed to a narrow width between Aldgate and Mylor, and a section between Macclesfield and Strathalbyn has one metre wide sealed shoulders.

Table 55: Sealed width of Strathalbyn Road

Location	Lane width	Sealed shoulder width	Total seal width
S of Glen Bold Road (Biggs Flat)	2.5m / 3.2m	N/A	5.7m
W of Flaxley Road (Flaxley)	3.0m / 3.1m	N/A	6.0m
S of Cosgrove Road (Macclesfield)	2.9m / 3.2m	N/A	6.1m
N of Waterman Road (Strathalbyn)	2.8m	0.9m	7.4m

Unlike other corridors in the Adelaide Hills, there is space available for shoulder sealing along much of Strathalbyn Road, and shoulders should be sealed to 1m where possible, or a minimum of 0.5m in conjunction with other safety treatments such as motorcycle friendly safety barriers.

Recommendation 14B

Seal shoulders to 1m wide on Strathalbyn Road (0.5m minimum where environment is constrained)

Speed limits

The speed limit along Strathalbyn Road is 80km/h for open sections of road, with reductions to 50km/h or 60km/h through townships. Consideration should be given to consolidating speed limits through townships along the route with 50km/h limits. '50 AHEAD' signage is installed on the

approaches to Mylor, but not in Macclesfield where a 50km/h limit also applies. For consistency, '50 AHEAD' signs should be installed on both approaches to Macclesfield, and on approaches to other townships where speed limits are consolidated.

Table 56: Speed limits on Strathalbyn Road

Segment	Speed limit (km/h)
Aldgate	60
Aldgate – Mylor	80
Mylor	50A – 50 – 50A
Mylor - Echunga	80
Echunga	60 – 50
Echunga - Flaxley	80
Flaxley	60
Flaxley – Macclesfield	80
Macclesfield	50
Macclesfield – Strathalbyn	80
Strathalbyn	60

Recommendation 14C

Install '50 AHEAD' signage on each approach to Macclesfield, and other townships if speed limit consolidation takes place along Strathalbyn Road.

AusRAP star ratings

Strathalbyn Road would typically be described as a one-star rated road, with sections of two or three-star road. The narrow, winding sections which characterise it would be considered one star while the wider sections with extensive barrier protection near Strathalbyn would be considered two to three stars. Straight sections without barrier protection would be considered two stars.



Figure 78: AusRAP star rating on a straight section of Strathalbyn Road

Barriers on both sides of the carriageway, combined with a narrow (<1m) shoulder seal would increase this star rating to four stars on straight sections, and two to three stars on curves depending on the curve radius.

Other observations

Exposed hazards, primarily large trees, are situated along most of the corridor, within two metres. Further barrier protection should be considered to reduce the exposure to these hazards and reduce the number of casualty crashes involving collisions with fixed objects. It is important that these barriers include motorcycle under run protection as Strathalbyn Road is popular amongst motorcycle riders.

Recommendation 14D

Install additional motorcycle friendly barriers on Strathalbyn Road.

The pavement, although quite old, is mostly in serviceable condition and structurally sound. There are some localised surface defects on straight sections of the carriageway that could negatively impact on skid resistance, particularly during wet weather where water is likely to pond.

Summary of recommendations for Strathalbyn Road

Recommendation 14A

Install centre line ATLM along Strathalbyn Road between Flaxley and Strathalbyn to deter motorcycle riders from crossing the centre line in this high-risk location.

Recommendation 14B

Seal shoulders to 1m wide on Strathalbyn Road (0.5m minimum where environment is constrained)

Recommendation 14C

Install '50 AHEAD' signage on each approach to Macclesfield, and other townships if speed limit consolidation takes place along Strathalbyn Road.

Recommendation 14D

Install additional motorcycle friendly barriers on Strathalbyn Road.

Other roads reviewed

Battunga Road

Battunga Road is a state-maintained arterial corridor extending for 10km between Echunga and Meadows. The road carries 3500 - 5000 vehicles per day and is controlled by a 100km/h speed limit with 80km/h buffer zones on the approaches into Echunga and Meadows. Compared to other roads in the Adelaide Hills region, Battunga Road is generally quite straight, with gentler gradients.

While the road was raised by several survey respondents, citing poor driver behaviour and a lack of overtaking opportunities as the main issues, the intersection with Mawson Road in Meadows was considered the most significant issue on Battunga Road.

“Too many speeding cars, unsafe overtaking and very poor drainage which is a hazard with heavy rain.”

“At Mawson Road, drivers get confused about who goes when, dangerous and accidents will happen.”

“Large trucks pull out in front of you from Battunga Road if you are going straight along Mawson Road. Trucks are too large for the intersection. A bypass is needed.”

“Ridiculously dangerous intersection. Lots of traffic and heaps of accidents. No-one seems to understand who gives way to who – especially when crossing from the south side to the north side. Turning right to head to Kangarilla at this intersection is so busy and people take risks to turn. There is absolutely nowhere safe to cross as a pedestrian. There is room for a roundabout. If trucks can get around Mt Barker roundabouts, then they can get around one at this very concerning intersection that has been an issue for decades.”

A total of 15 casualty crashes occurred on Battunga Road between 2015 and 2019, with a casualty crash rate of less than 18 casualty crashes per 100 million vehicle kilometres travelled, which is low in comparison to many roads in the Adelaide Hills region. Rear end crashes and crashes involving a collision with fixed objects are the most common types of crashes occurring. Whilst w-beam barrier is used to some degree along the corridor, exposed trees line most of the corridor, which contributes to the current AusRAP rating of two stars for most sections of Battunga Road. Further barrier protection would increase the star rating to 3 stars, and a wire rope centre barrier or lower speed limit would give Battunga Road a five-star rating.

Recommendation 15A

Install additional barriers to reduce risk posed by to large roadside trees on Battunga Road.

