Main Road Review

Black Road to Oakridge Road

Version 1.3 | October 2020

RAA

Contents

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 and our own research 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.

Main Road between Black Road and Oakridge Road has been a source of concern and frustration for RAA members for many years, highlighted by multiple appearances in Risky Roads surveys as one of South Australia's riskiest roads and numerous nominations through RAA's 'Report a Road' program.

This report has been produced by RAA to highlight existing issues on this section of Main Road and is a culmination of several site visits, speed limit testing and an analysis of casualty crash and traffic volume data. RAA has outlined a series of recommendations aimed at improving the AusRAP star rating on this section of Main Road from one to three stars, which could reduce casualty crashes occurring by as much as 64%[1].

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

RAA's key recommendations for Main Road (Black Road – Oakridge Road)

RAA considers safety treatments to be a high priority on Main Road between Black Road and Oakridge Road. RAA recommends the following treatments on this section of Main Road which will aid in increasing the AusRAP star rating from one star to three stars on most sections.

Recommendation 1

Reduce the speed limit to 60km/h between Black Road and Oakridge Road.

Recommendation 2

Reseal the road, widening the sealed carriageway where possible, especially at curves.

Recommendation 3

Remove roadside hazards where possible and install additional safety barriers including motorcycle underrun protection.

Recommendation 4

Review and adjust guide post placement where possible, aiming to widen the visual appearance of the carriageway.

Recommendation 5

Clear and maintain clearance of vegetation along curves to maximise sight lines to approaching traffic.

Background

Main Road is a South Australian government-maintained road under the care and control of the Department of Infrastructure and Transport (DIT). The road serves an important link to Blackwood and metropolitan Adelaide from sections of Happy Valley and Aberfoyle Park as well as residents in Chandlers Hill, Cherry Gardens and Clarendon. Main Road also forms part of the Adelaide-Goolwa Road (TARS road number 0004640A) incorporating Kangarilla Road, Dashwood Gully Road, Bull Creek Road and Alexandrina Road through to Goolwa and passing through Kangarilla, Meadows and Ashbourne.

Figure 1: Typical cross section of Main Road

The primary section of concern is between Black Road (Coromandel Valley) and Oakridge Road. This section has featured in the past two RAA Risky Roads surveys. In 2017, the road was nominated the 4th riskiest road in metropolitan Adelaide and 9th in the state (In 2019, the road was nominated the 7th riskiest road in metropolitan Adelaide and 18th in the state Although in the area defined as 'metropolitan Adelaide' for the purposes of this survey, the road is more typical of a regional road in the Adelaide Hills and Fleurieu Peninsula regions.

Average annual daily traffic (AADT) Volumes between Black Road and Oakridge Road (Chandlers Hill) are approximately 1,300 vehicles per day, with 3.5% of this traffic made up of commercial vehicles. This makes this section the quietest section of Main Road. 8,300 vehicles per day travel the road north of Black Road, and 2,300 vehicles per day travel the road south of Oakridge Road.

Investigation and analysis

Width

Several cross-sectional widths have been measured by RAA, and these measurements (including location) are displayed in the map beside. The narrowest measurement comes in at 5.3m, where the southbound lane is only 2.3 metres wide (Point A, pictured). Sections south of Oakridge Road measured slightly wider, with lanes wider than 3.0m on average (Point C, D, pictured).

This narrow width can be highly dangerous given the maximum width for a heavy vehicle of 2.5m, which can be wider when including wing mirrors. Australian Standards dictate the 85th percentile passenger vehicle width to be 1.87m wide which leaves minimal clearance, even for these vehicles. It is impractical for trucks and school buses that use this route to avoid crossing the centre line when travelling the route.

Austroads Guide to Road Design Part 3: Geometric Road Design[2], states that a 3.5m lane width is desirable for both urban and rural roads with traffic volumes greater than 1,000 vehicles per day/ This allows large vehicles to pass without either vehicle having to move sideways towards the outer edge of the lane

The guide also notes that the additional cost incurred by providing wider lanes will also partially offset the long-term shoulder maintenance costs. RAA acknowledges that these widths are not realistic on Main Road.

