



Yorke Peninsula

Regional Road Assessment
April 2019



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RAA

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9/4/2019

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Revision History

Revision	Date	Author/s	Approved By	Comment
V1.0	24/1/19	MV/AC		Draft for comment.
V1.1	8/2/19	MV/AC		Draft for comment.
V1.2	25/2/19	MV/AC		Draft for final comment.
V1.3	9/4/19	MV/AC	CM	Final edits and approval.
V1.4	11/4/19	MV/AC	AG	Brand approval.

Executive Summary

RAA's Road Safety team periodically evaluates the South Australian regional road network. This assessment of the Yorke Peninsula region reviews the road network within five Yorke Peninsula councils, namely Adelaide Plains Council, Barunga West Council, Copper Coast Council, Wakefield Regional Council and Yorke Peninsula Council. The selection of roads and locations investigated is largely guided by the foremost concerns of RAA members in the region.

RAA consulted the community through an extensive survey of Yorke Peninsula members that was also open for public comment. In addition, a stakeholder consultation meeting was held in Kadina on 14 September 2018 prior to the commencement of the road assessments. Representatives from all five councils, Yorke Peninsula Tourism, Primary Industries and Regions SA (PIRSA), Regional Development Australia (RDA) and Fraser Ellis MP's office were in attendance. During this meeting, RAA discussed the purpose of the assessment with Yorke Peninsula crash statistics and sought feedback from attendees regarding the assessment and issues in the region.

RAA's Road Safety team then undertook five days of traffic and road assessments covering a distance of approximately 2,500 kilometres. These traffic and road assessments took place in late September and early October 2018.

The member survey identified key transport issues in the Yorke Peninsula region, namely:

- Difficulties using infrequent community transport services
- Shared paths required to provide safer cycling and walking between townships
- Safety concerns regarding the current b-double routes on some roads
- A lack of general maintenance on roads throughout the region

As a result of our investigations and community feedback, the RAA Road Safety team have identified some key areas of improvement and further investigation that are required in the Yorke Peninsula region including:

- Staged duplication of the Augusta Highway between Port Wakefield and Port Augusta.
- Installation of at least three additional overtaking lanes on the Copper Coast Highway.
- Road reconstruction, widening and reseal on Spencer Highway between Maitland and Minlaton.
- Widening of Upper Yorke Road between Kulpara and Maitland.
- Sealing of North Coast Road between Point Turton and Point Souttar.
- Shoulder sealing on Yorke Highway between Ardrossan and Marion Bay.
- An increase to annual maintenance funding on Port Wakefield Road.
- A review of community transport services in the Yorke Peninsula.

Notes

Note on Crash Data

Unless otherwise specified, all crash data discussed in this report refers to casualty crash data between the years 2013 and 2017 inclusive. For the purposes of this report, a casualty crash is defined as any crash that results in minor injuries, serious injuries or fatality. Crashes resulting in only property damage have been omitted from the broader analysis, however they were reviewed in local areas when required for the purposes of our investigations.

Not all crashes within the crash database include detailed coordinates specifying the location. Crash information shown on maps will only show crashes where coordinates are included. Therefore, crashes without location data will not be included in the visual analysis. Crashes without location information only make up a small portion of all crashes. For the 605 casualty crashes within the five Yorke Peninsula Councils, only three do not include coordinates.

Note on Traffic Volumes

Current estimated traffic volumes (AADT) quoted on state maintained roads in this report have been sourced through Data SA and these values generally refer to DPTI surveys conducted between 2014 and 2017. The 2007 AADT values quoted throughout this report refer to DPTI rural traffic volume estimate maps released in 2007.

List of Abbreviations

AADT

Average Annual Daily Traffic

APC

Adelaide Plains Council

ATLM

Audio Tactile Lime Marking

BWC

Barunga West Council

CAM

Chevron Alignment Marker

CCC

Copper Coast Council

DIRDC

Department of Infrastructure, Regional Development and Cities

DPTI

Department of Planning Transport and Infrastructure

RRPM

Retroreflective Raised Pavement Marker

WRC

Wakefield Regional Council

YPC

Yorke Peninsula Council

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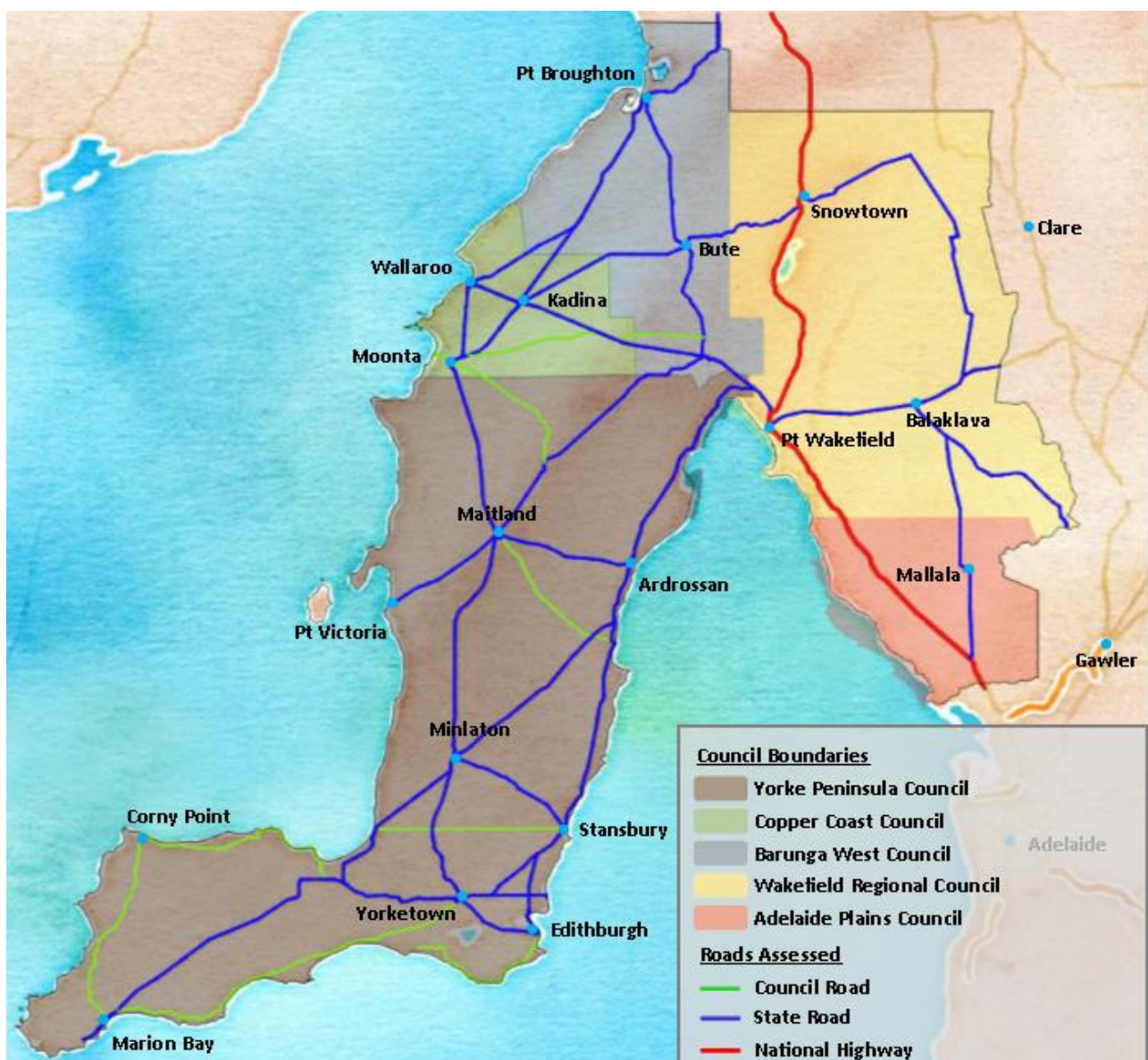
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Background

The RAA Road Safety team periodically evaluates the South Australian regional road network. This assessment of the Yorke Peninsula region covered approximately 2,500 kilometres of the region's road network made up of more than 40 roads and intersections over five days during September and October 2018. RAA last assessed the major transport corridors on the Yorke Peninsula in 2014, with most of these reviewed in the current report.

RAA consulted with local road authorities and regional stakeholders, along with sending a detailed survey to 6,500 RAA members in the Yorke Peninsula region. We sought information on locations that were deemed unsafe or inefficient and other mobility issues in the region such as active transport, community transport and challenges for freight operations.

The area assessed is shown in the map below and is defined by the combined boundaries of the five Yorke Peninsula Councils, namely Adelaide Plains Council, Barunga West Council, Copper Coast Council, Wakefield Regional Council and Yorke Peninsula Council.



The roads and locations assessed are listed in **Appendix A** in alphabetical order.

Recommendations

General Recommendations	Authority
Following on from the effectiveness and positive community feedback of the Upper Yorke Peninsula Regional Road Network Upgrade Program, a package of works targeting the southern Yorke Peninsula region should be considered to target the issues specified within this report.	DPTI
The feasibility of a shared path network should be investigated for the region to provide better cycling and active transport connectivity between townships in the Yorke Peninsula and surrounds, particularly those north of Moonta and inland that are not serviced by the 'Walk the Yorke' trail. Where possible, previous rail corridors should be considered and utilised.	All
Community transport schemes should be reviewed in the region, with an aim to provide better access for those using the services, and creating additional awareness of the services on offer.	All
The shoulder sealing process should be reviewed on a case by case basis to ensure the join is not in the wheel path and does not have a negative impact on drainage, especially on freight routes. DPTI specifications should be updated to reflect this, where necessary.	DPTI
The placement of D4-1-1 'unidirectional hazard markers' should be reviewed across the Yorke Peninsula road network, and where they have been used to delineate curves, are replaced with CAMs, installed as specified in AS1742.2 (2009).	DPTI
Port Wakefield Road	
<ul style="list-style-type: none"> Review guide post delineators and replace where necessary to ensure satisfactory delineation. 	DPTI
<ul style="list-style-type: none"> As a priority, reseal of the left hand northbound lane near Windsor, and the left hand southbound lane between Lower Light and Porter Road. 	DPTI
<ul style="list-style-type: none"> <u>Port Wakefield duplication and overpass</u> <ul style="list-style-type: none"> Provide convenient and clearly signed off-street parking with some allocation of space to long vehicle combinations. Ensure pedestrian movements are safe and controlled, and minimise the need for pedestrians to cross the road Consider construction of a link road between the overpass and Balaklava Road rather than a dual lane roundabout on Port Wakefield Road Ensure bridge spans are sufficient to cater for future duplication of Augusta Highway Explore concepts to remove all at-grade right turns at the intersection 	DPTI/WRC
<ul style="list-style-type: none"> <u>Intersection with Mallala Road</u> <ul style="list-style-type: none"> Extend all acceleration and deceleration lanes. Duplicate R1-2 'give way' sign on Mallala Road. Refresh line marking. 	DPTI

Augusta Highway	
<ul style="list-style-type: none"> Plan for and progressively duplicate Augusta Highway. <ul style="list-style-type: none"> Consult with local councils early on in the design process such that they are able to budget for and arrange complementary works along the corridor. 	DPTI
<ul style="list-style-type: none"> Remediate uneven pavement between Snowtown and Redhill. 	DPTI
<ul style="list-style-type: none"> Review 80km/h speed limit in Lochiel with consideration to pedestrian safety and expected vehicle compliance. 	DPTI/WRC
Copper Coast Highway	
<ul style="list-style-type: none"> Install ATLM on the remaining sections lacking this treatment west of Kulpara. 	DPTI
<ul style="list-style-type: none"> Repair undulations west of Kulpara. 	DPTI
<ul style="list-style-type: none"> Reseal or reconstruct (if necessary) the section west of Beare Street, Wallaroo. 	DPTI
<ul style="list-style-type: none"> Install a minimum of three new overtaking lanes. 	DPTI
<ul style="list-style-type: none"> <u>Intersection with Upper Yorke Road</u> <ul style="list-style-type: none"> Refresh line marking, install continuity edge line on Copper Coast Highway, and install RRPMS Consider barrier protection for the culvert on the southwestern corner 	DPTI
<ul style="list-style-type: none"> <u>Five-way Intersection with Athena Drive</u> <ul style="list-style-type: none"> Refresh line marking and install continuity edge lines to delineate the priority path through the intersection 	DPTI
Upper Yorke Road	
<ul style="list-style-type: none"> Seal shoulders to a desirable minimum of 1.0m for the remaining sections without sealed shoulders (approximately 75km). 	DPTI
<ul style="list-style-type: none"> Replace incorrectly used D4-1-1 'unidirectional hazard markers' with D4-6 'chevron alignment markers' as specified in AS1742.2. 	DPTI
<ul style="list-style-type: none"> <u>Port Broughton to Bute</u> <ul style="list-style-type: none"> Consider full re-seal, with local rut and undulation repairs required as a minimum. Increase lane widths to 3.3m 	DPTI
<ul style="list-style-type: none"> <u>Kulpara to Maitland</u> <ul style="list-style-type: none"> Full reseal between Kulpara and Maitland including widening, shoulder seal and edge lines. Increase lane widths to 3.3m 	DPTI

Yorke Highway	
▪ Seal shoulders between Ardrossan and Marion Bay to a width of 1.0m.	DPTI
▪ Install ATLM to combat inattention and fatigue related crashes	DPTI
▪ Review 90km/h speed limit in Marion bay with consideration given to reducing the speed limit during peak tourism season.	DPTI
▪ <u>Intersection with Beach Road (Hardwicke Bay)</u> <ul style="list-style-type: none"> ○ Remove/Maintain vegetation on the inside of the curve ○ Construct protected left and right turn lanes ○ Install RRPM's and refresh line marking ○ Install R1-2 'give way' sign on Beach Road 	YPC/DPTI
▪ Consider widening of shoulder seal between Marion Bay and Innes National Park	YPC
Spencer Highway	
▪ <u>Port Pirie to Port Broughton</u> <ul style="list-style-type: none"> ○ Seal shoulders to 1.0m each side of Port Broughton for the sections where they are not currently sealed. ○ Review drainage and undertake remediation measures to prevent water ponding in the wheel paths. ○ Consider widening of the Broughton River Bridge. 	DPTI
▪ <u>Port Broughton to Wallaroo</u> <ul style="list-style-type: none"> ○ Install barrier protection where the edge drop off exceeds 2 metres, with curves treated as a priority. ○ Install a dedicated right turn lane for southbound vehicles at the intersection with Port Broughton Road. 	DPTI
▪ <u>Wallaroo to Moonta</u> <ul style="list-style-type: none"> ○ Review route marking signage through Wallaroo. ○ Seal shoulders to 1.0m. ○ Undertake rut filling in most prominent sections. ○ Consider reseal for approximately 500m, south of Warburto Road. ○ Refresh line marking at the intersection with Mines Road, in Moonta. 	DPTI
▪ <u>Moonta to Maitland</u> <ul style="list-style-type: none"> ○ Seal shoulders to 1.0m on approximately 20km of this section without sealed shoulders. ○ Increase lane width to minimum 3.3m. ○ Local repairs to edge breakup (will be addressed with shoulder seal). ○ Consider reseal for 10km, north of Maitland. 	DPTI

<ul style="list-style-type: none"> ▪ <u>Maitland to Minlaton</u> <ul style="list-style-type: none"> ○ Reconstruct road for five kilometres, south of Maitland, and reseal other uneven sections of carriageway where full reconstruction is not required. ○ Increase lane width to minimum 3.3 metres. ○ Seal shoulders to one metre on approximately 30 kilometres of this section without sealed shoulders, and consider widening shoulders in other locations. 	DPTI
St Vincent Highway	
<ul style="list-style-type: none"> ▪ <u>Pine Point – Port Giles</u> <ul style="list-style-type: none"> ○ Install at least one overtaking lane in each direction. ○ Consider widening shoulder seal to one metre wide. 	DPTI
<ul style="list-style-type: none"> ▪ <u>Port Giles – Edithburgh</u> <ul style="list-style-type: none"> ○ Install one metre wide sealed shoulders. ○ Roadside hazard removal or protection. 	DPTI
<ul style="list-style-type: none"> ▪ <u>Edithburgh - Yorketown</u> <ul style="list-style-type: none"> ○ Widen lanes to 3.3 metres between Edithburgh and Troubridge Hill Road. ○ Seal shoulders to one metre wide between Edithburgh and Troubridge Hill Road. 	DPTI
<ul style="list-style-type: none"> ▪ <u>Yorketown - Warooka</u> <ul style="list-style-type: none"> ○ Install one metre wide sealed shoulders. 	DPTI
Owen Road	
<ul style="list-style-type: none"> ▪ As a priority, repair the failed 800 metre section between Stockyard Road and Alma Road. 	DPTI
<ul style="list-style-type: none"> ▪ For the 20 kilometres between McKenzie Road and Traeger Road, seal shoulders to one metre and widen lanes to 3.3 metres. 	DPTI
<ul style="list-style-type: none"> ▪ Undertake localised pavement rehabilitation for other failing sections of the road. 	DPTI
<ul style="list-style-type: none"> ▪ Review roadside vegetation maintenance schedule to ensure roadside safety features are not concealed. 	WRC
<ul style="list-style-type: none"> ▪ Adopt RAA's 2017 recommendations for Owen Road, south of Hamley Bridge. 	DPTI
Balaklava Road	
<ul style="list-style-type: none"> ▪ East of Balaklava, widen clear zone where possible or install additional barrier protection for roadside hazards. 	DPTI/WRC
<ul style="list-style-type: none"> ▪ Protect stobie poles between Balaklava and Port Wakefield. 	DPTI
<ul style="list-style-type: none"> ▪ Refresh line marking at the intersection with Gwy Terrace in Balaklava and consider this intersection for future safety upgrades. 	DPTI

Mallala Road	Authority
▪ Repair edge drop-off along the length of the road by building up the level of the unsealed section of the shoulder.	DPTI
▪ Install CAMs to delineate the curve at Two Wells.	DPTI
▪ Rehabilitate surface between Mallala and Korunye.	DPTI
▪ Install RRPMS to delineate edge and centre lines in wet weather.	DPTI
▪ Review vegetation maintenance scheme along Mallala Road to ensure long grasses do not conceal warning signs and delineation devices.	APC
Traeger Road	
▪ Consider installing ATLM due to fatigue related crashes.	DPTI
▪ Localised surface rehabilitation and resealing	DPTI
Bute Road	
▪ Seal shoulders to one metre wide.	DPTI
▪ Widen clear zone to minimum three metres.	DPTI/BWC
▪ Review and update intersection warning signs.	DPTI
▪ Review signage at Willamulka Road intersection and replace W2-1 'crossroad' signs with W2-11 'successive side road intersections' signs.	DPTI
Harry Butler Road	
▪ Widen lanes to 3.3 metres.	DPTI
▪ Install one metre wide sealed shoulders.	DPTI
▪ Consider application of ATLM to combat inattention related crashes.	DPTI
Stansbury Road	
▪ Seal shoulders to one metre wide.	DPTI
▪ Consider widening lanes to 3.3 metres wide and sealing shoulders	DPTI
▪ Barrier protection for stobie poles between Yorketown and Pt Giles Road.	DPTI
▪ At the intersection with Port Giles Road: <ul style="list-style-type: none"> ○ Test skid resistance on all approaches, and remediate as necessary. ○ Refresh line marking and reinstall RRPMS. ○ On the southbound approach, install R1-2 'give way' signs and duplicated W3-2 'give way sign ahead' signs with 200m and 400m distance plates. ○ On the eastern and western approaches, install W2-4 'side road intersection' warning signs. ○ Widen and extend the left turn lane for eastbound vehicles turning left to continue northeast on Stansbury Road. 	DPTI

North Coast Road	
<ul style="list-style-type: none"> Seal North Coast Road to 6.6 metres and strongly consider concurrent shoulder sealing to a minimum width of 0.5 metres to provide a 7.6 metre wide sealed carriageway. 	YPC
<ul style="list-style-type: none"> Improve and update curve and intersection warning signs. 	YPC
<ul style="list-style-type: none"> Improve delineation by installing guide posts at regular 150 metre intervals and at more regular intervals around curves and over crests as specified in AS 1742.2 (2009). Consider CAMs as an additional delineation measure on tighter curves. 	YPC
<ul style="list-style-type: none"> At the intersection with Point Souttar Road: <ul style="list-style-type: none"> Relocate and duplicate W1-1 'turn' sign on westbound approach. Install D4-6 'chevron alignment markers' on both approaches as specified in AS 1742.2 (2009). Improve skid resistance. Consider sealing the corner as a priority whilst funding is sourced for the remainder of North Coast Road. 	YPC
Other Roads	
<ul style="list-style-type: none"> On Condowie Plain Road, in the longer term – widen lanes and shoulders to 3.3 metres and one metre respectively. 	DPTI
<ul style="list-style-type: none"> On Rail Corridor Road, seal shoulders between Blyth and Benbournie Road. 	DPTI
<ul style="list-style-type: none"> On Blyth Plains Road; <ul style="list-style-type: none"> Undertake rehabilitation works as a priority. Adopt previous RAA recommendations to install one metre wide sealed shoulders and additional w-beam barrier protection. 	DPTI
<ul style="list-style-type: none"> On Barunga Gap Road; <ul style="list-style-type: none"> Install W2-3 't-intersection, straight approach' signs with '200m' and '400m' supplementary plates at the intersection with Augusta Highway. In the longer term, seal shoulders, provide barrier protection for roadside hazards and drop offs, and improve curve delineation. 	DPTI
<ul style="list-style-type: none"> On Port Broughton Road; <ul style="list-style-type: none"> Seal shoulders to one metre wide for remaining sections. Repair the undulations occurring seven kilometres south of Spencer Highway intersection. 	DPTI
<ul style="list-style-type: none"> On Mines Road; <ul style="list-style-type: none"> Install ATLM to combat fatigue and inattention related crashes. Pavement rehabilitation and shoulder sealing for the 1.3 kilometre section between South Terrace and Martinga Road, in Kadina. Consider installing an overtaking lane in each direction. 	DPTI