Given that traffic volumes are high, and significant population growth is expected in Meadows, an overtaking lane in each direction should be investigated to provide safer overtaking opportunities together with consideration to providing a wire rope centre barrier.

Recommendation 15B

Consider installing an overtaking lane in each direction on Battunga Road.

The intersection with Mawson Road in Meadows was also reviewed. Sight distance was found to meet acceptable levels, however there is a substantial amount of open space in and around the intersection, with delineation mostly in the form of signage and line markings on the road. A review

of crash history indicates that two casualty crashes resulting in minor injury occurred here between 2015 and 2019: one rear-end crash, and one right angle crash which both occurred in 2016.

A roundabout would be an effective solution to traffic issues at this intersection. However, the service station on the northwest corner of the intersection and the bakery on the southeast corner of the intersection conflict with its desirable placement and as such, land acquisition would be required to progress with this solution. Whilst the maximum heavy vehicle size generally permitted through the intersection is a 19m semi-trailer, future provision of b-doubles should be considered in any upgrade as this intersection is on the most direct route between McLaren Vale and the South Eastern Freeway.

The image below depicts the absolute minimum footprint for a low speed roundabout suitable for b-double freight with a central island radius of 6m (10m radius for the apron) and total radius of 16m including the circulating carriageway. As the roads do not meet at 90 degrees, it is highly unlikely that this size roundabout would be appropriate to accommodate all b-double turn movements. Furthermore, the footprint of any pedestrian or cyclist pathways around the roundabout will further increase the amount of land required to install a roundabout.

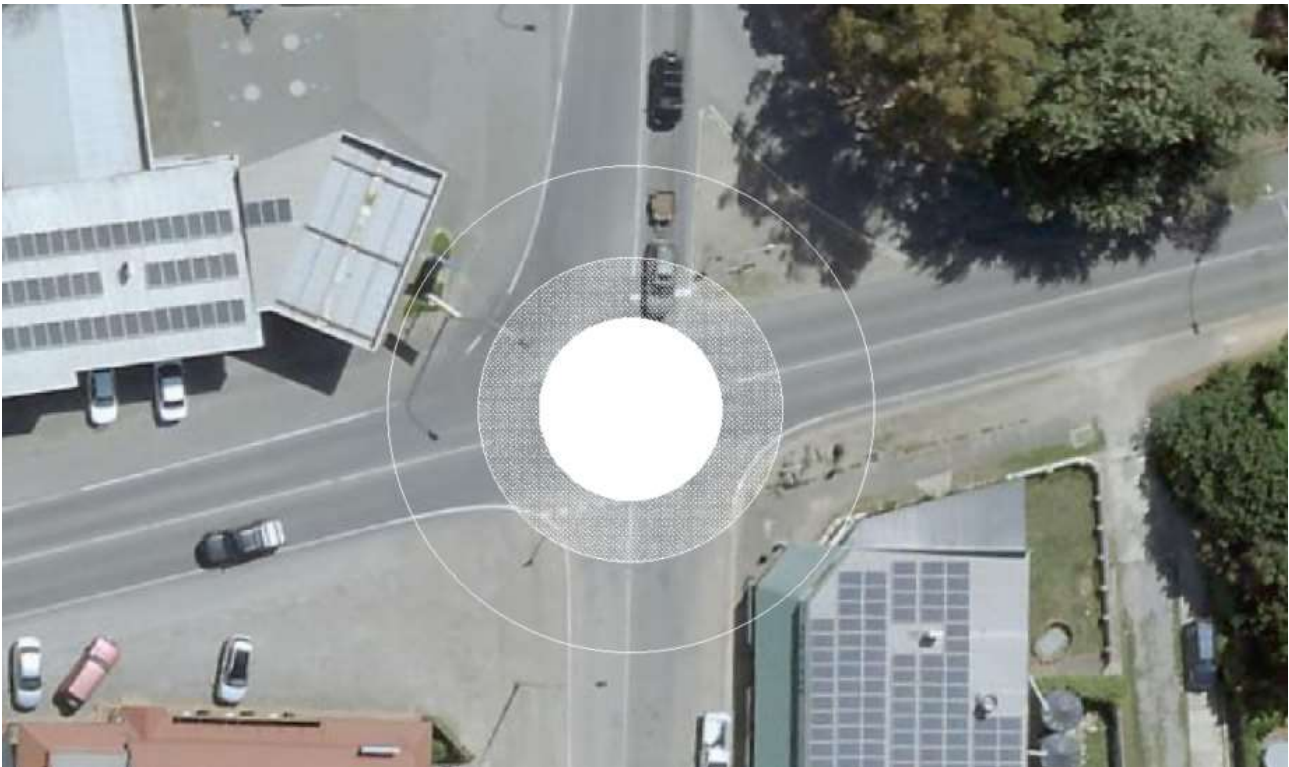


Figure 79: Minimum footprint for a roundabout suitable for potential future b-double access in Meadows.

Notwithstanding, an upgrade to the intersection would present further opportunities to improve streetscape, drainage and pedestrian accessibility at the intersection, and should be considered from these perspectives as well. Importantly, pedestrian movements across Mawson Road, east of the intersection were frequent at the time of site inspection and should be investigated for pedestrian crossing facilities or a refuge island. Inadequate pedestrian facilities in the vicinity were also raised by several community survey respondents when asked about walking issues in the Adelaide Hills region.

Recommendation 15C

Explore the feasibility of an upgrade at the intersection of Battunga Road and Mawson Road in Meadows.

Norton Summit Road

Norton Summit Road is a state-maintained road carrying approximately 750 vehicles per day between Magill and Norton Summit. The 8km road is subject to a 60km/h speed limit and is primarily used for Teringie residents to access their properties. The route is very popular amongst cyclists and is an alternative to the busier Old Norton Summit Road which connects Magill and Norton Summit over a shorter distance. Norton Summit Road is steep, with winding geometry between Magill and Norton Summit.