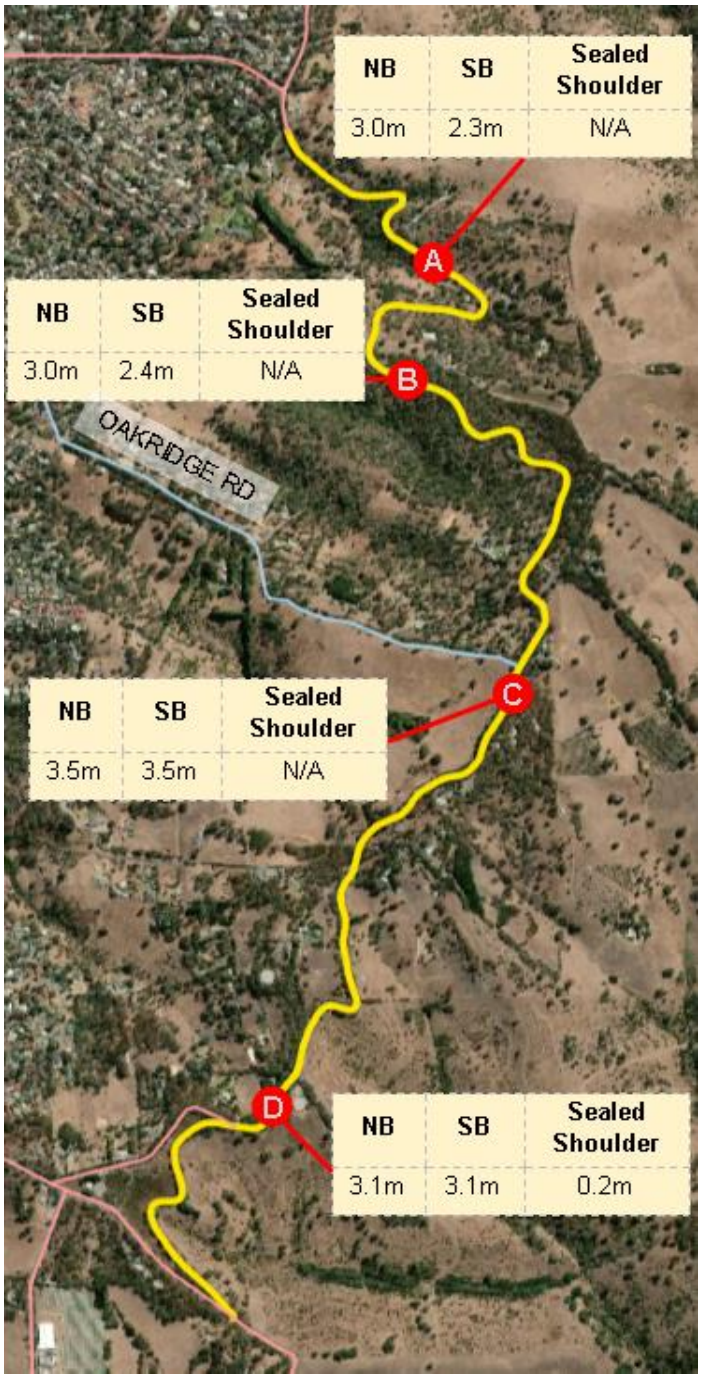


Figure 2: Measured cross sectional widths

[2] Austroads, 'Guide to Road Design Part 3: Geometric Road Design', Sydney, NSW, 2020, p. 45-49. *https://www.austroads.com.au/, (accessed 3 September 2020).*

Crash history

Crashes where a vehicle rolls over or hits a fixed object make up two thirds of all casualty crashes on Main Road between Black Road and Oakridge Road. Both crash types predominantly involve a single vehicle. The types of objects collided with include tree on one occasion, and an 'other fixed obstruction' on three occasions. Additional barrier protection along the corridor is likely to reduce the severity of crashes in these locations, and although the crash may still occur if barriers are installed as a standalone treatment, it is less likely that the crash will result in injuries due to the forgiving design of crash barriers. It is also pertinent that these barriers be installed with motorcycle underrun protection due to the high popularity of this route amongst motorcyclists.