<ul style="list-style-type: none"> ▪ On Thrington Road; <ul style="list-style-type: none"> ○ Install edge lines and refresh centre line marking east of the intersection with Kadina – Cunliffe Road. 	CCC
<ul style="list-style-type: none"> ▪ On Port Victoria Road, seal shoulders to a desirable one metre wide (minimum 0.5 metres). 	DPTI
<ul style="list-style-type: none"> ▪ On Port Giles Road, seal shoulders between Stansbury Road and St Vincent Highway as a longer term goal. 	DPTI
<ul style="list-style-type: none"> ▪ On Point Turton Road; <ul style="list-style-type: none"> ○ Install CAMs to delineate the two opposing curves between Little Sheoak Road and Yorke Highway. ○ Install a W3-2 't-intersection, straight approach' sign on approach to Yorke Highway. ○ In the longer term, install minimum 0.5 metre wide shoulder seal. 	YPC
<ul style="list-style-type: none"> ▪ On Marion Bay Road, refresh centre line marking and consider painting edge lines to further delineate the carriageway. 	YPC
<ul style="list-style-type: none"> ▪ On Arthurton Road; <ul style="list-style-type: none"> ○ Localised Pavement rehabilitation between Agery Road and Arthurton. ○ Monitor and repair edge drop-off. ○ Review and update intersection warning signage. ○ Install Guide Posts between Pedler Road and Moonta. ○ Seal shoulders as a longer term priority. 	YPC/CCC
<ul style="list-style-type: none"> ▪ On South Coast Road, use CAMs to delineate tighter curves. 	YPC
<ul style="list-style-type: none"> ▪ On Corny Point Road; <ul style="list-style-type: none"> ○ Grade poor sections of the road and bring in additional surface material where required to form a crown and improve runoff. ○ Install guide posts to delineate the edges of the carriageway. ○ Update outdated W2-1 'crossroad' warning signs to conform to current Australian Standards. 	YPC
<ul style="list-style-type: none"> ▪ On Pine Point Road; <ul style="list-style-type: none"> ○ Install W3-2 'give way sign ahead' on the westbound approach to Yorke Highway. ○ Update outdated W2-1 'crossroad' warning signs to conform to current Australian Standards. ○ Install guide posts along the length of the road to improve delineation, particularly at night. ○ Install W2-9 'side road intersection on a curve' signs on the approaches to McFarlane Road, and consider additional delineation improvements such as CAMs. 	YPC

<ul style="list-style-type: none"> ▪ On Cutline Road; <ul style="list-style-type: none"> ○ Install guide posts at regular intervals along the length of the road ○ Update outdated W2-1 'crossroads' warning signs to comply with current Australian Standards. ○ Install W3-2 'give way sign ahead' warning sign on the westbound approach to Harry Butler Road. ○ Cut back vegetation concealing give way ahead warning sign on the westbound approach to Yorke Highway. 	YPC
<ul style="list-style-type: none"> ▪ On the Edithburgh – Port Moorowie tourist drive: <ul style="list-style-type: none"> ○ Review maintenance schedules to address to formation of corrugations on Troubridge Point Drive, Heel Road and Wattle Point Road. ○ Consider additional tourist route signs to assist wayfinding ○ Consider installation of guide posts to delineate road edges 	YPC

Discussion and Survey Analysis

Member Sampling Frame

A total of 6,500 RAA members were invited by email to participate in the confidential online survey, along with a copy of the survey link forwarded to regional stakeholders for distribution.

A total of 970 responses were received, 747 directly from member engagement and a further 223 through external engagement opportunities. The majority of respondents were aged between 45 and 64 years (50.3%) and have resided in the region for 11+ years (63.4%).

Approximately 47% of survey respondents reside in the Yorke Peninsula Council, 31% reside in the Copper Coast Council, 7% reside in the Wakefield Regional Council, 6% reside in the Barunga West Council region, and 5% were residents of the Adelaide Plains Council (formally District Council of Mallala). Only 4% of respondents reported living outside of these five councils but they identify with the region i.e. own a holiday/rental property in the area, holiday in the area regularly.

Based on the number of responses received the confidence interval is within the acceptable range of less than $\pm 5\%$.

Confidence interval of survey responses

Yorke Peninsula Population	Sample Size (Members and Non-members)	Confidence Interval	Confidence Level
43,000	970 responses	$\pm 3.11\%$	95%

*The **confidence level** – accuracy at one point in time will provide how often the percentage of the population would choose a particular answer. When the confidence level is combined with the **confidence interval**, you can say that you are 95% sure that the true percentage of the population is between $\pm 3.11\%$. In addition the larger the sample size, the more you can be sure that the answers truly reflect the population.*

The Region

In 2016, the Australian Bureau of Statistics reported the population for the five combined councils as 43,341 inhabitants. These correspond to Adelaide Plains Council (8,801), Barunga West Council (2,544), Copper Coast Council (14,139), Wakefield Regional Council (6,801) and Yorke Peninsula Council (11,056).

The defined region covers an area of approximately 12,500 square kilometres, and the five councils are responsible for the maintenance of over 1,250 kilometres of sealed public roads and almost 9,000 kilometres of unsealed public roads. In addition, there are over 1,200 kilometres of sealed roads maintained by the Department of Planning, Transport and Infrastructure (DPTI) in the region, including Augusta Highway, a national highway of federal significance and funding allocated by the federal Department of Infrastructure, Regional Development and Cities (DIRDC).

Road Authority	Approx. Sealed Roads (kms)	Approx. Unsealed Roads* (kms)
Adelaide Plains Council	165	825
Barunga West Council	70	1045
Copper Coast Council	290	750
Wakefield Regional Council	210	2685
Yorke Peninsula Council	515	3440
Total Council Roads	1250	8745
State Government (DPTI)	1090	<1
Federal Government (DIRDC)	132	<1
Total	2470	8745

*Includes formed and unformed roads

Key industries across the region include agriculture, forestry and fishing; construction; rental, hiring and real estate services; retail trade; and accommodation and food services¹.

Key Industries in the Yorke Peninsula
Agriculture, forestry and fishing 36%
Construction 12%
Rental, hiring and real estate services 11%
Retail trade 8%
Accommodation and food services 5%

Mobility Profile

Cars and mobility are very important to our members. When asked about their driving habits, the majority of respondents indicated they drive everyday (58%) or 5-6 days per week (23%). Residents in Barunga West Council (71%) and Yorke Peninsula Council (77%) were slightly less likely to drive 5+ days per week compared to respondents from the other council regions (>80% of respondents).

The majority of respondents travel outside of their council area more than once per week (56%), with the most common reasons being for 'work' (28%), to 'visit family/friends' (23%), 'health/medical appointments' (19%) and 'shopping' (17%).

Of those who reported using alternative forms of transport (37%), the majority use their alternative transport regularly (56% indicated more than once per week). The most popular forms of alternative transport reported were bicycle (33%), truck (24%) and motorcycle (20%).

Road Maintenance

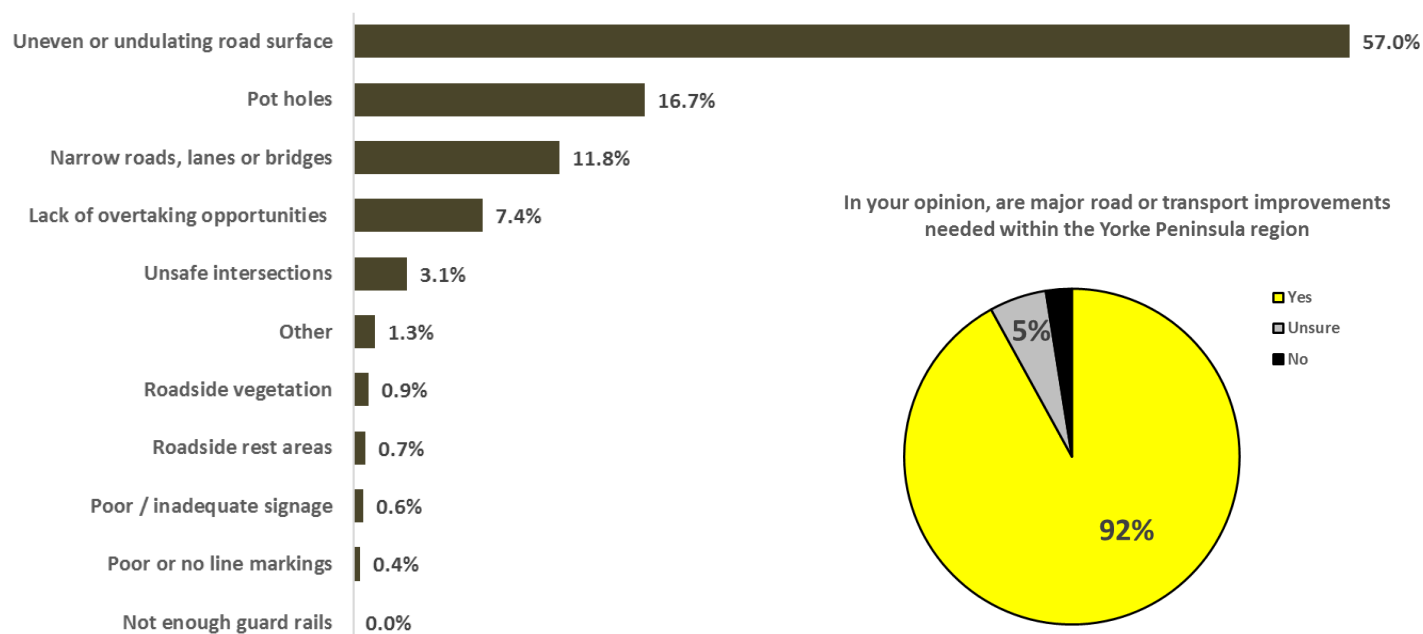
In response to whether roads in the region are maintained to an acceptable standard, 77% of respondents disagreed and only 7% of respondents considered the regions roads to be maintained at an acceptable level. The average agreement rating across all respondents was 2 out of 5 (where 5 = 'Strongly agree that roads are maintained to an acceptable standard'), and this same average score was seen across each council region. Furthermore, 92% of respondents feel that major improvements are needed within the region to improve the road/transport conditions.

When asked to select the most concerning road maintenance issue within the region, 57% of respondents selected 'uneven or undulating road surface' as their biggest concern. This was

¹ Australian Bureau of Statistics, 2015, Yorke Peninsula: Region Data Summary, <<http://stat.data.abs.gov.au/>>.

followed by 'pot holes' (17%), 'narrow roads, lanes or bridges' (12%), 'lack of overtaking opportunities' (7%) and 'unsafe intersections' (3%).

Most concerning road issue in the Yorke Peninsula



Those who indicated that road improvements were needed in the region were asked to provide more information. Some common themes emerged, particularly in regards to narrow roads, unsealed edges and sharing the road. These comments are summarised below.

- *Hardwicke Bay – slip lane required on Yorke Highway to turn into township (Beach Rd).*
- *St Vincent Highway, Edithburgh to Yorketown - narrow roads with deep drop off sides. Oncoming traffic needs to run off the side of the road when caravans and trucks pass.*
- *Yorketown – pedestrian crossing facilities/speed reduction required in town centre.*
- *Upper Yorke Road/Spencer Highway, Arthurton - Maitland – Minlaton. Edges need to be sealed, narrow road and uneven surface.*
- *Marion Bay - Speed reduction through township, currently 90 km/h on Yorke Highway.*
- *Harry Butler Rd, Yorketown to Minlaton – too narrow.*
- *Use of Coastal Way by Road Trains should be reconsidered.*

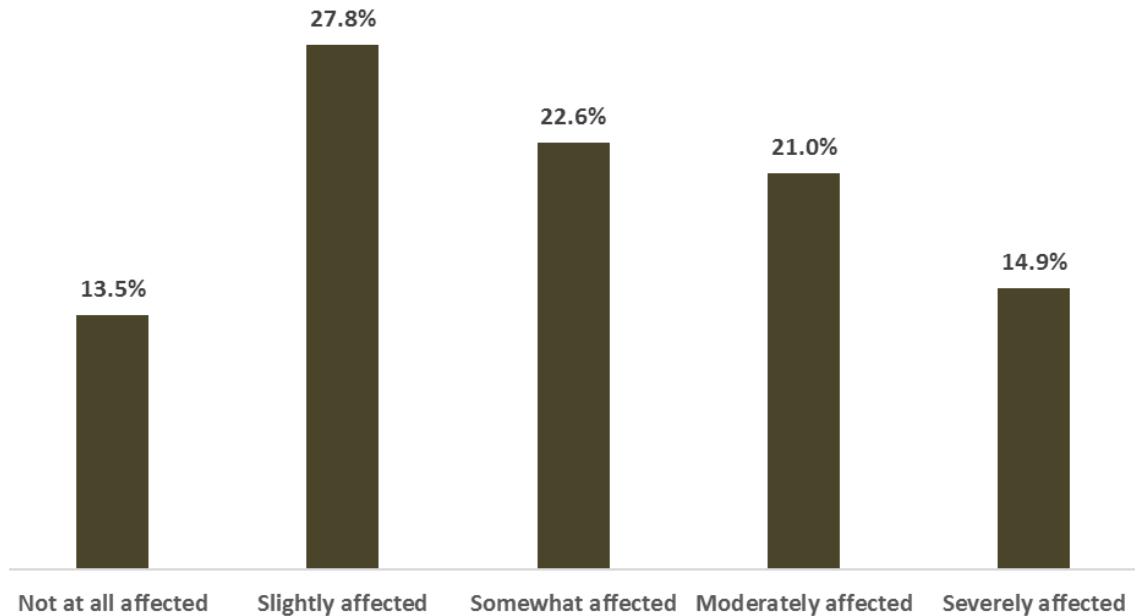
Unsealed Roads

There are almost 9,000 kilometres of unsealed roads across the Yorke Peninsula region which form a vital part of the road network, with many of these subject to a relatively high volume of seasonal traffic. Motorists driving these roads have varying degrees of experience when it comes to driving in unpredictable road conditions, highlighted particularly in popular tourist locations such as Point Turton or Moonta.

When asked about the impact of bad weather on their mobility across unsealed roads in the region, 36% of respondents reported being moderately to severely affected, 50% were slightly to somewhat affected, while only 14% reported not being affected at all. There were no

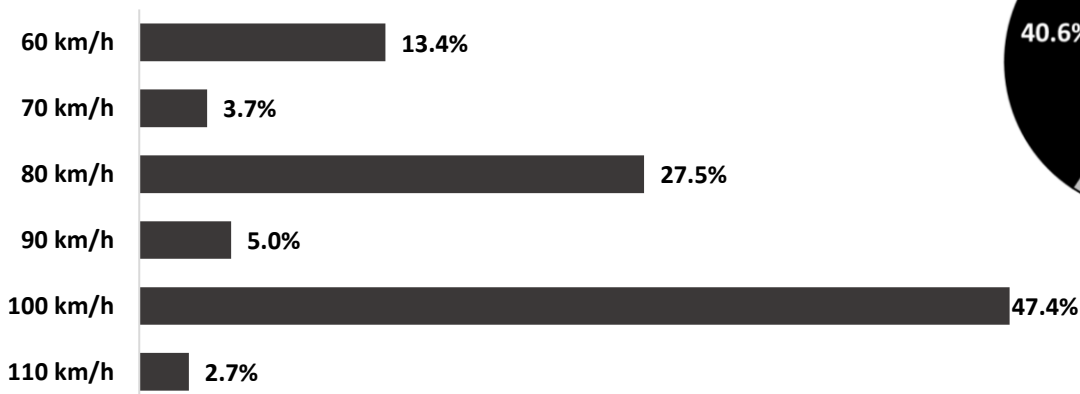
significant differences in response by council area, with all areas having an average score of 3 out of 5 (which equates to 'somewhat affected').

To what extent does bad weather negatively affect your mobility on the region's unsealed road network?

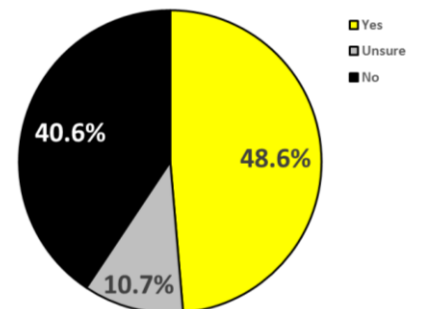


Unsealed roads are subject to a default speed limit of 100 km/h; however, 53% of respondents were not aware of this, with 3% citing a higher speed (i.e. 110 km/h) and 50% citing more than 20 km/h below the speed limit. A subsequent question was asked to gauge support for a blanket speed reduction to 80 km/h on unsealed roads. Responses for and against were relatively evenly split, with 49% supporting a speed reduction and 41% opposed to a reduced speed.

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

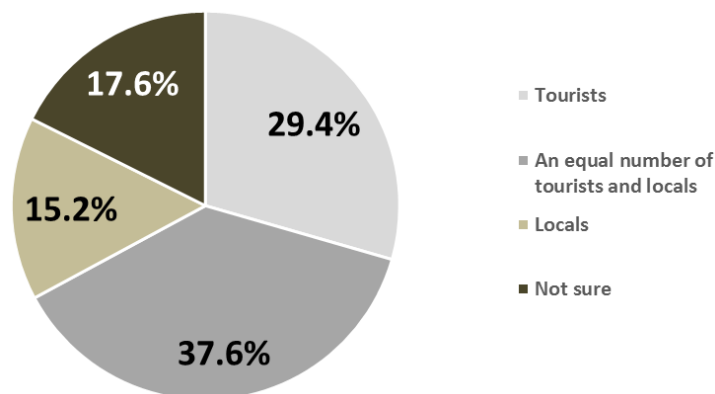


Would you support a blanket speed reduction to 80 km/h on all unsealed roads?



Residents were asked whether they believed locals and/or tourists would be involved in the majority of crashes on unsealed roads in the region, to which 37.6% believed an equal number of tourists and residents contributed to these incidents. This was followed by approximately 30% of respondents who feel tourists are more likely to be involved in crashes on the unsealed road network. This highlights a general perception within the region of the higher crash risk for tourists. An analysis of crash data does not support this perception, and further analysis on the difference with local and visitor drivers involved in crashes can be found in the 'Crash Statistics' section of this report.

Who do you believe is involved in the majority of crashes on unsealed roads in the region?



Survey respondents were given the opportunity to identify specific unsealed roads which should be considered for sealing. While many comments related to the safety issues presented by unsealed roads, a number of comments were made regarding accessibility issues for tourists which detract from increasing tourism in the region.

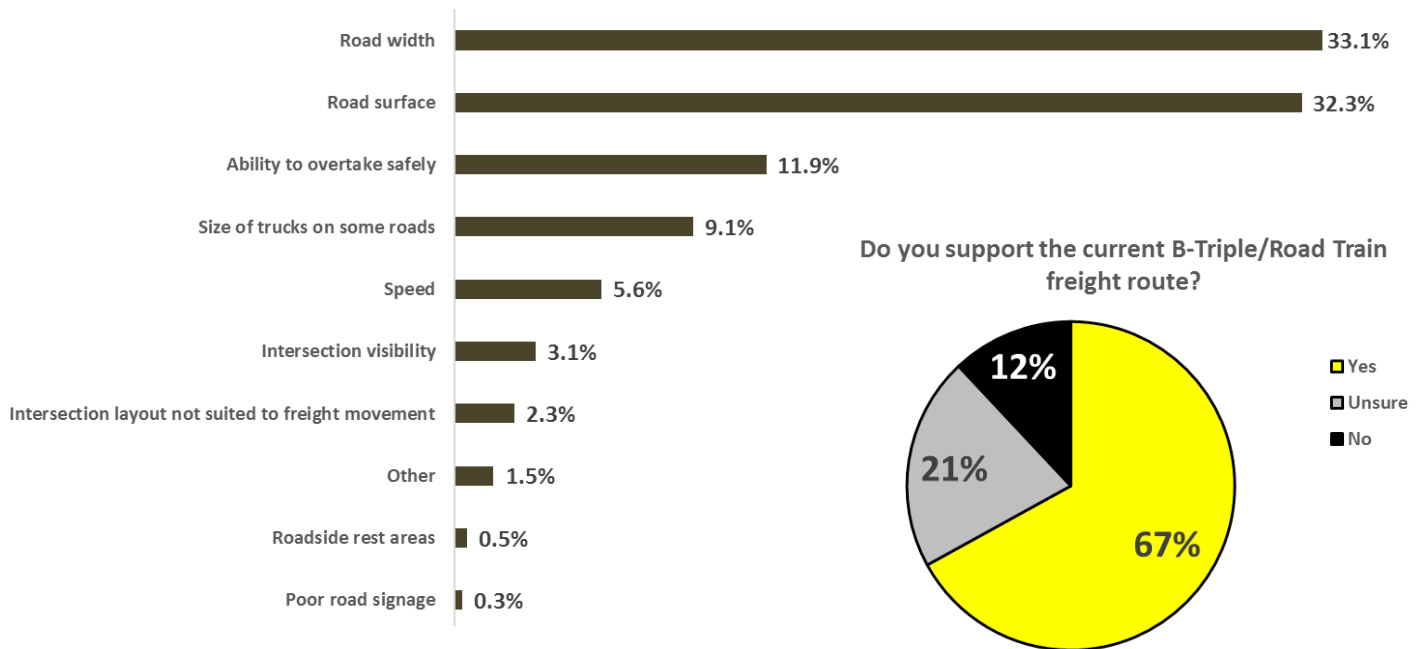
Key unsealed roads and locations identified by survey respondents include:

- *North Coast Road*
- *The southern coastal road going past Troubridge Point Lighthouse – A tourist spot which is currently unsuitable for caravans, motorhomes and hire cars to visit.*
- *Cutline Rd (Stansbury to Hardwicke Bay).*
- *Corny Point to Point Turton.*
- *The roads leading to the wind farm near Edithburgh are tourist lane ways and should be considered for an upgrade.*
- *Pine Point Road.*
- *Lack of regular maintenance on the dirt roads is a major concern, particularly when the roads are not graded/maintained for more than 12 months. Some bus routes are also tourist routes, but maintenance is not performed during the school year which makes travelling dangerous for a regulated school route.*

Freight Transport

The most significant concern for residents regarding freight movement within the region was 'road width' (33%), followed by 'road surface' (32%), 'ability to overtake safely' (12%) and 'the size of trucks on some roads' (9%).