The road condition is fair, and w-beam barrier is used to protect against collisions with roadside hazards or steep drop offs.

Crash history is poor, with 20 casualty crashes occurring between the Glen Stuart Road intersection and Norton Summit between 2015 and 2019. One of these resulted in a fatality, six in serious injuries and 13 in minor injuries. 75% of casualty crashes involved a single vehicle with 'hit fixed object' and 'rollover' the most common crash types.

Bicycles are substantially over-represented in crashes on Norton Summit Road as shown in the below table, making up more than 50% of units involved in casualty crashes on Norton Summit Road. It is also important to note that this only includes crashes that were reported to police, and it is known that many single cyclist crashes are not reported, even when minor injuries are sustained.

Table 57: Units involved in crashes on Norton Summit Road

Unit type	Approximate number of units
Bicycle	14 (52%)
Car	9 (33%)
Motorcycle	3 (11%)
Truck	1 (<4%)

Of the 13 reported crashes involving cyclists (one crash involved two cyclists), a cyclist was determined to be responsible for the crash 70% of the time as most cyclist crashes involved the single bicycle and no other human controlled unit. Two of three crashes involving a cyclist and a car were attributed to car drivers, and a further two attributed to an animal on the road.

Table 58: Bicycle crashes on Norton Summit Road

Unit type	Approximate number of units
Bicycle v object	4
Bicycle v bicycle	1
Bicycle rollover	3
Bicycle v car	3
Bicycle v animal	2

Old Norton Summit Road

Old Norton Summit Road is a state-maintained road carrying approximately 3,200 vehicles per day between Magill and Norton Summit and is governed by a 60km/h speed limit. Old Norton Summit Road is 5.5km long, making it a more popular route for commuters than Norton Summit Road due to its shorter length. As with other roads in the foothills, the gradient is steep, and road geometry is winding. Old Norton Summit Road is still popular amongst recreational cyclists; however, higher traffic volumes can discourage less confident riders.

Between 2015 and 2019, 18 casualty crashes occurred on Old Norton Summit Road, with three of these resulting in serious injuries and 15 in minor injuries. In 50% of these crashes a driver or rider collided with a fixed roadside object, and in 22% of these crashes a driver or rider rolled over.

Table 59: Units involved in crashes on Old Norton Summit Road

Unit type	Approximate number of units
Car	17 (71%)
Bicycle	4 (17%)
Truck	2 (8%)
Motorcycle	1 (4%)

When analysing the four cyclist crashes on Old Norton Summit Road, three of these were single cyclist roll over crashes, and the fourth involved a cyclist and car colliding head on, with responsibility attributed to the cyclist for this crash.

The road condition is mostly serviceable, however there are some failing sections exhibiting cracking and delamination which can pose a hazard to cyclists and motorcyclists, particularly on blind curves.

Recommendation 15D

Undertake localised pavement rehabilitation on Old Norton Summit Road, particularly around curves.

Unprotected fixed roadside hazards are present along most of the corridor and include trees and stobie poles. There is capacity to improve signage as well, with hazard boards missing from some of these fixed hazards, and outdated intersection approach warning signs used. Delineation could be further improved by installing guide posts where possible, and reflectors on barriers where they are currently not present.

Recommendation 15E

Undertake improvements to signage and delineation on Old Norton Summit Road



Figure 80: Typical cross section of Old Norton Summit Road highlighting exposed hazards and narrow lanes

Montacute Road

Montacute Road is a council-maintained road under the care and control of Adelaide Hills Council. The section reviewed extends for approximately nine kilometres between Maryvale Road through to Cherryville Road, where Montacute Road continues as Marble Hill Road through to Lobethal Road at Ashton. The route is popular amongst cyclists due to its challenging gradient and lower traffic volumes and is primarily used for access to properties in Montacute and surrounding localities. Montacute Road is controlled by an 80km/h speed limit.

Between 2015 and 2019, 20 casualty crashes occurred on this section of Montacute Road, with five of these resulting in serious injury. Of these, 17 were involving a single vehicle with 'hit fixed object', 'roll over', and 'left road - out of control', the three most prevalent crash types. Furthermore, 18 of the crashes occurred on curves, with most of these having an obscured view.

As with other popular cycle routes connecting the Adelaide plains and the foothills, cyclists are over-represented in the crash statistics on Montacute Road, with eight cyclists involved in seven crashes. Five of the cyclist crashes were due to the cyclist rolling over or colliding with a fixed object, with the remaining two due to a vehicle failing to give way to the cyclist(s) when leaving private driveways.

The four motorcycle crashes were single vehicle crashes involving either a collision with a guardrail or a roll over.

Table 60: Units involved in crashes on Montacute Road

Unit type	Approximate number of units
Car	11 (46%)
Bicycle	8 (33%)
Motorcycle	4 (17%)
Other/unknown	1 (4%)

Roadside drop-offs are well protected by w-beam barriers, however, fixed hazards such as trees and stobie poles along the route are not granted the same level of protection.. RAA recommends that council considers installing motorcycle underrun protection attachments to the current w-beam safety barriers and further barrier installation be carried out to reduce road user exposure to fixed hazards.

Recommendation 15F

Install additional barrier protection (including motorcycle underrun) along Montacute Road.

It was observed that intersection warning signage along the length of Montacute Road and Marble Hill Road is missing at a number of locations or is outdated or non-standard. Adelaide Hills council should review this signage and replace as necessary given that many side road intersections are located on curves or crests where sight lines are compromised.

Marble Hill Road

Marble Hill Road is the continuation of Montacute Road and is under the care and control of Adelaide Hills Council. The road extends for almost five kilometres between Cherryville Road and the intersection with Lobethal Road at Ashton.