Table 1: Main Road casualty crash types between Black Road and Oakridge Road (2015-2019)

Crash type	Number of casualty crashes	Crash severity		
		Minor	Serious	Fatal
Roll Over	4	4	0	0
Hit Fixed Object	4	2	1	1
Right Angle	2	2	0	0
Right Turn	2	2	0	0
Total	**12**	**10**	**1**	**1**

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

Table 2: Units involved in crashes on Main Road between Black Road and Oakridge Road (2015-2019)

Unit type	Approximate number of units
Car	10 (63%)
Motorcycle	5 (31%)
Bicycle	1 (6%)

Motorcycle crashes are overrepresented making up almost one third of all units involved in crashes on this section of Main Road despite making up less than 2.6% of vehicles registered in South Australia[3]. Three of these were single motorcycle crashes, with the remaining two being right angle crashes where cars entering Main Road failed to give way to a motorcyclist travelling on Main Road.

To analyse and compare various sections of road, current casualty crash rates per 100 million vehicle kilometres (vkt) travelled have been calculated. This takes into account the number of crashes along the length of road occurring per distance travelled. Main Road was split into several sections between Blackwood and Chandlers Hill based on DIT traffic volume estimates.

[3] DIT, 2020, Department for Infrastructure and Transport, Government of South Australia, *Registration and licensing statistics*, accessed at <https://dit.sa.gov.au/registration_and_licensing>.

Table 3: Traffic volume, length and casualty crash statistics for various sections of Main Road

Section	Approximate AADT	Length	Casualty crashes
East Terrace – Rowlands Hill Road (North)	11,000	3,300m	27
Rowlands Hill Road (North) – Black Road	9,000	1,650m	8
Black Road – Oakridge Road	1,300	2,840m	12
Oakridge Road – Sugarloaf Road*	2,800	1,760m	4

**Note that Sugarloaf Road was used as the end point for this analysis rather than Chandlers Hill Road as traffic volumes are significantly lower for the 850m section between Sugarloaf Road and Chandlers Hill Road and no crashes occurred on this section between 2015 and 2019.*

The results of the following analysis on Table 4, highlights that the rate of casualty crashes occurring between Black Road and Oakridge Road is substantially higher than for other sections of Main Road, with crashes between Black Road and Oakridge Road occurring at more than four times the rate of the sections immediately north and south.

Table 4: Casualty crashes per 100m vkt on various sections of Main Road

Section	Casualty crashes per 100m vkt
East Terrace – Rowlands Hill Road (North)	41
Rowlands Hill Road (North) – Black Road	30
Black Road – Oakridge Road	178
Oakridge Road – Sugarloaf Road	44

Speed limits

The section of Main Road, south of Black Road is governed by a 70km/h speed limit. North of Black Road, the speed limit is set at 60km/h due to the higher traffic volumes and urban environment.

Travel times at the existing 70km/h speed limit were measured by a series of tests alongside travel times at 60km/h and 50km/h speed limits. In each test, the same driver travelled at a restricted maximum speed in unrestricted traffic. When slow moving traffic was encountered, tests were abandoned and re-started which was a regular occurrence at the time of testing.

Table 5 below, plots the average speeds and travel times between Black Road and Chandlers Hill Road for each possible speed limit, in both the southbound and northbound directions.

Table 5: 70km/h zone travel time test between Black Road and Chandlers Hill Road (length: 5450m)

Test number	Speed limited	Direction of travel	Total travel time	Average speed
1	70km/h	SB	5m50s	56km/h
2	70km/h	NB	5m55s	55km/h
3	60km/h	SB	6m20s	52km/h
4	60km/h	NB	6m16s	52km/h
5	50km/h	SB	6m50s	48km/h
6	50km/h	NB	6m56s	47km/h

The following table (Table 6) plots the average speeds and travel times between Black Road and Oakridge Road for each possible speed limit, in both the southbound and northbound directions.

Table 6: 70km/h zone travel time test between Black Road and Oakridge Road (length: 2840m)

Test number	Speed limited	Direction of travel	Total travel time	Average speed
1	70km/h	SB	3m5s	55km/h
2	70km/h	NB	3m7s	55km/h
3	60km/h	SB	3m20s	51km/h
4	60km/h	NB	3m16s	52km/h
5	50km/h	SB	3m37s	47km/h
6	50km/h	NB	3m36s	47km/h

Table 7 displays the average speeds and travel times between Oakridge and Chandlers Hill Road for each possible speed limit, in both the southbound and northbound directions.