Main concerns related to freight movement within the region



Further insight was sought into the b-triple freight route, with 67% of respondents indicating their support for the current route. Only 12% of respondents indicated they didn't support the route, who were then given the opportunity to provide comment regarding their concerns. The following responses are indicative of the overall responses received:

- *The roads are not suitable for large trucks, they throw up lots of gravel because they can't stay on the bitumen.*
- *Grain trucks on high traffic routes with narrow and uneven road surfaces.*
- *B-triples are too big for most of the road system in the region.*
- *Bitumen roads are not able to handle the weight of b-triples. The roads are too narrow and not enough maintenance is done on the roads that these trucks use.*
- *The route needs to be extended to take in the other side of the peninsula as well.*
- *There's not enough space to overtake and the speed is too slow at 100km/h, it needs to be 110km/h.*
- *The route doesn't cover enough roads on the Yorke Peninsula.*
- *The roads do not appear to accommodate both freight route and passenger movements.*
- *It is a very high tourist traffic area.*

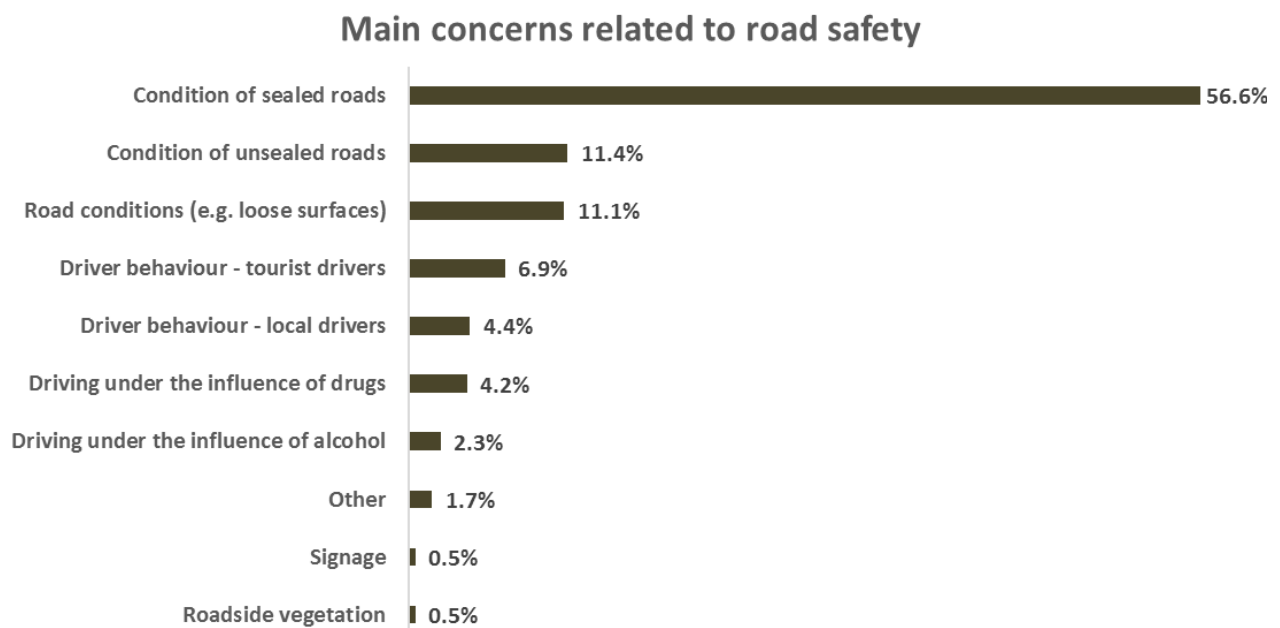
If the road network is designed to safely accommodate b-triples and road trains, these vehicles are more efficient and require less vehicle movements to transport the same amount of product. These vehicles have less of a detrimental impact on an appropriately designed road network overall when compared to multiple smaller freight vehicles carrying the same load. The most important factors to consider for heavy vehicle routes are turn paths, road width and infrastructure such as bridges and overtaking lanes to facilitate safe interactions with other vehicles.

Comments were also received from respondents regarding locations where challenging interactions with freight vehicles were observed. The following list contains a summary of the key roads mentioned in the survey:

- *St Vincent Highway – the road is not wide enough and the edges are damaged making the trucks sit a little closer to the line.*
- *Copper Coast Highway/Augusta Highway – drivers turning right think they have right of way and they do not. They pull in front of trucks and often don't even look.*
- *Copper Coast Highway/Yorke Highway intersection – b-double trucks cannot safely turn in the roundabout.*
- *Upper Yorke Rd – between Maitland and Artherton. Narrow road with unsealed edges.*

Road Safety

Road safety is everyone's responsibility, and it incorporates a number of factors such as road conditions, road maintenance and human involvement. Within the Yorke Peninsula, the 'condition of sealed roads' was the biggest road safety concern for 56% of respondents. Other safety concerns included 'condition of unsealed roads' (11%), 'road conditions e.g. loose surfaces, sight distance at junctions' (11%), 'driver behaviour – tourist drivers' (7%), and 'driver behaviour – local drivers' (4%).



Respondents were asked about topical safety issues within the region, specifically:

- congestion in and around Port Wakefield,
- improving safety at the Copper Coast and Augusta Highway intersection ("Crash Corner"), and
- recent upgrades to the road network (which include a roundabout at Federation Corner).

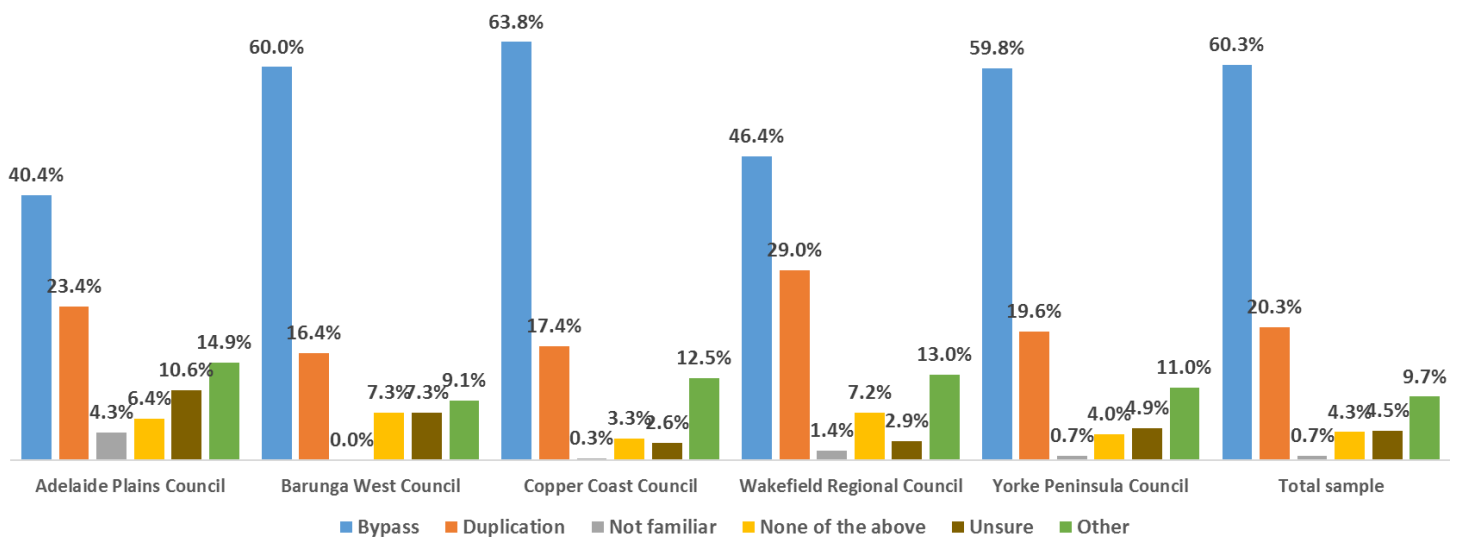
It is important to note that the announcement on August 30 2018 to duplicate the highway through Port Wakefield and construct an overpass at the intersection with Copper Coast

Highway was made mid-way through the survey; however, the majority of responses had been received prior to this announcement.

When asked their opinion on the best solution for resolving congestion issues at Port Wakefield, 60% of respondents felt a bypass of Port Wakefield township would be most suitable. Only 20% of respondents felt the duplication of Port Wakefield Road would provide an adequate solution. Responses for 'other' (10%) included: installation of traffic lights or a roundabout at the intersection, construction of both a bypass and road duplication through Port Wakefield, and reducing the speed limit near the current intersection.

Responses across each of the council areas followed a similar trend to the overall sample, however residents from Wakefield Regional Council were the most supportive of the road duplication when compared to residents from other areas.

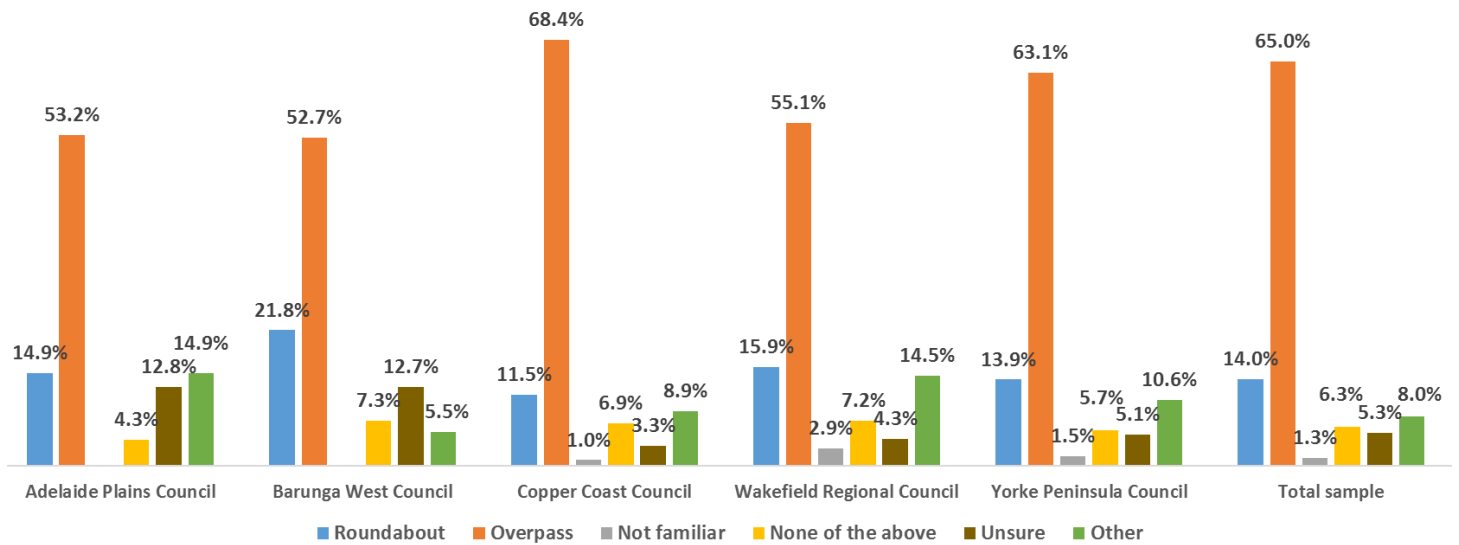
Best solution for resolving congestion issues at Port Wakefield - by Council area



With regard to improving safety at the intersection of Augusta Highway and Copper Coast Highway ('Crash Corner'), the majority of respondents (65%) would like to see the construction of an overpass, while 14% felt a roundabout would be more suitable. Responses for 'other' (8%) included installation of traffic lights and reducing the speed limit to 80km/h on either side of the current intersection.

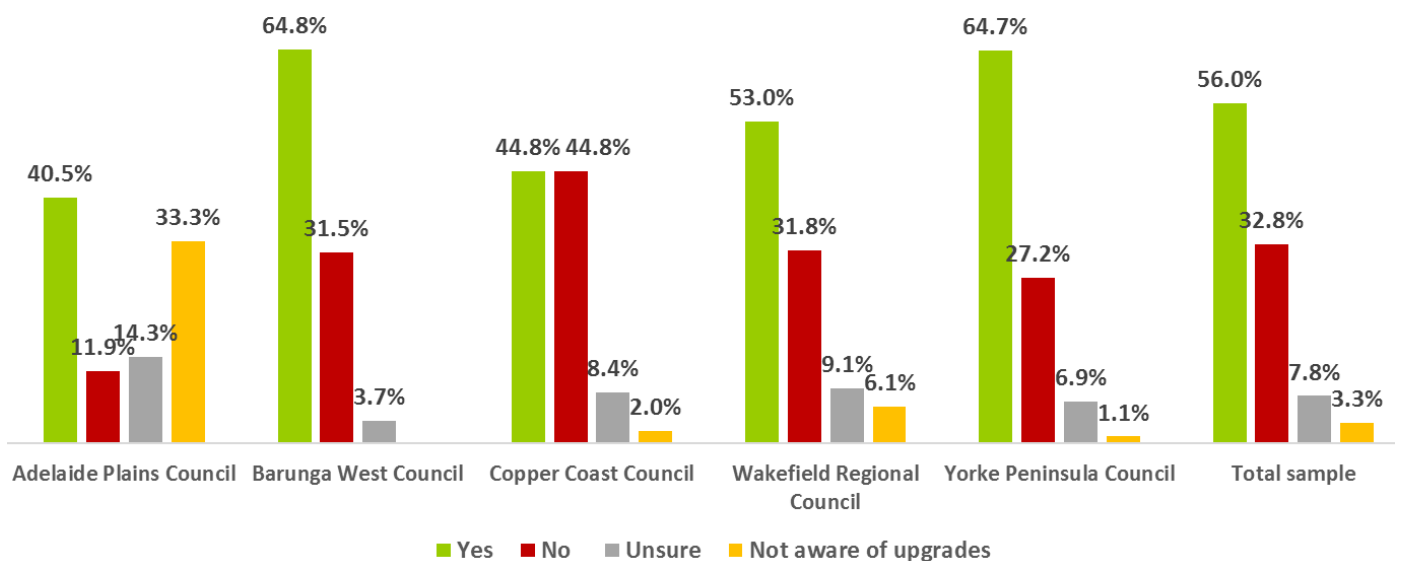
Responses across each of the council areas followed a similar trend to the overall survey sample, but the segmentation by council area did identify greater support for the construction of a roundabout by Barunga West Council residents.

Best solution for improving road safety at 'Crash Corner' - by Council area



Almost \$40 million of road improvements were recently completed in the region through the *Upper Yorke Peninsula Regional Road Network Upgrade* package. Survey respondents were asked their opinion on whether these upgrades have resulted in a significant improvement to the region's road network. More than half of respondents (56%) agreed that the upgrades have improved the road network, while 33% did not agree. A further 8% indicated they were not aware of these upgrades.

Has the recent \$40 million upgrade made a significant improvement to the road network? - by Council area



Looking at the results by council area, Copper Coast Council residents were the least likely to feel that the upgrades had made a significant improvement to the region (44.8%), while Adelaide Plains residents were the most likely to be unaware of the upgrades (33.3%).

Residents from Barunga West and Yorke Peninsula Council were the most positive about the road improvements, with approximately 65% of respondents from these areas indicating that a significant improvement had been made to the road network.

Respondents were able to comment on why they responded either positively or negatively about the improvements, with these responses summarised below.

Positive:

- *Federation corner flows well in non-peak times.*
- *I feel the pavement was a waste of money. The roundabout and overtaking lanes were a great idea.*
- *I believe the roundabout has improved this intersection and the extra overtaking lanes are great. Some reminder signage at the roundabout on how to use a roundabout would be good. Copper Coast travellers heading towards Port Wakefield often assume they do not have to give way to traffic already on the roundabout.*
- *Travelling is now safer and less stressful with roads now smoother.*
- *Overtaking lanes on the road to Ardrossan have made a big difference.*
- *The Clinton to Maitland Road is much safer now. The new overtaking lanes on Yorke Highway are great.*
- *Widening and levelling from Kulpara to Kadina is a significant improvement, especially with road trains now using this road.*

Negative:

- *The roundabout has created confusion and traffic turning left to Ardrossan now don't have the free flow which causes traffic to build up.*
- *That roundabout is ridiculous – Road trains/b-doubles can barely fit around it and cars drive straight over the top of it because it is not above road level. You can see where people have driven over it.*
- *Band-Aid measures that have not fixed the core problem - poor quality surfaces and narrow roads.*
- *My only issue is with all the money spent on guard rails.*

When asked generally about the roads and intersections in the region where unsafe interactions have occurred, more than 300 comments were received. While the vast majority were in relation to the Federation Corner roundabout and the Augusta Highway/Copper Coast Highway intersection, other areas of concern included:

- *Yorke town – intersection of St Vincent Hwy, Minlaton Rd, Stansbury Rd and Waterloo Bay Rd.*
- *Wallaroo – intersection of Copper Coast Hwy, Athena Dr, East Tce, Victoria St and Charles Tce.*
- *Minlaton to Maitland Rd.*
- *Lack of pedestrian crossing facilities in Kadina.*

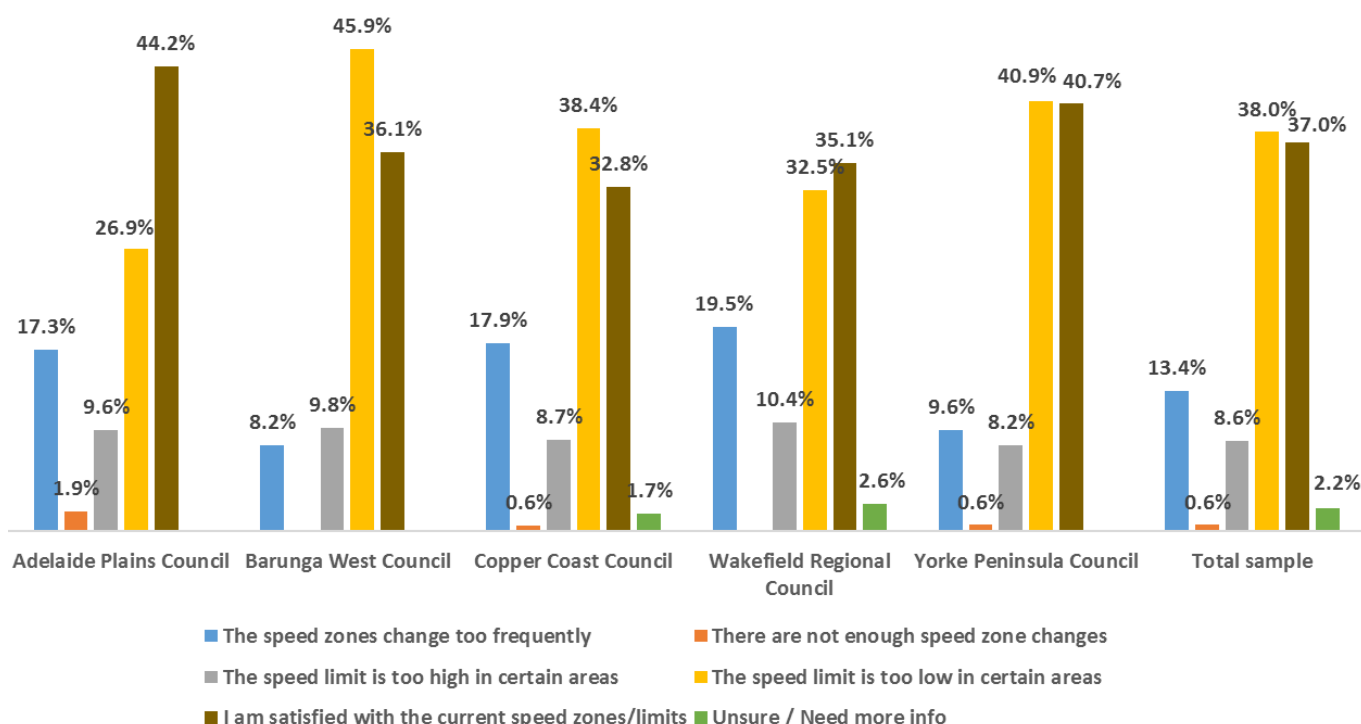
Key Recommendation	Authority
Following on from the effectiveness and positive community feedback of the Upper Yorke Peninsula Regional Road Network Upgrade Program, RAA recommends that a package of works targeting the southern Yorke Peninsula region be considered to target the issues specified within this report.	DPTI

Speed Zones

Changing speed zones can cause confusion for drivers, especially if there are multiple changes in what appears to be similar driving conditions over short stretches of road. More than a third of survey respondents felt that speed limits were too low in certain areas (38%), with a similar number indicating they were satisfied with the current speed zones/limits (37%).