Between 2015 and 2019, five casualty crashes occurred on Marble Hill Road, with two of these resulting in serious injuries. Four of these crashes involved a single vehicle, and three of these involved a tree. Significantly less barrier protection has been installed on Marble Hill Road than on Montacute Road, with exposed hazards commonplace along most of the corridor allowing little margin for driver error. RAA recommends that further installation of barrier protection (including motorcycle underrun) be carried out along Marble Hill Road.

Recommendation 15G

Install additional barrier protection (including motorcycle underrun) along Marble Hill Road.

As was the case on Montacute Road, intersection warning signage is regularly missing, outdated or non-standard and council should seek to review this signage.

Recommendation 15H

Review and replace intersection warning signage as necessary along Montacute Road and Marble Hill Road.



Figure 81: Roadside hazards and outdated intersection warning signage on Marble Hill Road.

Cudlee Creek Road

Cudlee Creek Road is a state-maintained road extending for eight kilometres between Gorge Road in Cudlee Creek and Main Street in Lobethal. The road is controlled by an 80km/h speed limit and traversed by more than 2200 vehicles daily. The road is very popular amongst motorcyclists due to its wide cross-section and long series of sweeping curves.

The road surface is generally in good condition, with shoulders sealed to a good width in contrast to many roads in the Adelaide Hills that have insufficient flat (or gently sloping) land available for shoulder sealing.

Between 2015 and 2019, 26 casualty crashes occurred on Cudlee Creek Road. One of these resulted in a fatality, and eight in serious injuries. Single vehicle crashes made up 62% of crashes on Cudlee Creek Road, with many of the vehicles involved being motorcyclists who are significantly over-represented in crashes on this road.

Table 61: Units involved in crashes on Cudlee Creek Road

Unit type	Approximate number of units
Motorcycle	18 (49%)
Car	16 (43%)
Truck	2 (5%)
Bicycle	1 (3%)

When looking specifically at motorcycle crashes, 67% of these involved the motorcycle in either a collision with an object or a roll over.

Casualty crashes on Cudlee Creek Road are trending downwards in recent years as safety improvements have been implemented such as shoulder sealing, additional and motorcycle

friendly barrier protection, and intersection upgrades – notably the introduction of the rural junction active warning system (RJAWS) at the intersection with Fox Creek Road.

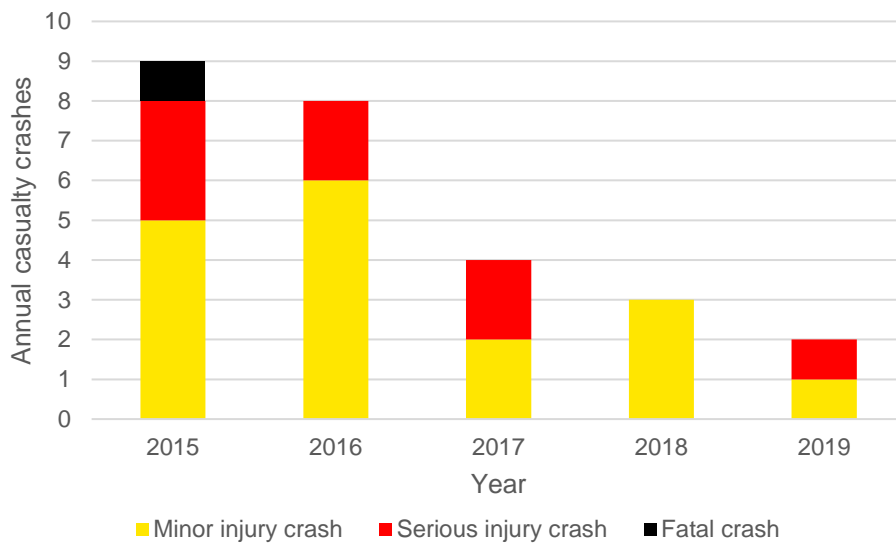


Figure 82: Casualty crashes on Cudlee Creek Road

These improvements have all very noticeably improved safety on this popular road, making it a good example of how corridor-wide safety can be improved in the Adelaide Hills.



Figure 83: Wide sealed shoulders and motorcycle friendly barriers are typical safety treatments on Cudlee Creek Road



Figure 84: The RJAWS reduces the speed limit on Cudlee Creek Road when a vehicle is entering from the side road

Kenton Valley Road

Kenton Valley Road is a state-maintained road extending for approximately eight kilometres between Gumeracha and Lobethal. Average daily traffic volumes are in the vicinity of 1,700 vehicles per day, and the speed limit is mostly 100km/h. There is a 500m 80km/h buffer zone on the approach to Gumeracha, and a 2.5km 80km/h section on the approach to Lobethal where horizontal geometry becomes more challenging.

The road surface condition is mostly good and barrier protection is provided around most curves. There are still many trees in very close proximity to the road shoulders that should ideally be protected by barriers, even though most of these are on straight sections of road.

Only two minor injury crashes occurred on Kenton Valley Road between 2015 and 2019, with both occurring at the intersection with Burfords Hill Road. One of these crashes involved an eastbound vehicle on Burfords Hill Road colliding with a fixed object, and the other was a rear end crash involving two northbound cars, with the first car intending to turn right onto Burfords Hill Road. This right turn is very tight and located on a curve and a crest, vehicles will generally need to slow down substantially to make this turn. RAA recommends widening the eastern shoulder of Kenton Valley Road through the intersection to allow northbound traffic to pass a vehicle turning right.

Recommendation 15I

Widen the eastern shoulder of Kenton Valley Road through the intersection with Burfords Hill Road to allow northbound traffic to pass a vehicle turning right.

South Para Road

South Para Road is a state-maintained road extending for approximately 19 kilometres between Chain of Ponds and Williamstown in the southern Barossa Valley. The majority of this road is located within the Adelaide Hills region, and the entire length was reviewed for the purposes of this regional road assessment.