Table 7: 70km/h zone travel time test between Oakridge Road and Chandlers Hill Road (length: 2610m)

Test number	Speed limited	Direction of travel	Total travel time	Average speed
1	70km/h	SB	2m45s	57km/h
2	70km/h	NB	2m48s	56km/h
3	60km/h	SB	3m0s	52km/h
4	60km/h	NB	3m1s	52km/h
5	50km/h	SB	3m13s	49km/h
6	50km/h	NB	3m20s	47km/h

If a 60km/h speed limit was imposed for the section between Black Road and Chandlers Hill Road, the travel time loss would be between 20 and 30 seconds per trip (6% to 9%).

If a 60km/h speed limit was imposed for the section between Black Road and Oakridge Road, the travel time loss would be between 9 and 15 seconds (5% to 8%).

If a 60km/h speed limit was imposed for the section between Oakridge Road and Chandlers Hill Road, the travel time loss would be between 13 and 15 seconds (8% to 9%).

Extending the existing 60km/h zone by 3km to a point just south of Oakridge Road would have a minimal impact on travel times when compared to the 70km/h zone that currently exists in this section. Further, this section exhibits a casualty crash rate per vehicle kilometre travelled that is four times higher than other sections of Main Road.

Recommendation 1

Reduce the speed limit to 60km/h between Black Road and Oakridge Road.

Side roads and property access points

Between Black Road and Oakridge Road, 27 side road access points and five side roads were counted by the survey team. Two of these side road access points are no through roads for the purpose of allowing local property access.

Many of these property access points enter Main Road at an angle and have minimal sight distance for through traffic of the driveway, and for a driver exiting of oncoming traffic.

AusRAP star ratings

AusRAP star ratings have been calculated for discrete sites along Main Road that are typical of the overall road condition or highlight certain deficiencies. These ratings are 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 rating[4].

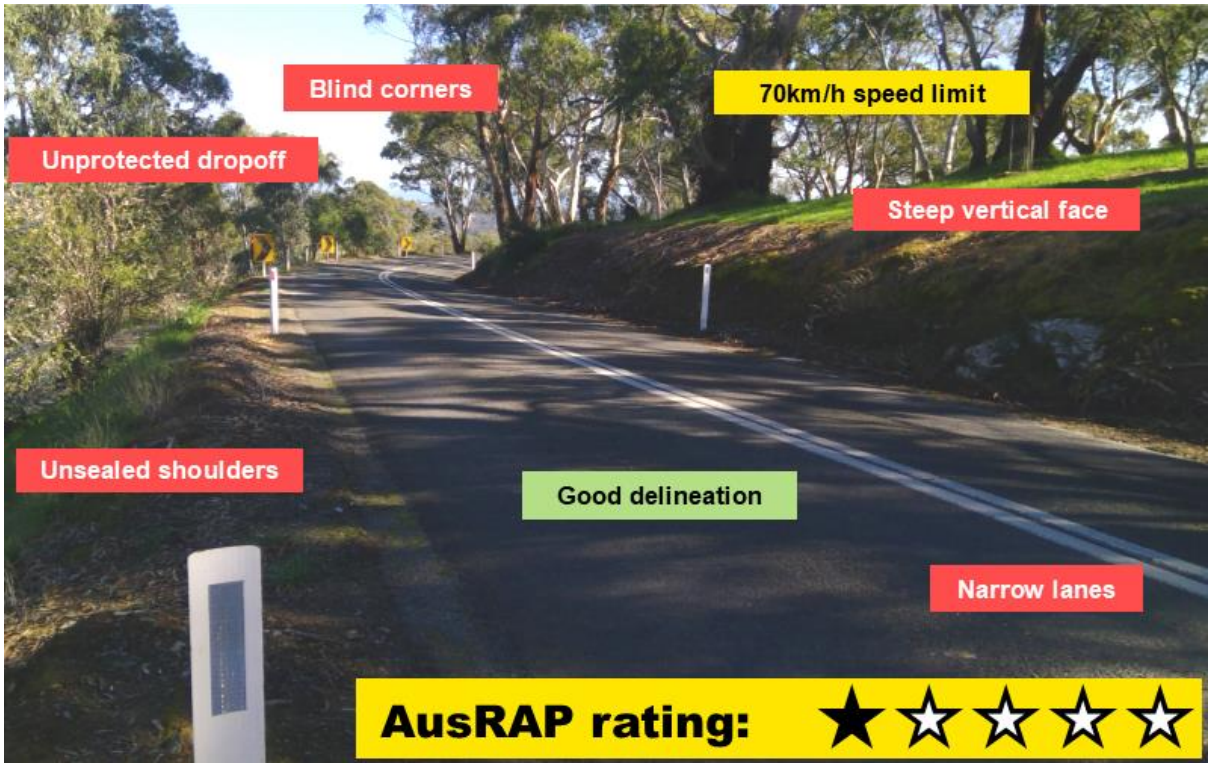
Table 8: Estimated reduction in fatalities and serious injuries with increases in AusRAP star rating (iRAP, 2020).