Across the five council areas, Adelaide Plains Council residents were more likely to feel satisfied with the current speed zones/limits (44.2%) than residents of other council areas. Almost 46% of respondents from Barunga West Council feel the speed limit is too low in certain areas (based on the comments received this most likely relates to increasing the speed limit on sealed highways from 100 km/h to 110 km/h).

Satisfaction with speed limits in the Yorke Peninsula - by Council area



Respondents were asked to provide further details of any locations where the speed zones/limits should be reviewed. The majority of responses related to increasing the speed limit on sealed highways from 100 km/h to 110 km/h. Other locations which received a number of mentions include:

- Increasing the speed limit through Alford and Paskeville townships.
- Increasing the speed limit on the Copper Coast Highway, east of Kulpara ("The Hummocks").
- Decreasing the speed limit for the approach to Federation Corner roundabout.
- Decrease speed limit through Marion Bay township.
- Decrease speed limit through Yorketown.

In 2011, the DPTI *Now 100* campaign reduced the speed limit from 110 km/h to 100 km/h on a number of roads across the Yorke Peninsula including:

- | | | |
|--------------------|-----------------------|------------------|
| ▪ Mallala Road | ▪ Upper Yorke Road | ▪ Agery Road |
| ▪ Traeger Road | ▪ Spencer Highway | ▪ Ardrossan Road |
| ▪ Balaklava Road | ▪ Port Broughton Road | ▪ Kainton Road |
| ▪ Copper Coast Hwy | ▪ Arthurton Road | ▪ St Vincent Hwy |
| ▪ Bute Road | | ▪ White Hut Road |

The change in travel time is often cited as a significant contributor to fatigue, however, there is little evidence to show that this is the case, with the benefits of increased reaction and shorter stopping times outweighing the increased travel time. A change from 110 km/h to 100 km/h means that approximately 2.5 minutes is added to a 50 kilometre journey (eg Kadina to Minlaton), assuming that drivers do not need to slow down at any point in each journey.

A 2015 report detailing findings conducted by the Centre for Automotive Safety Research (CASR) indicated that the number of crashes on subject roads where the speed limit had been reduced from 110km/h to 100km/h was 27.4% lower than what would have been expected if the subject roads followed control road conditions².

Tourism

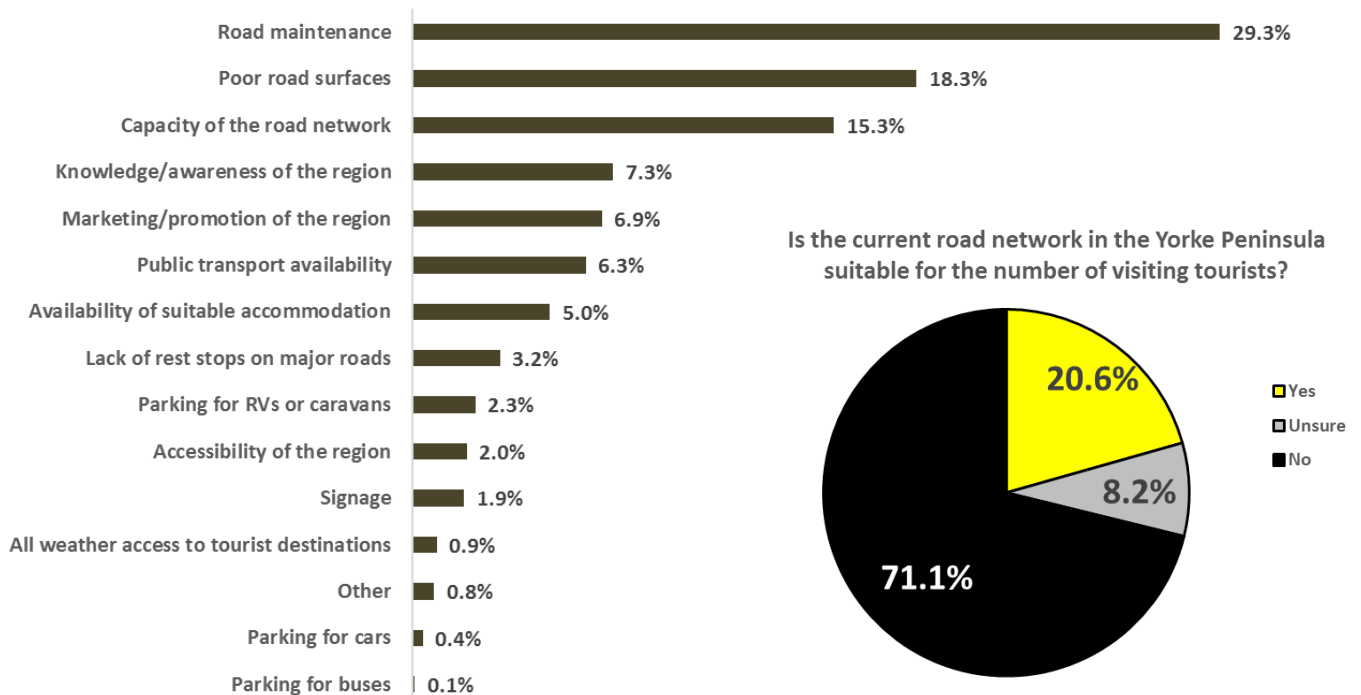
The South Australian Tourism Commission has valued tourism in the Yorke Peninsula region at a potential of \$302 million by 2020. In 2016/17 tourism in the region contributed approximately \$156 million to the Yorke Peninsula economy, and directly employed around 1300 people. The region is most popular with domestic visitors who make up 99% of those travelling to the region (88% of whom are from South Australia and 12% from interstate)³.

Despite the region's popularity with domestic tourists, more than 70% of survey respondents believe the current road network is not suitable for the number of visitors to the region. Only 21% of respondents feel the road system is adequate. In fact, when asked what they perceived to be the biggest barrier to increasing tourism within the region, 30% felt that 'road maintenance' was a significant issue, followed by 'poor road surfaces' (18%) and 'capacity of the road network' (15%). To a lesser degree respondents indicated a need for greater 'awareness and promotion' of the region (7%).

² Centre for Automotive Safety Research, 2015, *Reduction of speed limit from 110km/h to 100km/h on certain roads in South Australia: a follow up evaluation*, publication no. CASR115, <<http://casr.adelaide.edu.au/publications/list/?id=1497>>.

³ South Australian Tourism Commission, 2017, *The Value of Tourism on the Yorke Peninsula*, <<http://tourism.sa.gov.au/research-and-statistics/regions/value-of-regional-tourism>>.

Main barriers to increasing tourism in the region



Suggestions for improvements to enhance visitor experiences in the region were primarily in regards to improving the condition of roads, sealing the unsealed roads (particularly those coastal routes frequented by tourists) and providing adequate rest areas that include bathroom and rubbish facilities. Other suggestions included:

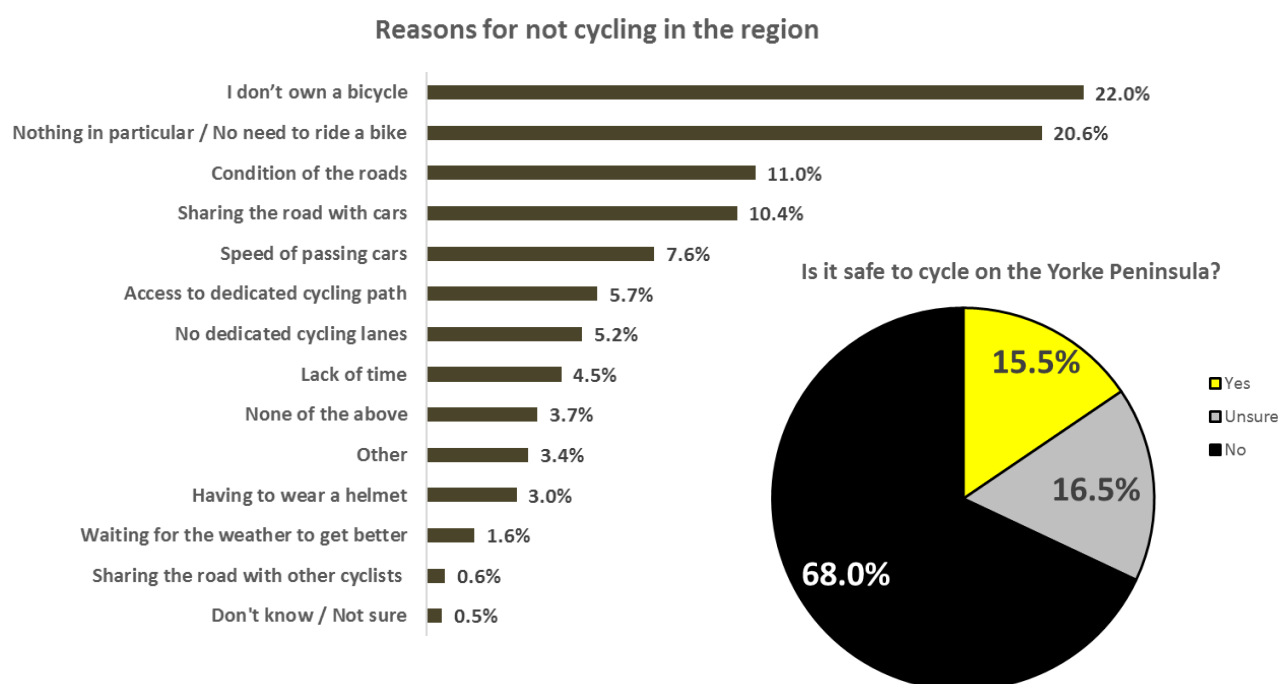
- *Booklets that include maps of rest areas and pet friendly beaches in the area, including horse float parking areas.*
- *Opening of Pt Giles Jetty when ships are not present. Under the current system, access is unpredictable.*
- *Vouchers booklet for local businesses.*
- *More visitor experiences and high-end accommodation and conference facilities.*
- *Bigger focus on historical background of the area. Restore our heritage areas and focus on tourist attractions e.g. virtual reality for tours in beautiful Moonta mine.*
- *Free camping areas*
- *Parking available for caravans within town centres so they can use the shops and facilities.*
- *Ferry from Adelaide to Edithburgh.*

Cycling

A quarter of respondents indicated they had ridden a bicycle in the region over the past 6 months, with those who hadn't indicating it was mainly due to not owning a bicycle (22%) or having no reason to ride a bicycle (21%). The majority of respondents felt that the current road network does not encourage cycling (65%) and don't consider cycling in the region to be safe (68%).

Comments relating to increasing the uptake of cycling within the region highlighted the importance of having dedicated bike lanes and/or wider roads, with many residents pointing out the danger of having to share roads with trucks. Other suggestions to encourage cycling included:

- *Upgrade the 'Walk the Yorke' to be bike compatible. Some areas where the walking trail is unsealed and crosses the highway are dangerous. For example at the Port Moorara Road and Haywood Park Road intersections, the path crosses the road which is 100 km/h on a blind corner.*
- *Wider roads and dedicated bike lanes/paths.*
- *Convert all old railway corridors in the area to dedicated cycling lanes. Provide opportunities for adults and kids to ride safely away from cars.*
- *Bicycle rentals.*



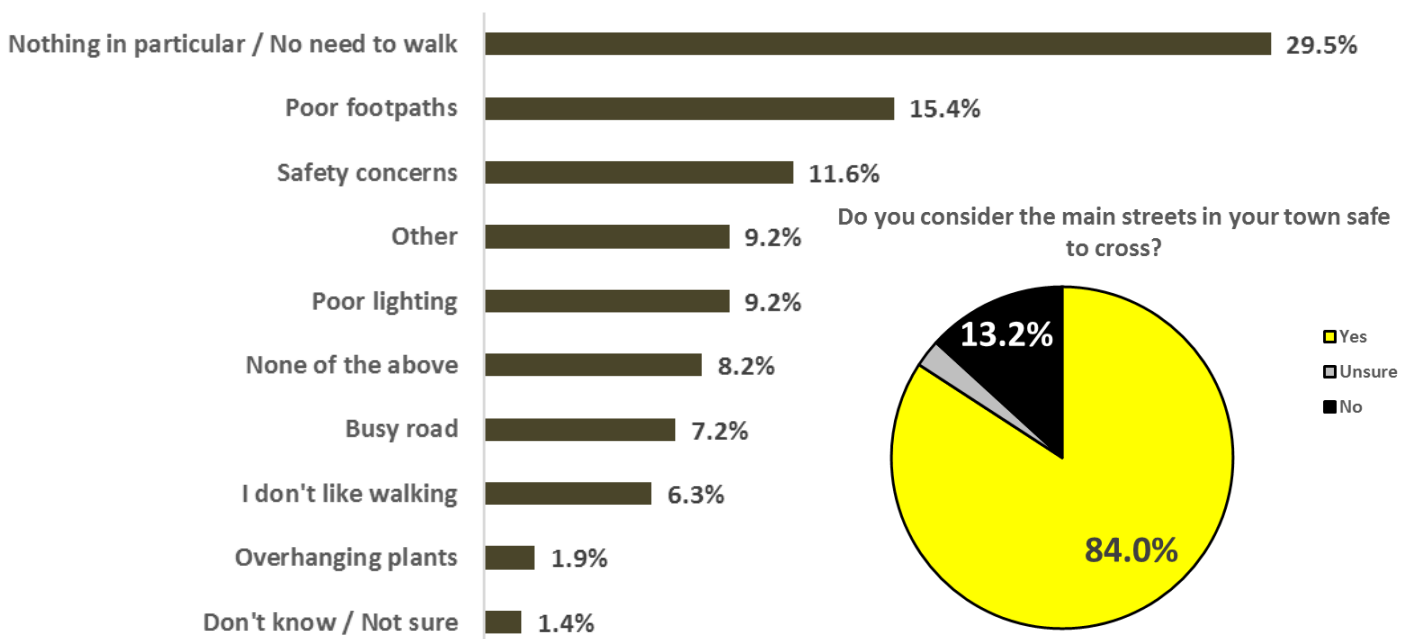
Key Recommendation	Authority
RAA recommends that the feasibility of a shared path network be investigated for the region to provide better cycling and active transport connectivity between townships in the Yorke Peninsula and surrounds, particularly those north of Moonta and inland that are not serviced by the 'Walk the Yorke' trail. Where possible, previous rail corridors should be considered and utilised.	All

Walking / Pedestrians

Motorists traditionally walk at some point in their journey, so encouraging active mobility and improving people's choices provides an opportunity to look at the walking journey and how this can be enhanced.

Neighbourhood walking received a positive response from residents, with 52% indicating they take regular walks. The reasons for those indicating they do not regularly walk around their neighbourhood included: 'No reason/No need to walk' (29.5%), 'poor footpaths' (15.4%) and 'safety concerns' (11.6%).

Reasons for not walking in the local area



When asked for suggestions which would improve the walking experience in their local area, the overwhelming majority of comments were in regards to the lack of footpaths in the area (resulting in residents having to walk on the road) or the condition of existing footpaths (many of which are unsealed). A number of responses also mentioned poor drainage/guttering, and that signs were needed in locations where residents walk on the road to alert drivers to be cautious. Other suggestions included:

- *More signs with local history so you can stop and read about the town. For example, why is pink lake called pink lake? Airport road track - when was the airport constructed, upgraded, used for royal flying doctors?*
- *Solar lighting or sensor lighting for safer trails and footpaths.*
- *We ALL walk on the roads in Marion Bay as there are no footpaths. We have limited access to the shore due to thick scrub. A walkway along the shoreline would promote 'Walk the Yorke' and give visitors, walkers, cyclists, wheelchairs or prams safe access to the beach and a wonderful seaside stroll.*
- *Maps of available walking tracks in hardcopy/brochure/smartphone app format.*
- *I 'walked the Yorke' which is great - more toilets and better signage would be good.*

Despite mentioning a lack of pedestrian facilities in earlier comments, 84% of respondents do feel that it is safe to cross the main streets in their town.

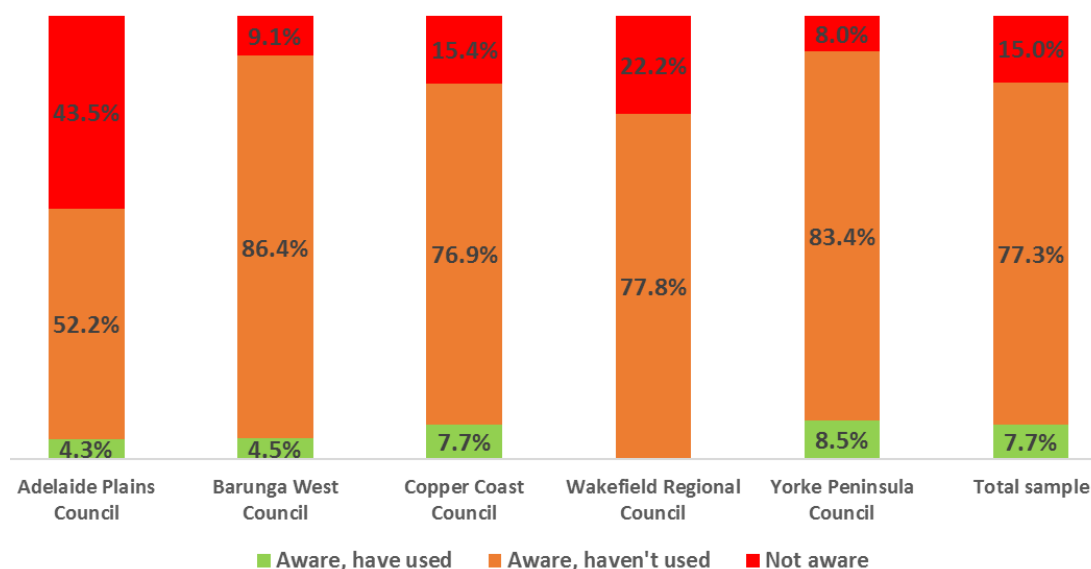
Respondents provided suggestions for improvements that could be made to increase pedestrian safety on their local streets. Among the main items mentioned were the inclusion of pedestrian crossings in town centres and speed limit reductions through the main township. The below comments are indicative of the survey responses:

- *Better crossings and footpaths which allow prams and wheelchair access (currently need to walk on the road in many spots).*
- *Yorke town needs pedestrian crossings, disabled ramps and pedestrian refuge islands.*
- *Trucks should not use Robert Street in Maitland as it is lined with our main shops, with elderly & children crossing it constantly.*

Community Transport

The majority of respondents (65%) do not feel that adequate community transport is provided to meet the needs of residents in the region. Although awareness of community transport options was good overall (85%), only around 8% of respondents had actually used a community transport service. Residents from the Yorke Peninsula Council showed the greatest awareness and uptake of community transport services (92%), followed by Barunga West Council residents (91%). The lowest awareness and use across the council areas was Adelaide Plains Council, with only 57% awareness. This highlights the potential to improve the uptake of community transport services within the area.

Awareness of community transport services - by Council area



Comments on community transport highlighted issues with the current offerings, such as infrequent services and lack of volunteer drivers. Suggestions sought to help improve these services, with a selection of comments listed below:

- *It is often difficult to get community transport for aged care residents at short notice. Have to book a long time in advance.*
- *A bus service with timetable at affordable prices, more than once a day.*
- *The Health bus timetable is limited. Community drivers are volunteers and like hen's teeth. Local bus lines don't operate in every town every day.*
- *More funding for community transport services. Our region relies solely on the use of volunteers to provide these services in some areas and these numbers have dwindled making it difficult to meet demand.*
- *The service bus only runs to Adelaide twice a week – It should be more. The Health bus service is wonderful, but it is a very long day for clients who get on the bus from southern Yorke Peninsula. It would be good if a solution could be found to lessen the length of this journey.*

When asked whether they had used any of the public coach services in the region (i.e. Yorke Peninsula Coaches, Premier Stateliner, Copper Coast Passenger Service, Greyhound Australia, Balaklava Passenger Service), 82% of respondents had not used any of these services. Around 10% of respondents had used Yorke Peninsula Coaches, while the other coach services were used by less than 2% of respondents.

Key Recommendation	Authority
RAA recommends that community transport schemes be reviewed in the region, with an aim to provide better access for those using the services, and creating additional awareness of the services on offer.	All

Taxi / App-Based Ride-sharing

Taxi and chauffeur cars have long operated in a market with limited disruption. The recent introduction of app-based ride-sharing services (e.g. Uber) has changed the face of fare based services, and lead to increased mobility options for many. Regional towns often have limited alternative transport options, with little or no regular public transport, thus ridesharing may offer a practical and convenient localised solution.

The use of taxi services in the Yorke Peninsula region is low, with only 7% of survey respondents having used a taxi service in their local area in the past six months.