The township of Kersbrook, with a population of more than 1,000, is situated approximately five kilometres north of the intersection with North East Road at Chain of Ponds. Traffic volumes between Williamstown and Kersbrook are in the order of 1,300 vehicles per day, and double to 2,600 vehicles per day between Kersbrook and Chain of Ponds. South Para Road forms part of a well utilised route to the Adelaide Hills region from Adelaide's northern suburbs and Gawler via Kersbrook Road.

Between 2015 and 2019, 25 casualty crashes occurred on South Para Road. Three occurred at the intersection with North East Road, five occurred between Chain of Ponds and Kersbrook, two occurred in Kersbrook and 15 occurred between Kersbrook and Williamstown. Two of these crashes resulted in a fatality and four resulted in serious injuries. 60% of these crashes involved a single vehicle on a midblock section of road. Cars are the primary unit involved in crashes on South Para Road, however, motorcycles are involved in a greater than average percentage of crashes when considering that motorcycles make up approximately 15% of all units involved in crashes in the Adelaide Hills region.

Table 62: Units involved in crashes on South Para Road

Unit type	Approximate number of units
Car	26 (70%)
Motorcycle	9 (24%)
Truck	1 (3%)
Pedestrian	1 (3%)

South Para Road is characterised by long, sweeping curves and is mostly subject to a 100km/h speed limit. The pavement is generally in good condition and shoulders are sealed to an acceptable width. Although the corridor is lined by large trees (many within 1m of the shoulders), safety barriers are seldom used between Chain of Ponds and Kersbrook, with the only installations over two narrow culverts between Checker Hill Road and Maidstone Road. Significant trees have been preserved for these barrier installations which greatly limits the effectiveness of the barrier in these locations. A review of 2015-2019 casualty crash data shows that three of the five casualty crashes between Chain of Ponds and Kersbrook involved collisions with trees, with two of these resulting in serious injuries. As such, RAA recommends that motorcycle friendly barrier installation be carried out between Chain of Ponds and Kersbrook to reduce the risk of serious crashes with trees on this busy section of road.

Recommendation 15J

Install motorcycle friendly crash barriers on South Para Road between Chain of Ponds and Kersbrook to reduce the risk of serious crashes with trees.

Barrier use is far more extensive between Kersbrook and Williamstown, with most barriers incorporating motorcycle underrun protection. Exposed hazards are still present but are mostly located in lower risk locations than between Chain of Ponds and Kersbrook.



Figure 85: Exposed trees on South Para Road between Chain of Ponds and Kersbrook

Upper Sturt Road

Upper Sturt Road is a 7.5km long state-maintained arterial road linking Crafers to Hawthorndene via Upper Sturt. The road carries more than 7,000 vehicles each day and serves an important link between the South Eastern Freeway at Crafers and suburbs in the Mitcham Hills such as Blackwood and Coromandel Valley. For the purposes of this assessment, Upper Sturt Road was reviewed between Hawthorndene Drive and Sheoak Road.

Upper Sturt Road was raised by several survey respondents with most responses citing poor road surface while some suggested that speed limit is too low. Typical responses are included below.

“Road surface is constantly breaking up and is laced with potholes.”

“Constant potholes, high traffic area requiring significant upgrade including overtaking opportunities.”

“Some areas could have the speed limit raised to 70km/h.”

A variety of crash types occur on Upper Sturt Road, with no significant trends in the types of crashes occurring. The most frequent crash type is a rear end crash, making up just over one quarter of all casualty crashes that occur on Upper Sturt Road.

Table 63: Upper Sturt Road casualty crash types (2015-2019)

Crash type	Number of casualty crashes	Crash severity		
		Minor	Serious	Fatal
Rear End	7	6	1	0
Right Angle	4	4	0	0
Hit Fixed Object	4	3	1	0
Head On	4	4	0	0
Right Turn	3	3	0	0
Roll Over	3	3	0	0
Hit Object on Road	1	1	0	0
Left Road - Out of Control	1	1	0	0
Total	27	25	2	0

Between 2015 and 2019, cars were the dominant units involved in crashes on Upper Sturt Road, highlighting its primary use as a commuter corridor.

Table 64: Units involved in crashes on Upper Sturt Road

Unit type	Approximate number of units
Car	42 (86%)
Motorcycle	3 (6%)
Scooter	1 (2%)
Other/Unknown	1 (2%)
Bicycle	1 (2%)
Bus	1 (2%)

When crashes are weighed up against traffic volumes, data shows that approximately 27 casualty crashes occur for every 100 million vehicle kilometres travelled on Upper Sturt Road, which places it on the low end of the scale compared to many other roads in the Adelaide Hills region.

Upper Sturt Road is generally constructed to a reasonable width, with 3.2m lanes and shoulders sealed to 0.5m where possible. Some sections have narrower geometry due to steep and hilly terrain. Whilst widening the road would be desirable, construction costs may be insurmountable.

RAA considers the 60km/h speed limit between Crafers and Hawthorndene appropriate, given the high traffic volumes and proximity to roadside hazards such as large trees and rock faces.

Upper Sturt Road would mostly be rated three stars under AusRAP star rating protocols, however, sections around sharp curves would likely be rated as only two stars.



Figure 86: Typical AusRAP star rating on Upper Sturt Road

The primary issue on Upper Sturt Road was the condition of the pavement, with ruts, cracks and undulations experienced along most of the corridor. Maintenance works, which may extend to a full reseal, are required to address these issues.

Recommendation 15K

Undertake pavement rehabilitation, which may extend to a full reseal, along Upper Sturt Road between Hawthorndene Drive and Crafers.

At the time of our assessment, two separate slow vehicle turnouts were being used as parking bays for vehicles, which renders them ineffective. It was observed that yellow line markings were not installed in these turnouts. It is suggested that slow vehicle turnouts are reviewed, and further parking control measures are implemented to ensure these are not used as parking bays.