Star rating	Relative proportion of fatalities and serious injuries
1	1
2	0.6
3	0.36
4	0216
5	0.1296

Under the AusRAP star rating protocols, Main Road is currently rated as a one-star road, which is the lowest possible rating. This is mostly due to its very narrow geometry and unforgiving roadside geometry.

Figure 3: Typical star rating of Main Road

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



The section pictured could be improved to 2 stars by simply installing a metal safety barrier to protect the drop off on the outside of the curve, although this wouldn't improve the star rating for motorcyclists and cyclists as barriers still pose a hazard to vulnerable road users (however this can be mitigated by installing motorcycle underrun protection). Conventional road safety upgrades such as widening the lanes, sealing shoulders and completing required maintenance (reseal) would improve the rating to 3 stars on straight sections or moderate curves, whilst remaining at a maximum of one or two stars around most sharp curves. Whilst these upgrades would certainly improve safety, for most sections of the road there is not enough space to adequately widen lanes or shoulders without substantial prior investment in earthworks and vegetation removal.

A reduction in speed limit from 70km/h to 60km/h would increase the star rating to two stars as a standalone project, and three stars when undertaken in conjunction with barriers and pavement rehabilitation. Whilst these upgrades would increase star rating on straight or moderately curving sections, most curves on this section of Main Road would be considered 'sharp' (radius 200m-400m and can only be driven between 40km/h-70km/h) or 'very sharp' (radius <200m and can only be driven less than 40km/h) and maintain a one or two star rating if a barrier were to only be installed on one side of the road. These curves would require barriers to protect hazards on both sides of the carriageway and some localised road widening to receive a three-star rating at 60km/h. Improvements to sight distance around curves would also improve the current star rating.

Other comments

Other issues on Main Road include deteriorating pavement with potentially poor skid resistance which creates safety issues, especially for motorcyclists and cyclists.

Recommendation 2

Reseal the road, widening the sealed carriageway where possible, especially at curves.

Roadside hazards are prominent along the route in various forms including trees/vegetation, rock faces, and steep drop offs. These are all located in very close proximity to the road edges, in many cases with less than one metre clearance.

Figure 4: Deteriorating pavement and roadside hazards on Main Road

There is a noticeable lack of barrier protection along this section of Main Road, and there is space on the road edges to install additional barriers and reduce crash severity in the event a crash occurs. Whilst some sections are very narrow, cantilever barriers may be suitable to maximise road width similar to barriers installations on other sections of Main Road. It is critical that all new barrier sections are fitted with motorcycle underrun protection.

Recommendation 3

Remove roadside hazards where possible and install additional safety barriers including motorcycle underrun protection.

It is also noted that guide posts, whilst important to delineate the carriageway, are usually located very close to road edges which may be causing drivers to shy away from them and straddle the centre line. Where possible, guide posts should be located further from road edges, although this isn't always achievable due to the roadside environment.

Recommendation 4

Review and adjust guide post placement where possible, aiming to widen the visual appearance of the carriageway.

Sight distance around curves can also be improved by clearing and maintaining vegetation on the inside of curves such that oncoming vehicles are visible from a further distance which is critical on a road this narrow, particularly for approaching trucks and buses that find it challenging to keep left of the centre line at all times.

Recommendation 5

Clear and maintain clearance of vegetation along curves to maximise sight lines to approaching traffic.