A quarter of respondents had utilised a ride-sharing service in the past six months. Of those that indicated that they had utilised a ride sharing service in the past six months, 59% had used it in Adelaide, and 30% interstate. With a lack of transport options available within the region, 31% of respondents indicated they would consider using a ride-share service if it were available in the region, with a further 14% needing more information before making a decision.

Crash Statistics

2013-2017 Casualty Crash Analysis

Crash data has been analysed for the five-year period between 2013 and 2017 for the five specified Yorke Peninsula Councils.

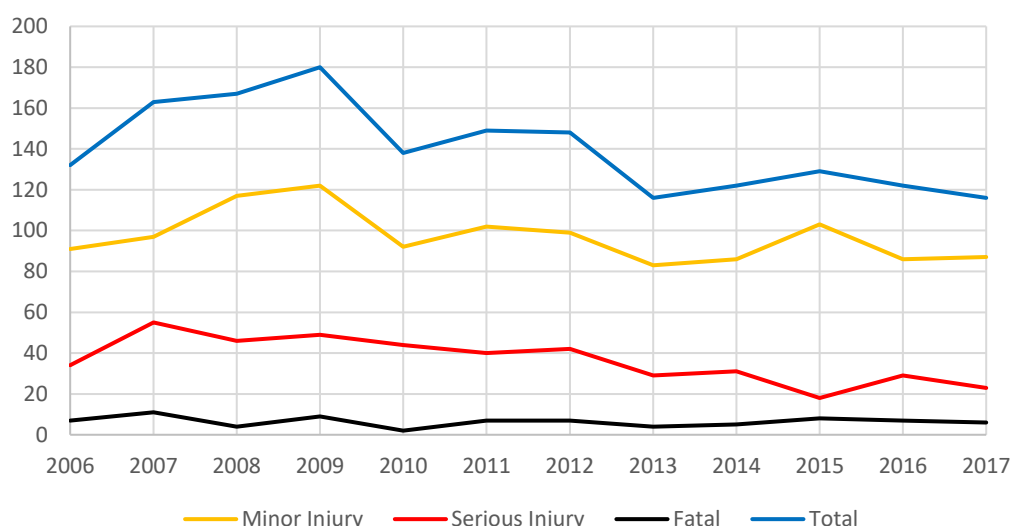
In total, 605 casualty crashes occurred in the Yorke Peninsula region between 2013 and 2017. This consisted of 445 crashes resulting in minor injuries, 130 resulting in serious injuries and 30 resulting in fatalities. The total number of crashes and casualties by council region is tabulated below.

Council Region	Total Casualty Crashes	Total Casualties*	Total Serious Injuries	Total Fatalities
Adelaide Plains Council	172	284	55	8
Barunga West Council	42	58	16	0
Copper Coast Council	109	166	16	2
Wakefield Regional Council	145	227	53	12
Yorke Peninsula Council	137	204	37	15
TOTAL	605	939	177	37

*Includes total minor injuries, serious injuries and fatalities

There has been an overall downward trend in casualty crashes in the region since 2006, however, the number of fatal crashes does not appear to have followed this trend.

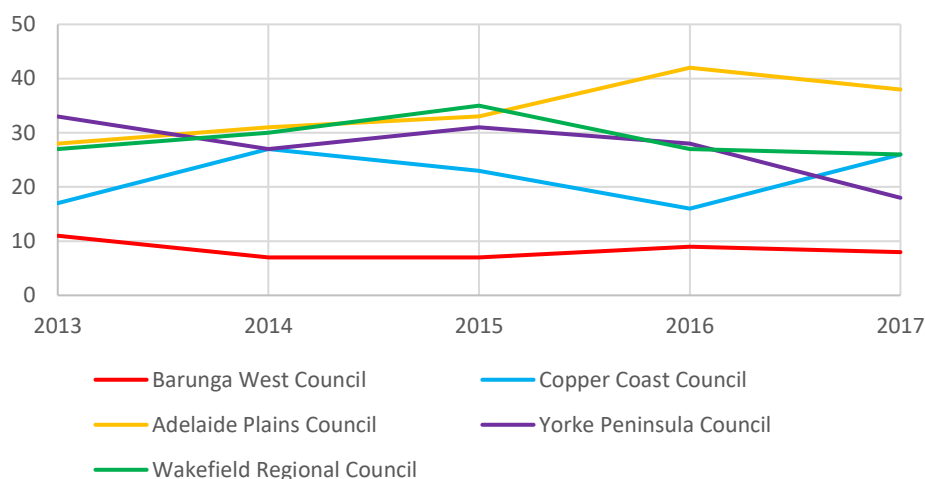
Casualty Crashes since 2006



When looking at casualty crashes between 2013 and 2017 by council region, Yorke Peninsula Council is the only region to record a significant decrease in casualty crashes over this period, with only 18 casualty crashes occurring in 2017 compared to 33 in 2013. In 2013, the 33 casualty crashes occurring in Yorke Peninsula Council was the highest number of casualty crashes of all five councils. The 2017 figure of 18 casualty crashes in Yorke Peninsula Council was the second lowest number behind Barunga West Council's eight casualty crashes.

Adelaide Plains Council appears to have had a steady increase in the number of casualty crashes occurring, increasing from 28 in 2013 to 38 in 2017, with a high of 42 occurring in 2016. The other three councils did not record any significant increases or decreases over same the time period.

Casualty Crashes by Council



'Hit fixed object' crashes are the most common crash type within the region, accounting for 37% of all casualty crashes followed by vehicle 'roll over' crashes attributed to 20% of all casualty crashes. These two crash types are generally the most common seen on South Australian regional highways, often involving a single vehicle and the crash usually attributed to inattention. In fact, 52% of all casualty crashes on the Yorke Peninsula are attributed to inattention, with 'disobeying give way signs' (12%) the second most common error. Crashes attributed to driving under the influence of alcohol or drugs ('D.U.I') make up a concerning 9% of all casualty crashes.

Crash Types	No. of Crashes	Apparent Error
Hit Fixed Object	226 (37%)	Inattention (73%), D.U.I (13%), died sick or asleep at wheel (9%), other (5%)
Roll Over	118 (20%)	Inattention (81%), D.U.I (10%), other (9%)
Right Angle	109 (18%)	Disobey – give way sign (69%), fail to give way (22%), other (9%)
Rear End	33 (5%)	Follow too closely (48%), inattention (42%), overtake without due care (6%), died sick or asleep at wheel (3%)
Head On	30 (5%)	Fail to keep left (63%), D.U.I, (13%), inattention (10%), other (14%)
Side Swipe	24 (4%)	Fail to give way (33%), overtake without due care (29%), change lanes to endanger (21%), other (17%)
Hit Parked Vehicle	13 (2%)	Inattention (54%), misjudgement (15%), reverse without due care (8%), D.U.I (8%), other (15%)
Hit Pedestrian	12 (2%)	Inattention (67%), fail to give way (17%), reverse without due care (8%), dangerous driving (8%)
Right Turn	11 (2%)	Fail to stand (100%)
Left Road – Out of Control	10 (2%)	Inattention (80%), D.U.I (10%), died sick or asleep at wheel (10%)
Hit Animal	9 (1%)	N/A (67%), inattention (33%)

Other	6 (<1%)	Inattention (50%), insecure load (33%), vehicle fault (17%)
Hit Object on Road	4 (<1%)	Inattention (75%), D.U.I (25%)
All Crashes	605	Inattention (52%), disobey – give way sign (12%), D.U.I (9%), fail to give way (6%), died sick or asleep at wheel (4%), fail to keep left (3%), follow too closely (3%), overtake without due care (2%), vehicle fault (2%), fail to stand (2%), other (5%)

Locations

Across the Yorke Peninsula region, 31% of crashes occurred at intersections, with the remaining 69% occurring at mid-block locations. Crashes in 100 km/h or 110 km/h speed limits made up 72% of all casualty crashes, with the remaining 28% occurring in 80 km/h (or lower) speed zones.

The roads with the highest numbers of casualty crashes are tabulated below. Not surprisingly, the key routes through the region are all represented in the list, as well as a number of roads in the Adelaide Plains region.

Road	No. of Casualty Crashes
Port Wakefield Rd (Angle Vale Rd - CC Hwy)	99
Augusta Hwy (Pt Wakefield - Pt Pirie)	71
Copper Coast Hwy	51
Spencer Hwy (Port Pirie - Minlaton)	44
Yorke Hwy	31
Mallala Road	18
St Vincent Hwy	16
Germantown Rd	11
Gawler River Road	10
Old Port Wakefield Road	10

The intersections in the region with three or more casualty crashes are tabulated below, with most of these being intersections along Port Wakefield Road or in the Adelaide Plains Council area.

Intersection	No. of Casualty Crashes
Copper Coast Highway & Augusta Highway (Port Wakefield)	9
Port Wakefield Road & Mallala Road (Two Wells)	6
Port Wakefield Road & Brooks Road (Two Wells)	4
Gawler River Road & Boundary Road (Lewiston)	4
Port Wakefield Road & Old Port Wakefield/Sanders Road (Dublin)	3
Port Hughes Road & Milne Terrace (Moonta)	3
Digby Street & Frances Terrace (Kadina)	3
Port Wakefield Road & Port Parham Road (Dublin)	3
Wasleys Road & Barabba Road (Mallala)	3

Local vs Visitor Involvement in Casualty Crashes

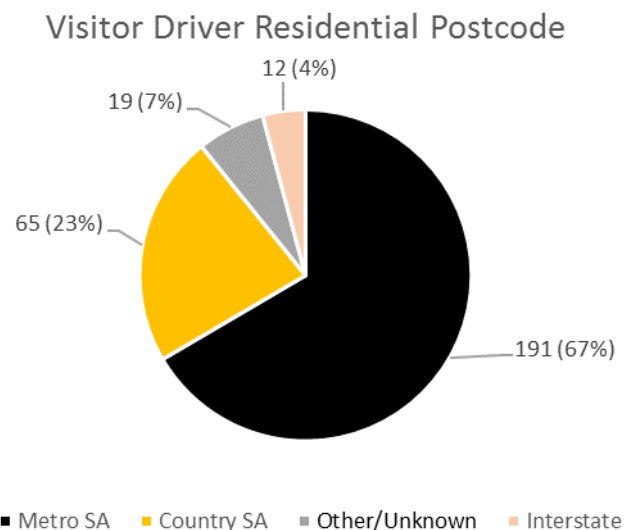
The member survey asked respondents who they thought were involved in the majority of crashes occurring on unsealed roads, and a subsequent analysis of crash data was undertaken to determine how community perception compared to reality.

For the purpose of this study, and due to the limitations of driver information in the available crash data, drivers were split into two groups:

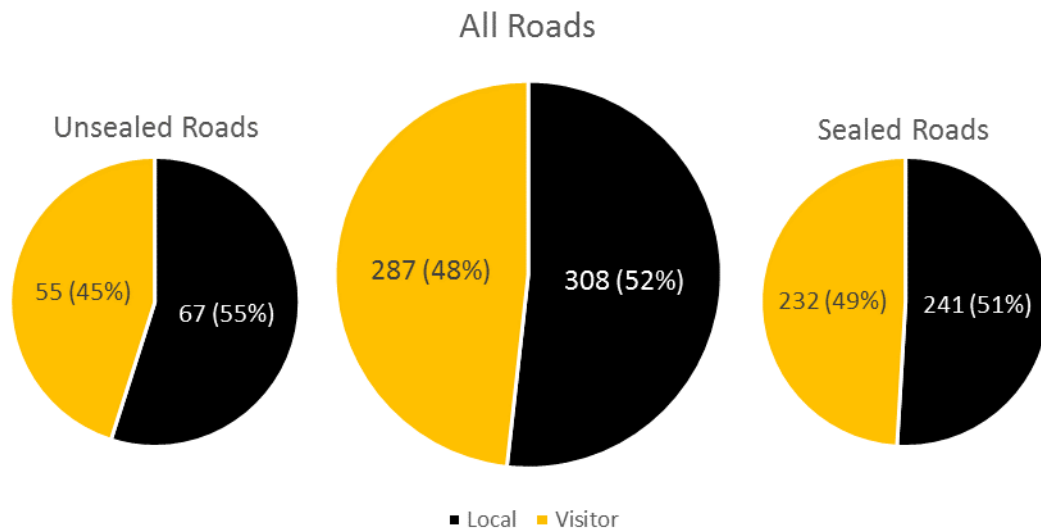
- **Locals**, with a residential postcode within the boundary defined for this assessment, and
- **Visitors**, with a residential postcode outside the boundary defined in this assessment.

The analysis of the data took into account which party in the crash made an error. For the 605 casualty crashes assessed in the region, a party was deemed to have made an error in 595 (98%) of these. The 10 crashes without an 'apparent error' code are excluded from this analysis.

Two thirds of visitor drivers deemed to have made the error leading to a crash are from the Metro SA region (postcode < 5200), with almost one quarter from country SA areas outside of the Yorke Peninsula. Interstate drivers only make up 4% of the total visitor drivers causing crashes, and 7% of visitor drivers did not have a specified postcode. Those without a specified postcode are usually either international tourist or have no fixed residential address.



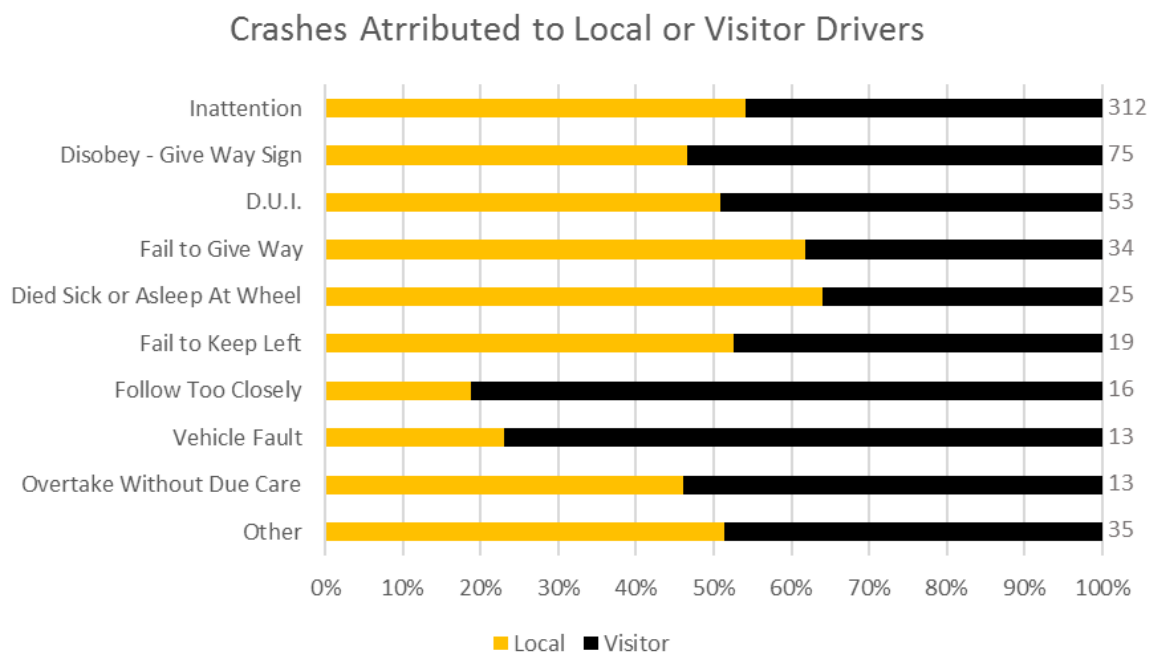
Of the 595 crashes, 52% of crashes were attributed to locals, and 48% of crashes attributed to visitors.



When broken down into sealed and unsealed roads, local drivers appear to have caused a slightly higher proportion of crashes on unsealed roads than on sealed roads. This is in contrast to the results from the member survey, with only 15% of respondents believing that local drivers were responsible for the majority of crashes on unsealed roads.

The percentage of crashes attributed to locals is similar to visitors to the region. This is not surprising as locals traverse more often, and sometimes solely within the region. In terms of the percentage of crashes involving visitors, this is most likely due to the popularity of the Yorke Peninsula as a major tourism region.

The most frequently occurring apparent errors leading to crashes (inattention, disobey give way sign, D.U.I) occur at similar levels with locals and visitors. It is worth noting that crashes caused by visitors as a result of following too closely and vehicles faults appear to occur more frequently than these crash types attributed to locals. Conversely, fatigue related crashes and failures to give way are more frequently attributed to locals.



Based on the total casualty crashes that occurred within the Yorke Peninsula region (595), 78 of these involved a vehicle towing. In 44 (56%) of these crashes, the towing vehicle was deemed to have made the error contributing to the crash.

Of these 44 crashes, 28 were attributed to errors made by visitor drivers, who were most likely to be towing a trailer (57%) or caravan (25%). Local drivers who were towing and deemed to have made the error were most likely to be towing a trailer (81%).

Site Investigation Details and Recommendations

General and Common Issues

Retrofitting shoulder seal

Across the region, it is noted that in areas where shoulder seal had been applied to an existing road seal, the join of the shoulder seal and existing seal was often located in the wheel path. This is already a weak point on the pavement due to the additional loading, and there were many incidences of potholes forming and water ponding in the join created where shoulders are sealed.



Examples of poor joins between shoulder seal and existing pavement

Key Recommendation	Authority
RAA recommends that the shoulder sealing process is reviewed on a case by case basis to ensure the join is not in the wheel path and does not have a negative impact on drainage, especially on freight routes. DPTI specifications should be updated to reflect this, where necessary.	DPTI

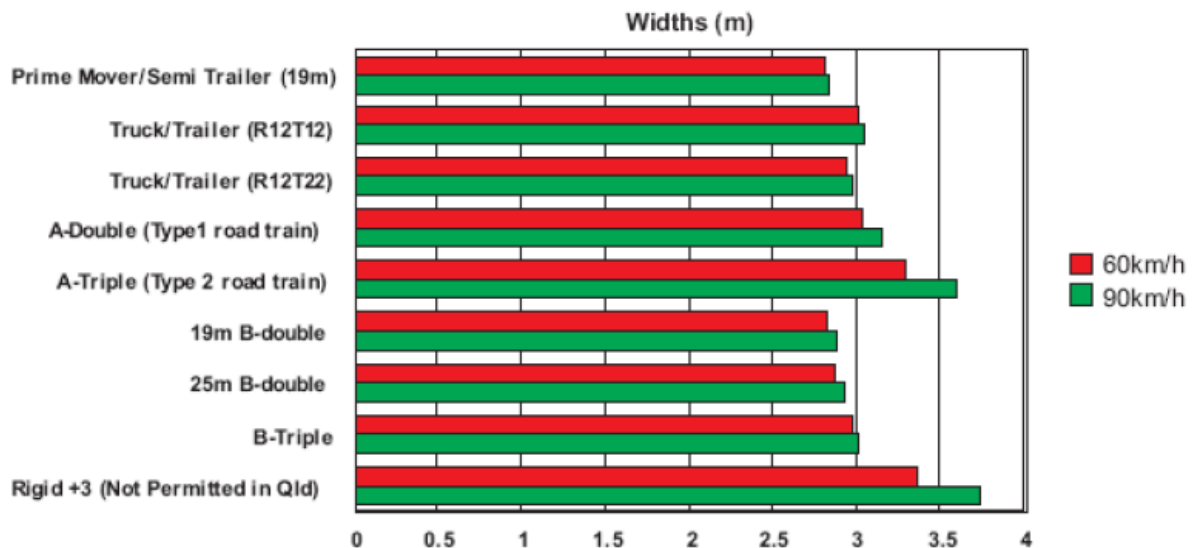
Road geometry

Many roads in the Yorke Peninsula region are very narrow, and do not have sealed shoulders. There are many instances, where the total carriageway width falls well below six metres, with the narrowest sections measuring only 5.4 metres wide. Throughout this report, there are a number of recommendations for road widening or shoulder sealing to bring roads across the Yorke Peninsula region to an acceptable and safe standard.

The maximum width of a general access commercial vehicle prescribed in the *Heavy Vehicle (Mass, Dimension and Loading) National Regulation* is 2.5 metres, however, this is exclusive of wing mirrors, provides no margin for error, and causes two opposing heavy vehicles to use the gravel shoulder in order to pass one another safely on roads with minimal width.

*Austrroads Guide to Road Design Part 3: Geometric Design (2016)*⁴ indicates that a 25 metre b-double requires 2.9 metres of pavement to account for sway.

⁴ Austrroads, 2016, *Austrroads Guide to Road Design Part 3: Geometric Design*, publication no AGRD03-16, pp 46-47, 338.



Vehicle sway limits for multi-combination vehicles, Austroads (2016)

The Austroads guide also suggests an absolute minimum 7.2 metre seal width should apply designated heavy vehicle routes with AADT between 150 and 1000 vehicles. It is possible to achieve this geometry with 3.1 metre lanes and 0.5 metre shoulders. As these dimensions are absolute minimum values provided by Austroads, RAA generally recommend a minimum 3.3 metre lane width and desirable 1.0m shoulder seal to provide additional safety for all road users in locations where tourism and freight operate concurrently.

Another issue raised by many survey respondents was the presence of crests on straight roads and the impact they have on safe overtaking. There is nothing that can be done to eliminate crests on an existing road without major earthworks and full road reconstruction where crests are present. RAA appreciate that this is very costly and not viable across the entire road network, but when major reconstruction works are required for other purposes, crest mitigation should be a consideration.