Recommendation 15L

Install further parking controls (yellow edge lines, parking restriction signs) in slow vehicle turnouts to ensure they are not used as parking bays.

Piccadilly Road

Piccadilly Road is a state government maintained arterial road providing connectivity between Greenhill Road at Summertown and the South Eastern Freeway interchange at Crafers via Piccadilly. Piccadilly Road has high traffic volumes, with 2000 vehicles using the northern section between Greenhill Road and Swamp Road, and up to 5200 vehicles using the southern section in Crafers.

Piccadilly Road provides primary access for tourists accessing the Mount Lofty Botanic Gardens lower carpark, with vehicles often parking on Piccadilly Road when the carpark fills up, generating high foot traffic along and across the road. Several community survey respondents raised the lack of a continuous footpath along Piccadilly Road, and extending a footpath from Crafers to Sprigg Road and beyond may be justified. Further pedestrian infrastructure along Sprigg and Lampert Road would also improve pedestrian accessibility to the Mount Lofty Botanic Gardens. As Piccadilly Road forms part of a bus route, an improved and continuous footpath would also improve access to bus stops along the road.

Recommendation 15M

Investigate the provision of a continuous footpath between Crafers and the Mount Lofty Botanic Gardens access point on Lampert Road

Between 2015 and 2019, 15 casualty crashes occurred on Piccadilly Road, with two of these resulting in minor injuries. Most of these crashes occurred on the built-up sections, with five crashes occurring within the 80km/h section.

Survey respondents raised issues with a poor surface, narrow carriageway and various concerns regarding the speed limit.

“Narrow width and poor surface with no safe cycling paths.”

“This road has at least three different speed zones. I think the speed limit should be 60km/h at the most and perhaps 50km/h in some sections.”

“50km/h is too slow for a road that connects towns.”

“80km/h on a narrow road?”

There are currently three different speed zones on this six-kilometre road, with a 50km/h limit recently introduced for the built-up areas of Summertown and Crafers (previously 60km/h). A 60km/h limit remains through Piccadilly, and a 1.5km long 80km/h limit extends between Piccadilly and Summertown. There are about 10 property access points and five side road intersections in this 80km/h section, however sight distance and clear zones are generally good. Consolidation of speed limits along Piccadilly Road would most likely result in the 80km/h zone being reduced to 60km/h or the 60km/h zone being reduced to 50km/h as the current 50km/h and 60km/h zones are appropriate for the level of development and roadside environment and an increased speed limit is not suitable.

The pavement condition between Piccadilly and Summertown is poor with cracks, ruts and potholes present. It is evident that minor maintenance work has been undertaken on the road to extend its serviceable life, however a reseal is now required to rectify the poor pavement on this section of road.



Figure 87: Typical pavement deterioration encountered along most of Piccadilly Road

Recommendation 15N

Reseal Piccadilly Road between Piccadilly and Summertown

Flaxley Road

Flaxley Road is a state government maintained arterial road extending for 8.5 kilometres between Mount Barker and Strathalbyn Road in Flaxley. Flaxley Road provides an important connection between Mount Barker and townships in the southern Adelaide Hills including Echunga, Meadows and Macclesfield.

Between 2015 and 2019, 19 casualty crashes occurred on Flaxley Road, with 17 of these occurring on the busiest section between Wellington Road and Church Hill Road. 'Hit fixed object' and 'rear-end' crashes were the most frequently occurring, with 7 of each recorded during this period.

Traffic volumes are highest between Echunga and Mount Barker with more than 3,600 vehicles travelling the road north of Church Hill Road each day. Traffic volumes exceed 10,000 vehicles per day within the built-up area of Mount Barker. With further developments such as Newenham, Clover Park and Springlake all likely to have a substantial impact on traffic volumes, duplication of Flaxley Road is likely to be a longer-term requirement between Wellington Road and Martin Road (future "Heysen Boulevard" Mount Barker ring route).

Recommendation 15O

Consider future duplication of Flaxley Road between Wellington Road and Martin Road (Heysen Boulevard) as residential developments progress and if traffic conditions approach capacity.

The road surface is mostly in serviceable condition, with pavement remediation works recently completed between Church Hill Road and Strathalbyn Road. Large trees line most of the corridor and present the most significant risk to safety given the current conditions and further barrier installations should be carried out along Flaxley Road to reduce the exposure to these hazards.

Recommendation 15P

Install additional barriers on Flaxley Road to reduce exposure to roadside hazards.



Figure 88: Exposed trees are a frequent occurrence on Flaxley Road.

Shoulder sealing should be considered south of Church Hill Road. However, given the lower traffic volumes (700 vehicles per day), this may be considered a lower priority than on other sections of the Adelaide Hills road network.

Recommendation 15Q

Seal shoulders on Flaxley Road between Church Hill Road and Strathalbyn Road.

Intersection of Wellington Road and Victoria Road

The intersection of Wellington Road and Victoria Road in Mt Barker was one of the most raised intersections in the regional community survey. Wellington Road is an arterial road under the care and control of DIT, and Victoria Road is a north-south collector road under the care and control of the District Council of Mount Barker. The four-way intersection allows all through and turn movements, however, at present, lacks the suitable infrastructure to allow it to operate safely and efficiently.

The intersection has been a concern to the local community for many years and traffic volumes are expected to increase further due to the Bluestone Mt. Barker development. A roundabout design has been developed and construction is expected to commence in Summer 2020, with the project funded by the developer of Bluestone Mt. Barker, Peet Limited.