It was noted that some roads had been built up to minimise the sight distance loss at crests (e.g. some sections of Spencer Highway), which does create the issue of steep edge drop offs requiring barrier protection. This makes crest reduction a very costly exercise, and something that is not generally feasible as a standalone job.

Unidirectional Hazard markers being used instead of chevron alignment markers.

The use of D4-1-1 and D4-1-2 'unidirectional hazard markers' is very important on regional highways as they help to delineate roadside hazards and high speed T-intersections. Similarly D4-6 'chevron alignment markers' (CAMs) are another equally important sign that is used solely to delineate curves (see examples of each marker type below).



D4-1-1 unidirectional hazard marker



D4-1-2 unidirectional hazard marker



D4-6 chevron alignment marker (CAM)

There are many circumstances where D4-1-1 'unidirectional hazard markers' have been used to delineate curves on Yorke Peninsula roads, instead of D4-6 'chevron alignment markers'. This issue was primarily noted on state maintained roads, and was rarely observed on roads under the jurisdiction of local councils. Australian Standard AS1742.2 (2009)⁵ dictates that D4-1-1 signs be used in the following circumstances:

- To indicate an abrupt narrowing of the pavement,
- To delineate an exposed median end or other roadway obstruction where all traffic must pass to one side; or
- To indicate vehicle paths at intersections.

The standard also specifically mentions that they shall not be used in lieu of width markers to delineate both sides of the roadway or in lieu of 'chevron alignment markers' to delineate sub-standard curves.

This signage has been incorrectly installed on curves along most rural arterials in the Yorke Peninsula region including, but not limited to, Upper Yorke Road, Spencer Highway, Yorke Highway and St Vincent Highway with two examples pictured below.

⁵ Standards Australia, 2009, *Manual for uniform traffic control devices part 2: Traffic control devices for general use*, AS1742.2 – 2009, pp31-40, 72-74, 97.



Upper Yorke Road – near the Sand Pit Road intersection (Bute – Kulpara)



St Vincent Hwy – between the Black Gate Road and Old Saltworks Road intersections (Yorketown – Warooka)

On a number of curves where D4-1-1 ‘unidirectional hazard markers’ have been installed, the illusion of a T-intersection was created from a distance, which initially caused confusion to the survey team. By using this signage on curves, drivers begin to expect to see it on curves, which greatly reduces the impact of the markers when installed opposite the terminating road of a T-intersection (where drivers are required to significantly slow down or stop to give way).

Key Recommendation	Authority
RAA recommends that the placement of D4-1-1 ‘unidirectional hazard markers’ is reviewed across the Yorke Peninsula road network, and where they have been used to delineate curves, are replaced with CAMs, installed as specified in AS1742.2 (2009).	DPTI

Port Wakefield Road (Two Wells – Port Wakefield)

For the purposes of this Regional Road Assessment, Port Wakefield Road was assessed between Two Wells (north of Angle Vale Road) and the intersection with Copper Coast Highway. Port Wakefield Road is a major interstate and intrastate federally maintained freight corridor, and is approved for b-triple freight use. The road is predominantly two lanes in each direction with a wide central median. The duplicated section currently ends just south of Port Wakefield and continues north with one lane in each direction, before splitting into the Augusta Highway and Copper Coast Highway just north of Port Wakefield. There has been a commitment of \$90M from the federal and state governments to construct an overpass of Copper Coast Highway and duplicate Port Wakefield Road between the overpass, through Port Wakefield and linking in with the current four-lane highway south of Port Wakefield.

Most mentions relating to Port Wakefield Road in the survey were in regards to congestion through Port Wakefield, and the intersection at Copper Coast Highway and Augusta Highway (locally known as ‘crash corner’). The condition of the road in general was another key issue raised, and a number of intersections along Port Wakefield Road were also mentioned, primarily the intersection with Mallala Road in Two Wells and Balaklava Road in Port Wakefield. When survey respondents were asked about locations in the region where challenging freight interactions had been experienced, the Balaklava Road intersection was one of the most mentioned.

Some typical survey responses are below.

Port Wakefield Road near Dublin to Two Wells has become bad with bone jarring potholes. Nothing done!

The road surface has ruts and potholes due to heavy vehicle use – this shakes your car to pieces and causes a less than happy trip, Port Wakefield road is terrible right through.

In Port Wakefield, turning to and from Bowmans/Balaklava, and the Copper Coast Highway/Highway One intersection. A bypass road is needed around Port Wakefield and the Copper Coast Highway intersection.

RAA members

Crash History

Between 2013 and 2017, 99 casualty crashes occurred on Port Wakefield Road or at intersections with Port Wakefield Road between Two Wells and Copper Coast Highway. Seven of these were fatal, and 18 resulted in serious injuries, with the remaining 74 casualty crashes resulting in minor injuries.

The intersection with Copper Coast highway and the intersection with Mallala Road have had nine and six casualty crashes respectively over the five year period. These two intersections have a higher crash rate than all other intersections in the region.

‘Hit fixed object’, ‘right angle’ and ‘roll over’ type crashes make up the majority of crashes on Port Wakefield Road with inattention the leading cause of crashes.

Port Wakefield Road Crash Types

Crash Types	No. of Crashes	Apparent Errors
Hit Fixed Object	27	Inattention (20), died sick or asleep at wheel (3), D.U.I (3), vehicle fault (1)
Right Angle	26	Disobey give way sign (15), Fail to give way (10), D.U.I (1)
Roll Over	22	Inattention (18), Vehicle Fault (3), Died sick or asleep at wheel (1)
Rear End	5	Follow too closely (4), inattention (1)
Head On	4	D.U.I (2), inattention (1), vehicle fault (1)
Left Road - Out of Control	4	Follow too closely (4)
Side Swipe	4	Change lanes to endanger (3), incorrect turn (1)
Right Turn	3	Fail to stand (1)
Hit Pedestrian	1	Inattention (1)
Hit Object on Road	1	Inattention (1)
Hit Parked Vehicle	1	Inattention (1)
Other	1	Vehicle Fault (1)
All Crash Types	99	Inattention (47), disobey give way sign (15), fail to give way (10), vehicle fault (6), D.U.I (6), follow too closely (4), died sick or asleep at wheel (4), change lanes to endanger (3), fail to stand (3), incorrect turn (1)

Traffic Volumes

Traffic volumes are very high on Port Wakefield Road, including a large volume of freight, with average estimated daily traffic volumes increasing by more than 20% since 2007.

Port Wakefield Road Traffic Volumes

Segment	Length (km)	AADT	% Commercial Vehicles	2007 Estimated AADT
Two Wells – Dublin	12.5	10100	18.0%	7800
Dublin – Balaklava Road (Port Wakefield)	35.0	8600	18.5%	6800
Balaklava Road – Copper Coast Highway	2.0	8600	18.5%	7100

Road Widths

For the most part, the geometry of Port Wakefield Road is very good, with dual 3.5-3.8 metre wide lanes in each direction and sealed shoulders, separated by a wide median. Shoulders on the median side of the road can be quite narrow and consideration should be given to widening these to reduce run off road crashes

Speed Limits

The speed limit remains at 110 km/h along open sections of road, with 80 km/h buffer zones used to reduce the speed limit into Port Wakefield, where a 50 km/h speed limit applies.

Port Wakefield Road Speed Limits

Segment	Length (km)	Speed Limit (km/h)
Two Wells – Port Wakefield	53.0	110
Port Wakefield	2.3	80/50/80
Port Wakefield – Copper Coast Highway	1.0	110

Observations

Port Wakefield Road (between Two Wells and Port Wakefield) is a great example of a well designed road suitable for its purpose of carrying commuters, freight and tourists simultaneously. Delineation is generally good with clear line marking, RRPMS and guide posts all present along the length of the road. It was noted that there were many old and damaged guide posts, and RAA recommends that these are reviewed and replaced where necessary to ensure satisfactory delineation, especially at night. Street lighting is provided at major intersections, and the clear zone is generally good, with roadside hazards set well back from the road, and steep drop offs usually protected by barriers.



Port Wakefield Road has good geometry but the surface is failing in a number of locations

An average speed camera zone is in place between Middle Beach Road and Port Wakefield, and it was noted that vehicles were generally very compliant with the speed limit in this 51 kilometre section.

The primary concern with Port Wakefield Road is the overall surface condition, and the safety at intersections. There are some sections that have been recently repaired, including reseals and rut filling over the last 18 months. This includes a particularly poor northbound section near Lower Light that RAA had previously identified. There are still sections that are significantly failing or highly polished which require attention. These failures are predominantly in the left hand lanes, in both the northbound and southbound direction. Some of the worst sections encountered included northbound, near Windsor and southbound between Lower Light and the beginning of the recent reseal at Porter Road. RAA recommends that these sections be resealed as a priority.

Intersection with Copper Coast Highway and Duplication through Port Wakefield

The Federal and State Governments have announced joint \$90M funding for a major upgrade of Port Wakefield Road through Port Wakefield. This funding consists of a \$72M contribution from the federal government and \$18M from the state government in an 80/20 split. This funding allows the highway through the Port Wakefield township to be duplicated, as well as an overpass to be constructed at the Copper Coast Highway intersection. Funding has also been allocated to address the intersection with Port Wakefield Road and Balaklava Road. One of the initial concepts includes construction of a new road between Port Wakefield Road and Balaklava Road, with a roundabout at the Port Wakefield Road end. This will significantly ease the issues experienced by heavy vehicles at the current Balaklava Road/Port Wakefield Road intersection in the centre of the township.



Artists impression of the Proposed Copper Coast Highway overpass, with Port Wakefield at the top right of the picture

RAA welcomes the recent funding announcements, as these issues have long been major causes of concern to RAA members, and this was evident prior to the Yorke Peninsula survey by the amount of feedback received through RAA advocacy work including 'Report a Road', and 'Risky Roads', as well as direct phone calls and emails made to the Road Safety team.

RAA surveyed members about their preferred configuration of the Copper Coast Highway intersection, and whether they would prefer a bypass of Port Wakefield, or duplication of the road through the township.

- 65% of respondents preferred an overpass, with 14% preferring a roundabout at 'crash corner'
- 60% of respondents preferred a bypass, with 20% preferring duplication through Port Wakefield

The cost of each option was not taken into account for the purposes of the survey, but it is estimated that a four lane full bypass of Port Wakefield would have cost at least three times more than duplication through the township. For this reason, it is very unlikely that a four lane full bypass of Port Wakefield would have had funding granted in the foreseeable future.

Although final details and road alignment have not yet been determined, RAA expects that the alignment will remain almost the same, resulting in a loss of some on-street parking in Port Wakefield. For this reason, RAA recommends that convenient and clearly signed off-street parking is provided for both regular and longer vehicles (including freight and caravans). Parking and visitor facilities should be provided on both sides of the highway to reduce the need for pedestrians to cross the road. Safe system pedestrian fencing and refuge islands should be provided to control pedestrian movements across the highway.

RAA support the proposal to construct an alternative link road between Port Wakefield Road and Balaklava, however, we hold safety concerns regarding the proposal to construct a dual lane roundabout on Port Wakefield Road. Consideration should be given to linking Balaklava Road directly with the overpass.

In concept animations, the Augusta Highway corridor appears wide enough to cater for future duplication of the Highway. It is vital that bridge spans over the highway are able to safely cater for four lanes of traffic with space allowed for appropriate medians, barriers and crash cushions to 'future proof' any bridge construction.

Alternative concepts must be explored that remove any at-grade right turns from the design. On 15 March 2019 RAA provided a detailed submission to the project team detailing these concerns and highlighting members' views as expressed in this report.

Intersection with Mallala Road

Although a small number of survey respondents raised the intersection with Mallala Road, RAA specifically investigated the intersection due to its' poor crash history. Six casualty crashes occurred at this intersection between 2013 and 2017 with five of these resulting in minor injuries and one resulting in serious injuries. Two of these crashes involved vehicles hitting a fixed object, two involved vehicles failing to give way when turning right from Mallala Road, and two involved vehicles failing to stand when turning right onto Mallala Road.



Line marking is faded at the intersection with Mallala Road

RAA observations on site found that sight distance was good, but line marking had deteriorated. The left turn acceleration lane provided only 50 metres for vehicles to accelerate to 110 km/h, which is well below standard. *Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (2017)*⁶ recommends for an entry curve with a 40 km/h design speed that the acceleration lane be a minimum 570 metres long on a level grade.

⁶ Austroads, 2017, *Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections*, publication no. AGRD04A-17, pp41

Other acceleration and deceleration lanes at the intersection were also far below minimum standards and did not allow for safe and efficient access and egress to Mallala Road. RAA recommends that all acceleration and deceleration lanes at the intersection be extended to allow safe entry and egress to Mallala Road.



The length of the left turn acceleration lane is far too short

Key Recommendations

Port Wakefield Road – Key Recommendations		Authority
<ul style="list-style-type: none"> Review guide post delineators and replace where necessary to ensure satisfactory delineation. 		DPTI
<ul style="list-style-type: none"> As a priority, reseal of the left hand northbound lane near Windsor, and the left hand southbound lane between Lower Light and Porter Road. 		DPTI
<ul style="list-style-type: none"> <u>Port Wakefield duplication and overpass</u> <ul style="list-style-type: none"> Provide convenient and clearly signed off-street parking with some allocation of space to long vehicle combinations. Ensure pedestrian movements are safe and controlled, and minimise the need for pedestrians to cross the road Consider construction of a link road between the overpass and Balaklava Road rather than a dual lane roundabout on Port Wakefield Road Ensure bridge spans are sufficient to cater for future duplication of Augusta Highway Explore concepts to remove all at-grade right turns at the intersection 		DPTI/WRC
<ul style="list-style-type: none"> <u>Intersection with Mallala Road</u> <ul style="list-style-type: none"> Extend all acceleration and deceleration lanes at the intersection. Duplicate R1-2 'give way' sign on Mallala Road. Refresh line marking. 		DPTI

Augusta Highway (Port Wakefield – Port Pirie)

For continuity purposes, RAA assessed Augusta Highway between Port Wakefield and Warnertown Road in Port Pirie. Augusta Highway is part of the federally managed National Highway network and is significant to freight and tourism across Australia. The highway is the primary b-triple and road train corridor to the north of the state, providing access between Adelaide, Perth and Darwin, and through to Queensland or New South Wales via the Wilkins Highway and the Barrier Highway.



Augusta Highway and its' key intrastate and interstate links

Duplication of Augusta Highway is listed as a long-term project for the state as outlined in the former Labor Governments *Integrated Transport and Land Use Plan (2015)*.

Issues raised in the survey related to the speed limit in Lochiel, and safety of the road through the township. Wakefield Regional Council have noted and raised the recent influx of international tourists visiting Bumbunga Lake and identified the need for a road upgrade,

including parking facilities which council are budgeting for. There is uncertainty around the future Augusta Highway alignment and this needs to be clarified before any development to support tourism takes place.

Augusta Highway is prone to many unsafe interactions between trucks and passenger vehicles, with faults on both sides.

Augusta Highway in Lochiel needs improvement. Widening and more signage and possibly a speed reduction. Very dangerous.

Lochiel township- speed restrictions and/or widening of road through town and upgrade of road for safety through town.

RAA members

Crash History

Between 2013 and 2017, 71 casualty crashes occurred on, or at intersections with the 118 kilometre section of Augusta Highway between Copper Coast Highway and Warnertown Road. Nine of these were fatal, 20 resulted in serious injuries, and 42 resulted in minor injuries.

High severity crash types such as 'hit fixed object', 'roll over', and 'head on' are common on this section of Augusta Highway with 'inattention' the most common error attributed to these crashes.

Augusta Highway Crash Types

Crash Types	No. of Crashes	Apparent Errors
Hit Fixed Object	23	Inattention (15), D.U.I (4), died sick or asleep at wheel (3), vehicle fault (1)
Roll Over	13	Inattention (7), vehicle fault (2), D.U.I, (2), O/T without due care (1), not specified (1)
Right Angle	13	Disobey give way sign (10), fail to give way (2), incorrect turn (1)
Head On	9	Fail to keep left (6), died sick or asleep at wheel (1), overtake without due care (1), inattention (1)
Rear End	9	O/T without due care (1). Died sick or asleep at the wheel (1)
Side Swipe	2	O/T without due care (1), fail to give way (1)
Left Road - Out of Control	1	Inattention (1)
Hit Object on Road	1	Inattention (1)
All Crash Types	71	Inattention (29), disobey give way sign (10), D.U.I (6), fail to keep left (6), died sick or asleep at wheel (5), O/T without due care (4), vehicle fault (3), fail to give way (3), follow too closely (3), incorrect turn (1), not specified (1)

The economic cost of crashes between Port Wakefield and Port Pirie over this five-year period exceeds \$92M, not taking into account the lifelong effects that fatal and serious crashes have on those directly involved or involved by association. This figure is estimated by adopting the willingness-to-pay approach for South Australia from *Austrroads Guide to Road Safety Part 8: Treatment of Crash Locations (2015)*⁷, and the inflation in costs from 2013 to 2017 dollars.

Traffic Volumes

Traffic volumes on Augusta Highway are high, with almost 4,000 vehicles per day using most sections of the highway between Port Wakefield and Port Pirie. When compared to 2007 estimates, traffic volumes have increased by approximately 25%.

Augusta Highway Traffic Volumes

Segment	Length (km)	AADT	% Commercial Vehicles	2007 Estimated AADT
Copper Coast Highway – Lochiel	28.5	3800	22.5%	3300
Lochiel - Snowtown	16.5	3700	27.0%	2800
Snowtown Bypass	2.0	3800	21.0%	2900
Snowtown - Redhill	27.0	3500	21.5%	2800
Redhill – Clements Road	13.5	3500	21.5%	2800
Clements Road – Crystal Brook	5.5	4000	24.5%	3100
Crystal Brook Bypass	7.0	3500	21.5%	2700
Crystal Brook – Wilkins Highway	7.5	5000	18.0%	3600
Wilkins Highway – Warnertown	6.0	5700	14.0%	5200
Warnertown – Port Pirie	5.5	4800	19.0%	3600

Not only have commercial vehicle volumes increased at about the same rate since 2007, but the maximum size and weight limits of these vehicles have also increased with a shift to higher productivity vehicles. This suggests that the total volume of freight transported on this section of Augusta Highway may have actually increased substantially more than 25% since 2007.

Augusta Highway Freight Traffic Volumes

Segment	No. of Commercial Vehicles	2007 No. of Commercial Vehicles
Copper Coast Highway – Lochiel	800	750
Lochiel - Snowtown	1000	750
Snowtown Bypass	800	650
Snowtown - Redhill	750	650
Redhill – Clements Road	750	650
Clements Road – Crystal Brook	950	600
Crystal Brook Bypass	750	600
Crystal Brook – Wilkins Highway	900	750
Wilkins Highway – Warnertown	800	750
Warnertown – Port Pirie	900	650

⁷ Austrroads, 2015, *Austrroads Guide to Road Safety Part 8: Treatment of Crash Locations*, publication no. AGRS08-15, pp 49 – 52.

Road Widths

Road geometry is very good for a two-lane two-way road, with lanes a suitable width for high freight use, and at least 1.5 metre sealed shoulders for most of the road between Port Wakefield and Port Pirie.

Augusta Highway Widths

Segment	Lane Width	Sealed Shoulder Width	Total Seal Width
North of Port Wakefield	3.6m	1.5m – 1.7m	10.4m
South of Lochiel	3.4m – 3.6m	1.8m – 2.2m	11.0m
North of Lochiel	3.4m – 3.5m	1.7m – 1.9m	10.5m
South of Collinsfield Road (Collinsfield)	3.4m – 3.6m	1.5m – 1.7m	10.2m

Speed Limits

Between Port Wakefield and Snowtown, the speed limit on the open road is 110 km/h, but is reduced to 80 km/h through Lochiel and Warnertown, and briefly to 100 km/h through the intersection with Copper Coast Highway and the bypass of Port Pirie.

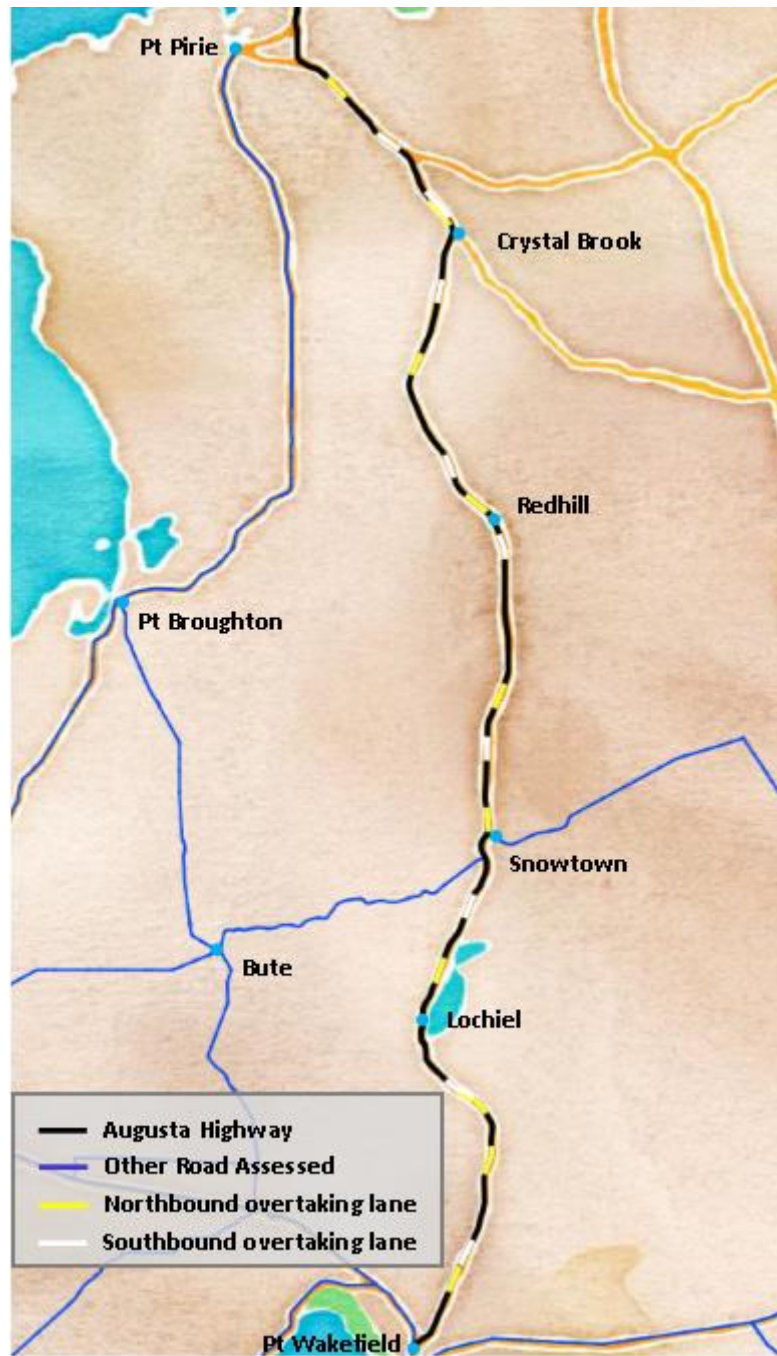
Augusta Highway Speed Limits

Segment	Length (km)	Speed Limit (km/h)
Copper Coast Highway – Lochiel	28.5	110
Lochiel	1.3	80
Lochiel Warnertown	17.0	110
Warnertown	0.7	80
Warnertown – Port Pirie	4.0	110
Port Pirie Bypass	6.5	100

Observations

Augusta Highway is constructed to a good standard generally, with 19 overtaking lanes between Port Wakefield and Port Pirie, or (on average) an overtaking lane every 6.2 kilometres. This is split between 10 lanes for northbound traffic and 9 lanes for southbound traffic. Some of these overtaking lanes only just meet the minimum length of 1605 metres (for road train routes) recommended in *Austrroads Guide to Road Design Part 3: Geometric Design (2016)*⁸, with eight falling below this length. Five of the overtaking lanes exceed two kilometres in length, which is approximately the minimum distance required to safely overtake a vehicle travelling at 100km/h without exceeding the 110km/h speed limit. There are other opportunities available for overtaking outside of the designated overtaking lanes, but high opposing traffic volumes often restrict the availability of the oncoming lane for overtaking.

⁸ Austrroads, 2016, *Austrroads Guide to Road Design Part 3: Geometric Design*, publication no. AGRD03-16, pp 225 – 236.



Locations of 19 overtaking lanes between Port Wakefield and Port Pirie

A number of rest stops are provided at some locations in each direction, providing basic facilities including a shelter and a bin, with seating and solar lighting provided on some occasions. Generally, these are well signed and entry points were clearly defined. Turnoffs to townships are also signed clearly, and drivers are encouraged by advisory signs to take the turn off into town if they need a break.

ATLM is present along the edge lines for most of this section of Augusta Highway, and line marking was in generally good condition with RRPMS and guide post delineators provided consistently.

The road surface is in serviceable condition for the most part, however, there is some evidence of surface polishing and ruts forming in the wheel paths. The section between Snowtown and Redhill is in poor condition compared to the remainder of the highway, and it is recommended

that remediation works take place in this section, especially for the five kilometres south of Redhill.



Road geometry on Augusta highway is good for a two-lane two-way road (polishing in the wheel paths is evident)

Regular overtaking lanes have delayed the need for a dual carriageway on Augusta Highway for some time, however due to the consistently high traffic and freight volumes, RAA concludes that duplication is the most effective and safest way forward for improving safety and efficiency on Augusta Highway. RAA recommends that the State and Federal Government work together, plan for, and fund the staged duplication of Augusta Highway between Port Wakefield and Port Augusta.

Lochiel

Lochiel is one of two townships that Augusta Highway does not bypass (with the other being Warnertown) and the speed limit is 80km/h through town. Development is currently contained on the west of the Highway, with Bumbunga Lake to the east.

Generally, an 80km/h speed limit would be acceptable for this level of roadside development, however, pedestrian activity between Bumbunga Lake and facilities in Lochiel is frequent. RAA recommends that speed limits be reviewed with consideration to pedestrian safety and expected vehicle compliance.



Development is contained to the west of Augusta Highway in Lochiel, with Bumbunga Lake on the east

Bumbunga Lake is a popular tourist drawcard in the region, attracting international visitors. As such, Wakefield Regional Council have expressed interest in improving amenities in Lochiel to increase tourism and enhance visitor experience. Due to current uncertainty around the future alignment of Augusta Highway, land that could be used for this purpose remains vacant and undeveloped.

RAA recommends that local councils be consulted early in the design process regarding the future alignment of Augusta Highway such that they are able to budget for and arrange complementary works along the corridor.

Key Recommendations

Augusta Highway – Key Recommendations		Authority
<ul style="list-style-type: none"> ▪ Remediate uneven pavement between Snowtown and Redhill. 		DPTI
<ul style="list-style-type: none"> ▪ Plan for and progressively duplicate Augusta Highway. <ul style="list-style-type: none"> ○ Consult with local councils early on in the design process such that they are able to budget for and arrange complementary works along the corridor. 		DPTI
<ul style="list-style-type: none"> ▪ Review 80km/h speed limit in Lochiel with consideration to pedestrian safety and expected vehicle compliance. 		DPTI/WRC

Copper Coast Highway (Port Wakefield – Wallaroo)

Copper Coast Highway is a state maintained highway and is the gateway to the Yorke Peninsula for both freight and tourists approaching from Adelaide or the eastern states. Copper Coast Highway was raised a number of times in the survey, particularly in relation to 'crash corner' and the recently constructed roundabout at the intersection with Yorke Highway. Other issues raised included a lack of overtaking lanes, and the condition of the highway between Kadina and Wallaroo.

The below comments are typical of the concerns raised in the survey.

Copper Coast Highway improvements need to be made ASAP. In particular the stretch into Wallaroo.

In Wallaroo, the intersection with Copper Coast Highway, Victoria Street, Charles Terrace, East Terrace and Athena Drive could do with a roundabout to improve safety.

Copper Coast Highway past Kulpara could do with overtaking lanes and now that the upgrade is complete, a return to 110 km/h speed limit.

RAA members

RAA's 2014 Yorke Peninsula Regional Road Assessment recommended an increase in lane width to 3.5m and shoulder seal to 1.0m, as well as additional barrier protection. This work has been undertaken since 2014, bringing the highway up to a much higher standard than previously.

Copper Coast Highway was a significant beneficiary of the 2017/18 \$40M *Upper Yorke Peninsula Regional Road Network Upgrade Program* with the worst sections being reconstructed or resealed. Other improvements included the new roundabout at the intersection with Yorke Highway, shoulder widening along all sections with narrow shoulders, and safety improvements including barrier protection and hazard mitigation. These recent upgrades have improved the worst sections of Copper Coast Highway, and the Yorke Highway roundabout has generated both positive and negative commentary from RAA members.

Crash History

Between 2013 and 2017, 51 casualty crashes occurred on or at intersections with Copper Coast Highway with four of these fatal, eight resulting in serious injuries and the remaining 39 resulting in minor injuries.

Single vehicle 'hit fixed object' and 'roll over' type crashes are common along with 'right angle' type crashes, with nine out of 15 'right angle' crashes occurring at 'crash corner'. Recent improvements to widen the shoulder seal should reduce the likelihood of these single vehicle crashes, however, RAA still recommends that ATLM be installed to complement this treatment and further reduce the likelihood of these crashes.

Copper Coast Highway Crash Types

Crash Types	No. of Crashes	Apparent Error
Right Angle	15	Disobey give way sign (10), fail to give way (3), incorrect turn (1), disobey stop sign (1)
Hit Fixed Object	14	Inattention (10), D.U.I (2), died sick or asleep at wheel (1), O/T without due care (1)
Roll Over	8	Inattention (8)
Rear End	6	Follow too closely (3), inattention (3)
Head On	4	Fail to Keep Left (3), unspecified (1)
Side Swipe	2	D.U.I (1), fail to give way (1)
Other	1	Insecure load (1)
Right Turn	1	Fail to stand (1)
All Crashes	55	Inattention (22), disobey give way sign (10), fail to give way (4), follow too closely (3), fail to keep left (3), D.U.I (2), insecure load (1), incorrect turn (1), fail to stand (1), O/T without due care (1), disobey stop sign (1), died sick or asleep at wheel (1), unspecified (1)

Traffic Volumes

Estimated traffic volumes between Port Wakefield and Kadina have increased marginally since 2007, with the exception being the section between Port Wakefield and Yorke Highway, which has had an approximate increase of 1,000 vehicles per day over this time. Estimated traffic volumes have also substantially increased in Kadina and Wallaroo as well as on the section between Kadina and Wallaroo.

Copper Coast Highway Traffic Volumes

Segment	Length (km)	AADT	% Commercial Vehicles	2007 Estimated AADT
Augusta Highway – Yorke Highway	5.5	4900	14.5%	3900
Yorke Highway – Upper Yorke Road (Kulpara)	11.0	3000	12.5%	2200
Upper Yorke Road (Kulpara) – Middle Terrace (Paskeville)	13.0	2400	13.5%	2400
Middle Tce (Paskeville) – Thrington Road	5.0	2600	11.0%	2400
Thrington Road – East Terrace (Kadina)	13.0	2100	16.5%	2000
East Tce (Kadina) – Mines Road (Kadina)	0.5	3400	11.0%	2400
Mines Rd (Kadina) – Harris Road (Kadina)	3.5	9000	5.0%	7100
Harris Road (Kadina) – East Terrace (Wallaroo)	5.5	6500	5.0%	4400
East Terrace (Wallaroo) – Owen Terrace (Wallaroo)	1.0	3600	5.5%	2400

Road Widths

Copper Coast Highway is geometrically very good, with wide lanes and sealed shoulders provided along the entire highway between Port Wakefield and the outskirts of Wallaroo.

Copper Coast Highway Widths

Segment	Lane Width	Sealed Shoulder Width	Total Seal Width
Northwest of Yorke Highway	3.5m	2.3m – 2.5m	10.8m
Near Thrington Road (estimated)	3.4m	1.2m	9.2m



The geometry of Copper Coast Highway has been significantly improved since our 2014 assessment.

Speed Limits

Copper Coast Highway is predominantly governed by a 100 km/h speed limit, with an 80 km/h section in place for the 3.5 kilometres through the Hummocks, east of Kulpara. Speeds are reduced into towns by way of 80 km/h buffer zones with the exception of Paskeville, where the speed limit is reduced to 60 km/h by way of a G9-79 'speed limit ahead' sign. Local residents successfully petitioned to have the speed limit through Paskeville changed from 80km/h to 60 km/h, with changes implemented in December 2017. There were some comments in the member survey suggesting that the 80 km/h speed limit should be reinstated, however, the level of roadside development warrants a 60 km/h speed limit through the township.

Copper Coast Highway Speed Limits

Segment	Length (km)	Speed Limit (km/h)
Augusta Highway – Yorke Highway (Federation Corner)	5.5	100
Federation Corner Roundabout	0.3	80
Federation Corner – Kulpara	10.5	100
Kulpara	2.0	80/60/80
Kulpara – Paskeville	11.5	100
Paskeville	1.5	80
Paskeville – Kadina	17.0	100
Kadina	5.0	80/60/80
Kadina – Wallaroo	3.0	100
Wallaroo	3.0	80/60/50

Observations

Following recent upgrades, Copper Coast Highway has very good geometry, with suitable lane and shoulder widths for the entire length. The pavement is in good condition for the most part, with many of the undulating and deteriorating sections having been recently repaired. There were two sections of the highway in noticeably poorer condition than the rest, including the section west of Kulpara, where the speed limit increases from 60 km/h to 80 km/h to 100 km/h, for approximately 1,500 metres, and the section in Wallaroo, west of Beare Street where the pavement has significantly failed, and there is no shoulder seal. RAA recommends that undulations be repaired west of Kulpara, and the section west of Beare Street be resealed, or fully reconstructed if pavement testing indicates that this is required.



The pavement is failing west of Beare Street in Wallaroo

One of the key issues noted during the RAA assessment is a lack of overtaking lanes and the suitability of current overtaking lanes. There are currently two overtaking lanes, both east of Kulpara and both for westbound vehicles. The first is encountered one kilometre north of 'crash corner' and is approximately 1.1 kilometres in length (1.3 kilometres including tapers). The next overtaking lane is located 12 kilometres further northwest, and is better defined as a climbing lane for heavy or slow vehicles on the winding incline through the Hummocks to Kulpara. There were 15 casualty crashes on this section between 2013 and 2017, and the speed limit was reactively reduced to 80 km/h late in 2017. Most modern vehicles are able to maintain this speed, and the overall effectiveness of this overtaking lane has subsequently reduced.

The 28 kilometre section of Copper Coast Highway between Kulpara and Wallaroo is the busiest road segment in the region without overtaking lanes. RAA recommends that at least three overtaking lanes be provided in the following locations;

- Westbound, between Kulpara and Kadina,
- Eastbound, between Kulpara and Kadina, and
- Eastbound, between Kulpara and Port Wakefield.

Intersection with Yorke Highway (Federation Corner)

The intersection with Yorke and Copper Coast Highway has traditionally performed poorly, both for safety reasons and congestion issues during peak holiday periods. Tragically, three people lost their lives in 2015, with another four seriously injured in a crash at the intersection. A roundabout was recently installed at a cost of \$4M, with completion in January 2018.

Survey respondents generally thought the roundabout had significantly improved safety, however, there were doubts raised about the effect it has in reducing congestion. The responses below are typical of what was mentioned in the survey.

The roundabout at the top of the peninsula is great – it actually makes it easier to see what is coming.

For me personally it has made the trip smoother and a bit shorter.

Not considering long weekends when traffic flow is a problem, I do think traffic is safer with the roundabout.

The roundabout should have been moved to the top of the hill (towards Pt Wakefield) to give a better view of oncoming traffic from that direction for people coming from the south, and been two lanes wide from the Copper Coast direction. It has not solved the issue of traffic congestion at holiday time.

RAA members

The speed limit of Copper Coast Highway in the vicinity of the roundabout is 80 km/h, and there were a number of members concerned that this was too fast to travel through the roundabout. The 80 km/h speed limit is a safety precaution when approaching the roundabout as the required stopping sight distance (distance travelled whilst reacting, and braking for a hazard/intersection) is much lower at 80km/h than at 100km/h. The intention is not to travel through the roundabout at 80km/h and as with all roundabouts, requires a much lower travel speed than the sign posted speed limit to be effective.



The new Federation Corner roundabout

The new roundabout has significantly improved safety at the intersection by reducing speeds and impact angles in the event of a crash. Signage was clear, and delineation was good during the day. Delineation was also suitable at night with street lighting, RRPMS, guide posts and reflective paint all present. Heavy vehicles were observed making all turning movements without restriction.

Another feature uncommon to roundabouts is the traffic signals on the Yorke Highway approach to the roundabout. The majority of the time, these signals are not operational, but when queues are detected beyond a predefined length on Copper Coast Highway, Yorke Highway traffic is given a red light to allow traffic on Copper Coast Highway to pass through. This is particularly aimed at reducing congestion and improving traffic flow during peak holiday periods, especially when a large number of tourists are returning to Adelaide via the Yorke and Copper Coast Highways. We have yet to notice a significant improvement in congestion, but when paired with the \$90M overpass and highway duplication project in Port Wakefield, the improvements at Federation Corner should be substantially more noticeable.

Intersection with Upper Yorke Road

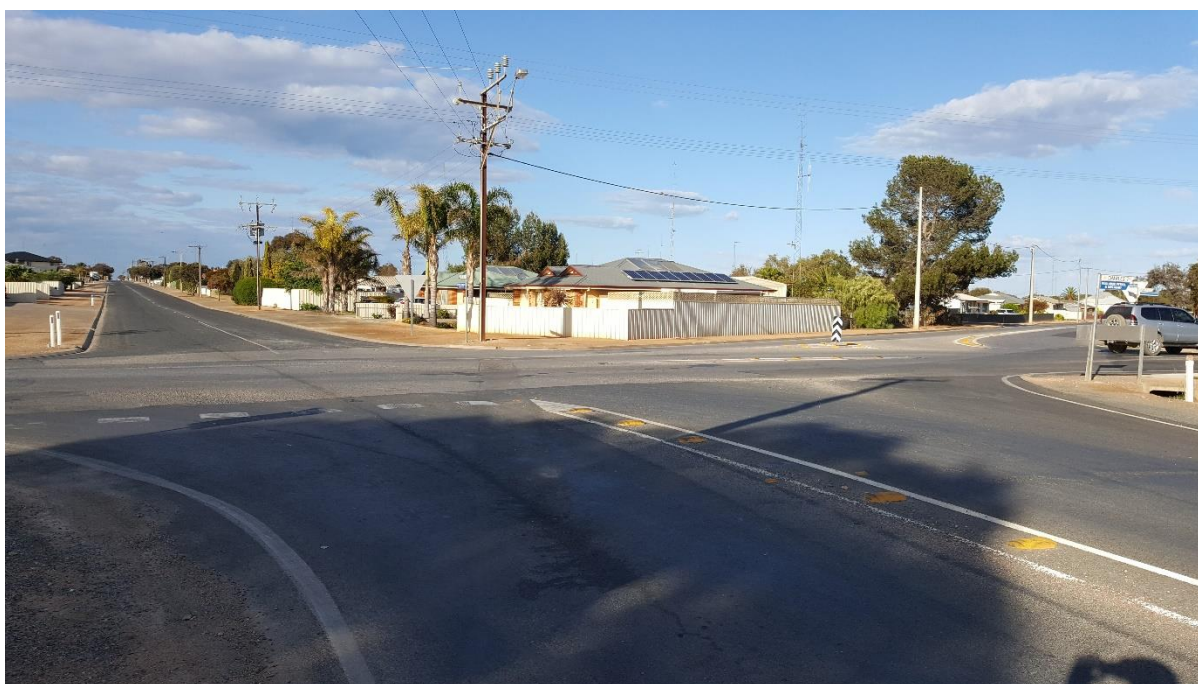
Respondents in the member survey raised the intersection of Copper Coast Highway and Upper Yorke Road in Kulpara. Whilst on site, the primary deficiency noted was the poor condition of line marking. RAA recommends that all line marking at the intersection be refreshed, and an edge continuity line be installed on Copper Coast Highway. RAA also suggests that RRPMS be installed to provide better delineation in poor weather and at night as the level of street lighting is poor. Barrier protection should be considered for the culvert on the southwestern corner of the intersection.



Line marking at the intersection with Copper Coast Highway and Upper Yorke Road is deteriorated

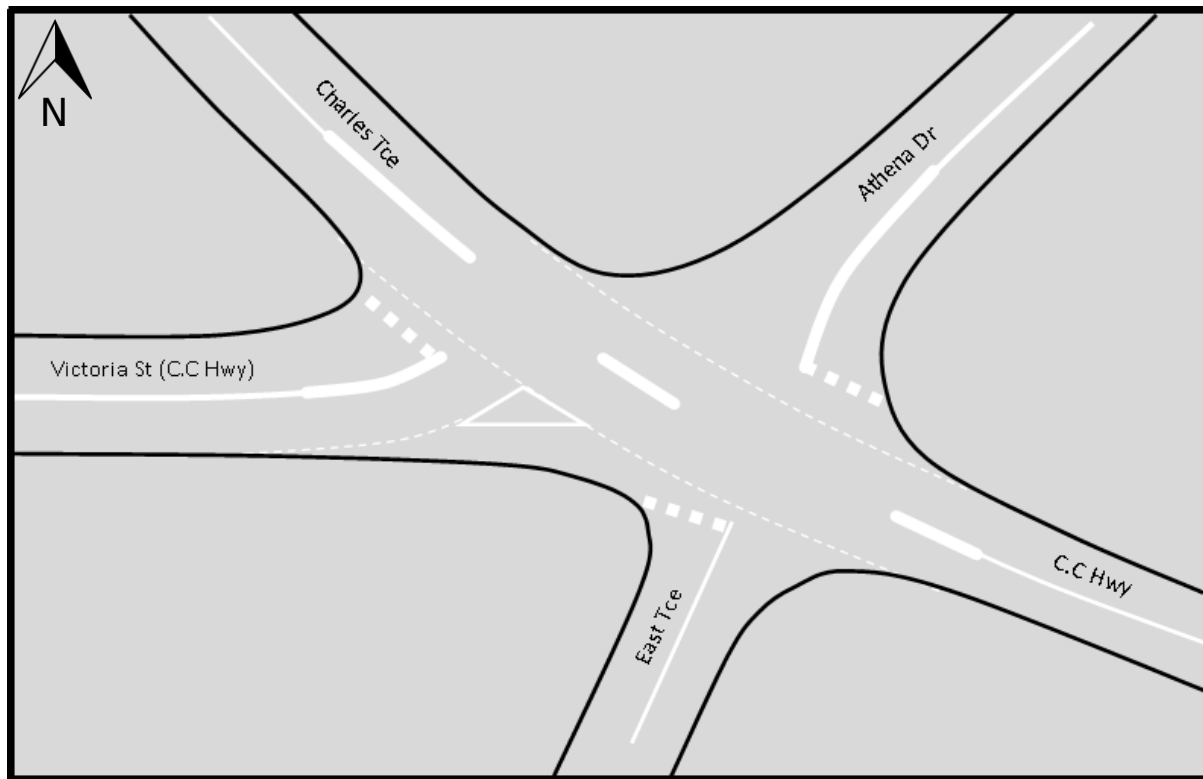
Five-way intersection with Athena Drive (Wallaroo 5-way)

The five-way intersection in Wallaroo was raised in the RAA member survey a number of times, with the consensus being that a roundabout would ease difficulties in this location. Whilst RAA agrees that a roundabout could vastly improve the intersection, it is not possible to create an effective solution on the current footprint with adjacent property boundaries, the skewed layout, drainage and services creating further issues. A roundabout would be a very costly exercise, as it would most likely require relocation of services, drainage upgrades, adjustments to property boundaries and re-alignment of roads. There was one casualty crash (resulting in minor injuries) at the intersection between 2013 and 2017, which suggests that the cost of designing and installing a roundabout is not currently warranted.