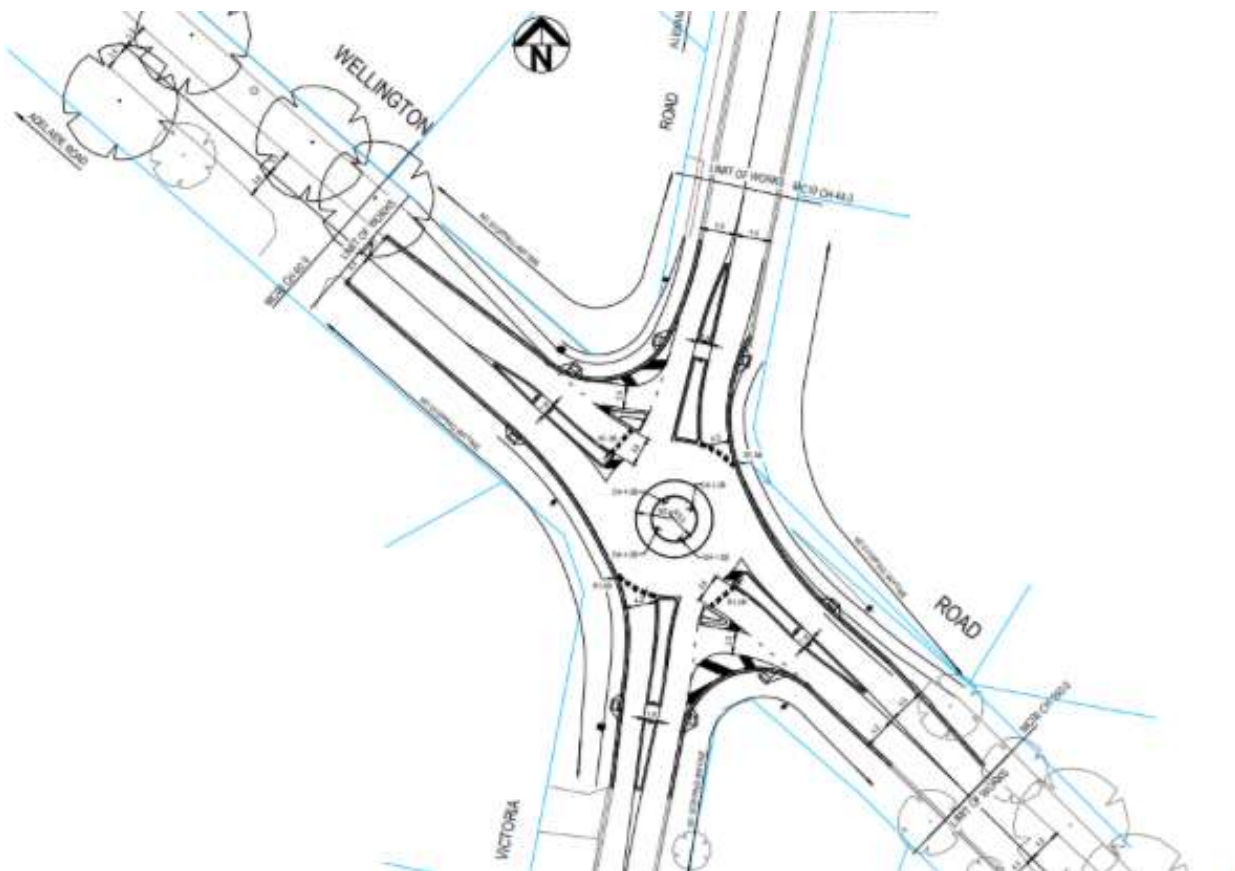


Figure 89: Roundabout design for the intersection of Wellington Road and Victoria Road¹¹

Recommendation 15R

Install a roundabout as proposed at the intersection of Wellington Road and Victoria Road in Mount Barker.

¹¹ DC Mt Barker, Wellington Road and Victoria Road Roundabout, *Roundabout Drawing – Wellington Road and Victoria Road*, accessed at <<https://www.mountbarker.sa.gov.au/infrastructure/infrastructure-projects/currentprojects/wellington-road-and-victoria-road-roundabout>>.

Intersection of Church Hill Road and Old Mount Barker Road, Echunga

The intersection of Church Hill Road and Old Mount Barker Road in Echunga was raised by several regional community survey respondents. The primary issue at this location is the poor sight distance due to the crest at the intersection, although no casualty crashes occurred here between 2015 and 2019. The intersection is situated about 500m from the Echunga township and is traversed on most trips between Echunga and Mount Barker. Comments received included:

“Drivers turning out cannot see traffic coming over the hill at 80km/h.”

“Poor visibility of cars on Church Hill Road when turning from Old Mt Barker Road.”

A review of conditions on site confirmed significant sight distance issues due to the crest on Church Hill Road situated immediately west of the intersection.



Figure 90: Substandard sight distance looking west from Old Mount Barker Road

This site would be ideal to implement a rural junction active warning system (RJAWS) that would reduce the speed limit on Church Hill Road to 50km/h only when a vehicle is approaching from Old Mount Barker Road. The key issue with this is that the intersection is located only 450m from the 50km/h zone in Echunga and, as such, implementing the RJAWS would result in an 80km/h zone that is less than 400m long between the intersection and Echunga, which could increase the risk of vehicles speeding into Echunga. It may therefore be more practical to extend Echunga’s 50km/h speed zone by 500m to cover the intersection, although compliance with this speed limit may be low due to a potential lack of perceived hazard by drivers unaware of the intersection.

Infrastructure treatments could also be considered, and modifying the intersection to make Mount Barker Road onto Church Hill Road a priority movement through the intersection could be seen as a low cost treatment but would result in a right turn restriction from Church Hill Road onto Old Mount Barker Road due to sight distance issues. Turn movements were observed whilst on site, and it was noted that right turns from Church Hill onto Old Mount Barker Road were the least frequent movement through the intersection and a right turn restriction may be feasible.



Figure 91: 'Modified T' intersection concept for the intersection of Church Hill Road and Old Mount Barker Road

Other more costly options could include a roundabout or a realignment of Old Mount Barker Road to join Church Hill Road in a safer location closer to the Echunga township. Each of the options considered have been summarised in the table below, with several distinct advantages and disadvantages of each option.

Table 65: Summary of various intersection treatments at Church Hill Road and Old Mount Barker Road

Treatment	Advantages	Disadvantages
RJAWS	<ul style="list-style-type: none"> Reduces speeds through intersection Low-cost 	<ul style="list-style-type: none"> Reliant on driver compliance Results in very short section of 80km/h zone between Echunga township and intersection
Extend 50km/h speed limit	<ul style="list-style-type: none"> Reduces speeds through intersection Lowest cost 	<ul style="list-style-type: none"> Reliant on driver compliance which is expected to be low without strict enforcement due to the road environment.
Modified T	<ul style="list-style-type: none"> Reduces impact of poor sight lines from Old Mount Barker Road and Church Hill Road heading west Relatively low-cost 	<ul style="list-style-type: none"> Removes right turn access onto Church Hill Road Poor visibility of intersection on Church Hill Road heading east May increase traffic volumes on Old Mount Barker Road (inferior to Church Hill Rd) Risk of increased driver confusion
Roundabout	<ul style="list-style-type: none"> Highest alignment with safe system principles Reduced speed and impact angles 	<ul style="list-style-type: none"> High cost Land acquisition Poor visibility of roundabout on Church Hill Road heading east
Realign Old Mt Barker Road	<ul style="list-style-type: none"> All sight lines are improved Reduced speed limit through intersection is more practical due to closer proximity to Echunga township 	<ul style="list-style-type: none"> High cost Land acquisition High impact angles if a T-intersection is adopted Lower alignment with safe system principles than a roundabout (if T-intersection)

Recommendation 15S

Upgrade the intersection with Church Hill Road and Old Mount Barker Road in Echunga to reduce speeds and improve sight lines, with consideration given to installing a rural junction active warning system (RJAWS).

Intersection of Warren Road, Lucky Hit Road and Martin Hill Road, Cromer

The intersection of Warren Road, Lucky Hit Road and Martin Hill Road in Cromer, near Birdwood was also reviewed by RAA due to its poor recent crash history. As Warren Road is under the care and control of DIT, any upgrades at the intersection are its responsibility. Between 2015 and 2019, three right angle crashes resulting in injury occurred, and in March 2020, a fatality tragically occurred as part of at least four crashes occurring between January and April.

This intersection meets the eligibility criteria for funding under the *2021-22 Black Spot Program* and has been nominated by RAA to receive an upgrade. In 2020, DIT in conjunction with Adelaide Hills Council upgraded signage and delineation at the intersection, however these are passive treatments that have no impact to the severity of crashes when they occur. Adelaide Hills Council have had a concept design prepared for a possible upgrade which is a teardrop arrangement which will reduce the likelihood of crashes occurring and aims to reduce severity by improving impact angles in the event of a crash. The safety treatments included in this concept design include road widening, concrete islands and line marking to introduce reverse curves on the eastern and western approaches to the intersection, which will reduce approach speeds and emphasise the presence of an intersection with the requirement to give way to traffic on Warren Road.

Recommendation 15T

Upgrade the intersection with Warren Road, Lucky Hit Road and Martin Hill Road in Cromer, funded under the *2021-22 Black Spot Program*, or otherwise.

Summary of other recommendations

Recommendation 15A

Install additional barriers to reduce risk posed by to large roadside trees on Battunga Road.

Recommendation 15B

Consider installing an overtaking lane in each direction on Battunga Road.

Recommendation 15C

Explore the feasibility of an upgrade at the intersection of Battunga Road and Mawson Road in Meadows.

Recommendation 15D

Undertake localised pavement rehabilitation on Old Norton Summit Road, particularly around curves.

Recommendation 15E

Undertake improvements to signage and delineation on Old Norton Summit Road

Recommendation 15F

Install additional barrier protection (including motorcycle underrun) along Montacute Road.

Recommendation 15G

Install additional barrier protection (including motorcycle underrun) along Marble Hill Road.

Recommendation 15H

Review and replace intersection warning signage as necessary along Montacute Road and Marble Hill Road.

Recommendation 15I

Widen the eastern shoulder of Kenton Valley Road through the intersection with Burfords Hill Road to allow northbound traffic to pass a vehicle turning right.

Recommendation 15J

Install motorcycle friendly crash barriers on South Para Road between Chain of Ponds and Kersbrook to reduce the risk of serious crashes with trees.

Recommendation 15K

Undertake pavement rehabilitation, which may extend to a full reseal, along Upper Sturt Road between Hawthorndene Drive and Crafers.

Recommendation 15L

Install further parking controls (yellow edge lines, parking restriction signs) in slow vehicle turnouts to ensure they are not used as parking bays.

Recommendation 15M

Investigate the provision of a continuous footpath between Crafers and the Mount Lofty Botanic Gardens access point on Lampert Road

Recommendation 15N

Reseal Piccadilly Road between Piccadilly and Summertown

Recommendation 15O

Consider future duplication of Flaxley Road between Wellington Road and Martin Road (Heysen Boulevard) as residential developments progress and if traffic conditions approach capacity.

Recommendation 15P

Install additional barriers on Flaxley Road to reduce exposure to roadside hazards.

Recommendation 15Q

Seal shoulders on Flaxley Road between Church Hill Road and Strathalbyn Road.

Recommendation 15R

Install a roundabout as proposed at the intersection of Wellington Road and Victoria Road in Mount Barker.

Recommendation 15S

Upgrade the intersection with Church Hill Road and Old Mount Barker Road in Echunga to reduce speeds and improve sight lines, with consideration given to installing a rural junction active warning system (RJAWS).

Recommendation 15T

Upgrade the intersection with Warren Road, Lucky Hit Road and Martin Hill Road in Cromer, funded under the *2021-22 Black Spot Program*, or otherwise.