Line marking is faded and the layout is somewhat confusing

Line marking at the intersection was faded, which does create some confusion with priorities. RAA recommends refreshing line marking at the intersection, and installing continuity edge lines along the continuing road (Copper Coast Highway/Charles Terrace) to delineate the priority path through the intersection, as pictured below.



Continuity edge lines would delineate the priority path through the intersection

Key Recommendations

Copper Coast Highway – Key Recommendations		Authority
▪ Install ATLM on the remaining sections lacking this treatment west of Kulpara.		DPTI
▪ Repair undulations west of Kulpara.		DPTI
▪ Reseal or reconstruct (if necessary) the section west of Beare Street, Wallaroo.		DPTI
▪ Install a minimum of three new overtaking lanes.		DPTI
▪ <u>Intersection with Upper Yorke Road</u> <ul style="list-style-type: none"> ○ Refresh line marking, install continuity edge line on Copper Coast Highway, and install RRPMS ○ Consider barrier protection for the culvert on the southwestern corner 		DPTI
▪ <u>Five-way Intersection with Athena Drive</u> <ul style="list-style-type: none"> ○ Refresh line marking and install continuity edge lines to delineate the priority path through the intersection 		DPTI

Upper Yorke Road (Maitland – Port Broughton)

Upper Yorke Road is a state maintained road connecting Port Broughton in the north to Maitland in the south, passing through the townships of Bute, Kulpara and Artherton.

Upper Yorke Road is an approved b-double route, however freight only is limited to a maximum speed of 80 km/h between Kulpara and Maitland as quoted on the state governments RAVnet (2018)⁹ heavy vehicle routing maps.

The sections raised most often in the survey were the Artherton to Maitland segment, and the Port Broughton to Bute segment, with Artherton to Maitland one of the roads mentioned most often of all Yorke Peninsula roads by respondents.

The road between Artherton and Maitland is a disgrace. It is a danger to motorists and an embarrassment to the state.

I drive from Artherton to Maitland every day to work. I often veer onto the dirt in my 4wd because the road is not wide enough to pass trucks safely.

Port Broughton to Bute road needs to be brought up to the same standard as the Bute to Kulpara road.

The road from Kulpara through to Minlaton is an absolute disgrace and is a fatal accident waiting to happen. It is narrow and two trucks cannot pass without both leaving the road surface onto the shoulder where there are steeper parts that would have guard rails on other roads. It is also so undulating that even in a modern car, you are barely confident to drive at the reduced speed limit.

RAA members

Crash History

Between 2013 and 2017, seven casualty crashes occurred on Upper Yorke Road between Port Broughton and Maitland, with three of these resulting in serious injuries, and four resulting in minor injuries. Four of these occurred between Port Broughton and Bute, one occurred between Bute and Kulpara, and two occurred between Kulpara and Maitland.

Upper Yorke Road Crash Types

Crash Types	No. of Crashes	Apparent Error
Head On	2	D.U.I (1), fail to keep left (1)
Hit Fixed Object	2	Inattention (2)
Rear End	1	Inattention (1)
Roll Over	1	Unspecified (1)
Side Swipe	1	Overtake without due care (1)
All Crashes	7	Inattention (2), D.U.I (1), fail to keep left (1), O/T without due care (1), unspecified (1)

⁹ RAVnet, 2018, Online Heavy Vehicle Routing Tool, accessed 22/10/18 on <https://maps.sa.gov.au/ravnet/index.html>

Traffic Volumes

Estimated traffic volumes on Upper Yorke Road are below 500 vehicles per day, on average, with little change since 2007. Freight generally makes up 10% of this traffic, however, this is expected to be higher during harvesting which usually commences in November.

Upper Yorke Road Traffic Volumes

Segment	Length (km)	AADT	% Commercial Vehicles	2007 Estimated AADT
Elizabeth Street – Moonta Road (Maitland)	0.5	2600	7.5%	2700
Moonta Road – North Terrace (Maitland)	0.5	2300	7.5%	2300
North Terrace (Maitland) – Kalkabury Road (Artherton)	15.0	470	7.5%	400
Kalkabury Road – Copper Coast Highway (Kulpara)	35.0	140	20.0%	150
Copper Coast Highway – Railway Terrace (Bute)	23.0	400	9.0%	450
Railway Terrace – North West Terrace (Bute)	0.5	450	11.0%	450
North West Terrace – Bay Street (Port Broughton)	31	430	10.5%	420

Road Widths

There are three distinct sections of Upper Yorke Road with varying geometry. Working from north to south, the Port Broughton to Bute section generally provides a six metre seal width or slightly greater, with no sealed shoulder for the most part. The recently upgraded section between Bute and Kulpara has excellent geometry with 3.3m wide lanes and 1.0 metre sealed shoulders on average. The section between Kulpara and Maitland through Artherton is very narrow with only a 5.5 metre seal width. Currently around 25% of Upper Yorke Road has sealed shoulders. RAA recommends that all remaining sections be widened to provide 3.3 metre wide lanes and 1.0 metre wide sealed shoulders consistent with the Bute to Kulpara section.

Upper Yorke Road Widths

Segment	Lane Width	Sealed Shoulder Width	Total Seal Width
North of Garfield Road (Pt Broughton – Bute)	2.9m – 3.3m	N/A	6.2m
North of Cameron Road (Bute – Kulpara)	3.0m – 3.5m	1.0m – 1.3m	8.8m
South of Black Gate Road (Kulpara – Maitland)	2.7m – 2.9m	N/A	5.6m
North of Bowey Road (Kulpara – Maitland)	3.2m – 3.3m	N/A	6.5m
South of Pootawana Rd	2.7m – 2.8m	N/A	5.5m
South of Artherton	2.7m – 2.8m	N/A	5.5m

The map below outlines all sections of Upper Yorke Road with any level of shoulder seal as of October 2018.



Current sections of shoulder seal on Upper Yorke Road

Speed Limits

The speed limit on the open sections of Upper Yorke Road is 100 km/h, with an 80 km/h buffer zone used to reduce the speed limit to 50 km/h or 60 km/h through townships. The 100 km/h zone has been long standing between Bute and Maitland, however, the Port Broughton to Bute section was reduced from 110 km/h to 100 km/h in November 2011 as part of DPTI's *Now 100* speed limit reduction campaign.

Freight is restricted to 80 km/h between Kulpara and Maitland, however this is not signposted and information is provided on RAVnet heavy vehicle routing maps.

Upper Yorke Road Speed Limits

Segment	Length (km)	Speed Limit (km/h)
Maitland	1.0	50/80
Maitland - Arthurton	13.0	100
Arthurton	0.8	80/60/80
Arthurton - Kulpara	34.5	100
Kulpara	1.5	80/60/80
Kulpara – Bute	21.5	100
Bute	1.5	80/50/80
Bute – Port Broughton	28.0	100
Port Broughton	0.3	80/60

Observations

Port Broughton – Bute

The section between Port Broughton and Bute is approximately 31 kilometres long. Shoulders are sealed and geometry is good for the first five kilometres when heading south from Port Broughton. The shoulder seal ends approximately two kilometres south of Bypass Road. W-beam barrier has also been recently installed to protect roadside hazards and around curves in this section. There are some small undulations in this first five kilometre section. The narrower section continues for a further 24 kilometres to the intersection with Barunga Road, where a narrow shoulder seal has been applied for the remaining two kilometres into Bute. Interactions with freight on the route were very tight, with little margin for error.



Freight interactions were tight between Port Broughton and Bute

In general, the gravel shoulder is in reasonable condition, however, there are some areas where the edges of the bitumen are crumbling and drop-offs are forming. The road is generally quite undulating, with cracks and ruts present in many areas.

RAA recommends that shoulders be sealed to one metre wide on the remaining 24 kilometres without sealed shoulders between Port Broughton and Bute, and lanes widened to 3.3 metres. Consideration should be given to a full re-seal, or as a minimum, significant repair to ruts and undulations in the road surface.

Bute – Kulpara

The section between Bute and Kulpara spans approximately 23 kilometres and has recently been upgraded with \$9M spent over three years between 2015 and 2017 to reseal the road in its entirety, including four kilometres of road reconstruction north of Kulpara. This section of Upper Yorke Road featured highly in RAA's 2013 Risky Roads campaign, receiving 27 nominations from across the state, making it the third most nominated road in South Australia. The investment in this road has made a significant difference with the below image comparing a photo from our October 2018 assessment to a photo taken in 2013 following our Risky Roads survey.



The Bute to Kulpara section of Upper Yorke Road in 2018 compared to 2013 (inset)

It was noted that D4-1-1 'unidirectional hazard markers' are being used to incorrectly delineate curves on this and other sections of Upper Yorke Road. RAA recommends that these be replaced with D4-6 'chevron alignment markers' as specified in AS1742.2 (2009)¹⁰ and discussed earlier in this report.

Kulpara – Maitland

The section between Kulpara and Maitland is approximately 50 kilometres long, passing through Artherton. This section is the poorest section of Upper Yorke Road, and is very narrow and uneven for most of the length. There are some short, localised sections of widening around curves, but for the most part the narrow carriageway continued around curves. As part of their conditions of use, heavy vehicles are restricted to 80 km/h along this section due to the poor geometry and road condition.

Failures in the pavement included potholes, cracks, ruts, edge break up and edge drop off, with corrugations and surface polishing also noted in some areas. The road is in an overall state of disrepair and requires significant investment to bring it to a safe and acceptable standard.

RAA recommends a full reseal between Kulpara and Maitland, increasing lane widths to 3.3 metres and shoulder widths to one metre, including edge lines. Vegetation clearance may also be required to achieve a satisfactory clear zone.

¹⁰ Standards Australia, 2009, *Manual for uniform traffic control devices part 2: Traffic control devices for general use*, AS1742.2 – 2009, pp72-74, 97.

Key Recommendations

Upper Yorke Road – Key Recommendations	Authority
<ul style="list-style-type: none">▪ Seal shoulders to a desirable minimum of 1.0m for the remaining sections without sealed shoulders (approximately 75km).	DPTI
<ul style="list-style-type: none">▪ Replace incorrectly used D4-1-1 'unidirectional hazard markers' with D4-6 'chevron alignment markers' as specified in AS1742.2.	DPTI
<ul style="list-style-type: none">▪ <u>Port Broughton to Bute:</u>▪ Consider full re-seal, with local rut and undulation repairs required as a minimum.▪ Increase lane widths to 3.3m	DPTI
<ul style="list-style-type: none">▪ <u>Kulpara to Maitland:</u><ul style="list-style-type: none">○ Full reseal between Kulpara and Maitland including widening, shoulder seal and edge lines.○ Increase lane widths to 3.3m	DPTI

Yorke Highway (Port Wakefield – Stenhouse Bay)

Yorke Highway is a state maintained highway and initially runs down the east coast of the Yorke Peninsula, connecting to Copper Coast Highway at the northern end before heading inland south of Ardrossan and continuing south to Stenhouse Bay in the Innes National Park. Yorke Highway traverses a number of major towns in the region including Ardrossan, Minlaton, Warooka and Marion Bay, and is significant corridor for both freight and tourism, with the northern section a b-triple/road train route.

As an important freight route in the region, it links major silo sites in Ardrossan and Port Giles with the state and national highway network, as well as the rest of Yorke Peninsula.

Recent improvements completed through the *Upper Yorke Peninsula Regional Road Network Upgrade Program* have significantly improved safety on the northern section of the highway. There is a good level of community support for the recently constructed overtaking lanes on Yorke Highway, however, survey respondents felt that more overtaking lanes were required, particularly further south. The below survey responses are typical of those regarding Yorke Highway.

The additional passing lanes and right turn lanes on the Yorke Highway have considerably added to the opportunities for safe passing. These opportunities need to be more frequent and extended further south.

RAA member

Crash History

Between 2013 and 2017, 31 casualty crashes occurred on Yorke Highway with four resulting in fatalities, six in serious injuries, and 21 in minor injuries. The majority of crashes were single vehicle crashes, with 'hit fixed object' and 'roll over' type crashes making up 58% (18) of all crashes on Yorke Highway with many of these being attributed to inattention. RAA recommends installation of ATLM along the length of Yorke Highway to combat these crash types. 'Head on' type crashes were also prevalent, which is noteworthy due to the high severity of this crash type.

Yorke Highway Crash Types

Crash Types	No. of Crashes	Apparent Errors
Hit Fixed Object	14	Inattention (9), D.U.I (3) died sick or asleep at wheel (1), dangerous driving (1)
Head On	4	Fail to Keep Left (3), unspecified (1)
Rear End	4	Inattention (2), follow too closely (1), O/T without due care (1)
Roll Over	4	Inattention (4)
Right Angle	2	Fail to give way (1), disobey give way sign (1)
Right Turn	1	Fail to give way (1)
Hit Pedestrian	1	Inattention (1)
Side Swipe	1	Fail to Give Way (1)
All Crashes	31	Inattention (16), D.U.I (3), fail to keep left (3), fail to give way (2), follow too closely (1), died sick or asleep at wheel (1), O/T without due care (1), dangerous driving (1), disobey give way sign (1), fail to stand (1), unspecified (1)

Traffic Volumes

The northern section of Yorke Highway carries approximately 2000 vehicles per day, of which approximately 15% are freight. South of the St Vincent Highway intersection, traffic volumes are substantially lower, with a lower overall percentage of freight movement. Traffic volumes through townships are high, but on the open road, most sections are travelled by an average of 500 to 800 vehicles per day.

Yorke Highway Traffic Volumes

Segment	Length (km)	AADT	% Commercial Vehicles	2007 Estimated AADT
Copper Coast Hwy (Pt Wakefield) – Old Boundary Rd	25.1	2400	18.0	2300
Old Boundary Rd – One and All Rd (Clinton)	2.0	2000	15.5	1900
One and All Rd – Arthurton Rd (Ardrossan)	15.2	2200	12.0	2100
Ardrossan	2.5	1700 - 2100	15.0	N/A
Bowman Rd (Ardrossan) – St Vincent Hwy	11.0	2000	15.0	1600
St Vincent Hwy – Bittner Rd	19.3	550	9.0	350
Bittner Rd – Roolama Rd	4.4	550	8.5	400
Roolama Rd – Mount Rat Rd (Curramulka)	2.0	500	8.0	290
Mount Rat Rd – Port Vincent Rd	8.8	700	8.0	460
Port Vincent Rd – Curramulka Rd (Minlaton)	3.2	950	6.0	900
Minlaton	1.3	3000	9.5	2800
South Tce (Minlaton) – Harry Butler Rd	2.0	1200	11.5	800
Harry Butler Rd – Corny Point Rd	26.3	800	14.0	460
Corny Point Rd – Main St (Warooka)	3.7	550	12.5	410
Warooka	2.5	1500	12.5	1300
Main St (Warooka) – Point Turton Rd	2.8	950	13.5	N/A
Point Turton Rd – White Hut Rd	3.8	650	11.5	N/A
White Hut Rd – Lowan Dr (Marion Bay)	46.0	250	11.0	210

Road Widths

Lane geometry is generally acceptable, particularly on the recently upgraded section between the Copper Coast and St Vincent Highways that can now comfortably cater for b-triple traffic. South of St Vincent Highway, lanes would desirably be a consistent 3.3m wide, and there are many sections still lacking shoulder seal. RAA recommends that shoulders are sealed to one metre on all remaining sections of Yorke Highway between Ardrossan and Marion Bay as shown on the shoulder seal map below.

Yorke Highway Widths

Segment	Lane Width	Sealed Shoulder Width	Total Seal Width
North of Clinton	3.6m – 3.7m	0.7m – 0.9m	8.9m
South of Pine Point Road	3.1m – 3.3m	N/A	6.4m
South of Germein Road	3.0m – 3.3m	1.2m – 1.5m	9.0m
North of Tillbrook Road	3.1m – 3.2m	N/A	6.3m
South of White Hut Road	3.1m	N/A	6.2m
East of Infracombe Road	3.0m – 3.1m	N/A	6.1m
South of Marion Bay	2.9m – 3.0m	0.1m – 0.2m	6.2m



Map of Yorke Highway showing where shoulders are sealed

Speed Limits

The speed limit on the open road between Port Wakefield and Marion Bay is 100 km/h, with reductions through townships facilitated by 80 km/h buffer zones. The speed limit through Marion Bay is 90 km/h, which raised some concerns with survey respondents (see example below). RAA recommends this speed limit be reviewed with consideration given to reducing the speed limit during peak tourist seasons as a minimum.

Slow down going through Marion Bay Township, cars thunder through at 90 km/h as people are going to the shop, with houses both sides of the road.

RAA member

Yorke Highway Speed Limits

Segment	Length (km)	Speed Limit (km/h)
Copper Coast Hwy – Ardrossan	41.5	100
Ardrossan	2.5	80
Ardrossan - Minlaton	48.0	100
Minlaton	3.0	80/60/50/60/80
Minlaton – Warooka	30.0	100
Warooka	1.5	80/60/50/80
Warooka – Marion Bay	49.5	100
Marion Bay	2.5	90
Marion Bay – Stenhouse Bay	3.0	80/60/40

Observations

Port Wakefield – Ardrossan

Yorke Highway between Copper Coast Highway in Port Wakefield and St Vincent Highway is constructed to a good geometry and has had a number of improvements made since the last RAA assessment in 2014. These include road widening, especially around curves, bridge widening, new and extended overtaking lanes, a number of key intersection upgrades and general safety improvements. Many of these upgrades were part of the *Upper Yorke Peninsula Regional Road Network Upgrade Program*, and this section is now capable of moving b-triple and road train freight. Allowing these larger, more efficient vehicles on the road network reduces the overall number of trips required to move the same volume of freight, as such reducing the overall number of heavy vehicles on the road network.



Geometry north of Ardrossan is good.

There are a total of six overtaking lanes on Yorke Highway between the Copper Coast and St Vincent Highways, providing many suitable opportunities to overtake slower moving vehicles. Four of these lanes were approximately 1,600 metres long, however, the two lanes south of Ardrossan were only measured to be 1,200 metres long. Given that 1,200 metres is the distance required for one car to safely and legally overtake a 14m car and caravan

combination travelling at 90 km/h without exceeding the 100 km/h speed limit, this length needs to be reviewed. Although this provides an overtaking opportunity, for a highway limited to 100 km/h, the disparity of vehicle speeds will be lower than that of a 110 km/h road, and therefore longer distances are required to overtake a 90 km/h vehicle safely and legally in a 100 km/h zone compared to a 110 km/h zone. It is recommended that overtaking lanes are extended to meet the 1,600 metre minimum distance on a road train route as recommended by *Austroads Guide to Road Design Part 3: Geometric Design* (2016)¹¹

Ardrossan – Marion Bay

The section of Yorke Highway between St Vincent Highway, south of Ardrossan and Marion Bay is vastly different to the northern section. This section carries far less traffic, including freight, and is geometrically very different. RAA welcomes the recent investment in barrier protection between Ardrossan and Minlaton, which has made a positive improvement to safety on a road where the most prominent crash type involves vehicles leaving the road and hitting fixed objects.

There is a significant lack of shoulder seal for this section of Yorke Highway, with only three of the 120 kilometre journey having sealed shoulders. RAA recommends that shoulder sealing programs are extended to seal shoulders to 1.0m wide for the remaining sections of Yorke Highway south of Ardrossan.

Traffic and freight volumes do not dictate a strong need for overtaking lanes, however, other safety improvements such as sealing shoulders will make overtaking far safer when opportunities arise.

The surface between Ardrossan and Maitland is old and showing some textural issues, however appears to be structurally sound. Stripping of the aggregate has occurred between the wheel paths, indicating that the application rate of asphalt binder may have been insufficient at the time of construction. This doesn't present any immediate safety concerns and a good amount of aggregate is located within the wider wheel path.

Some minor undulations were observed north of Curramulka, however most other sections of the Highway provided a comfortable ride.

Intersection with Beach Road (Hardwicke Bay)

Some survey respondents reported safety concerns with the intersection of Beach Road, which is used to access Hardwicke Bay from Yorke Highway. No casualty crashes were recorded at the intersection between 2013 and 2017 although this is not the only indicator of a dangerous intersection. A selection of survey responses relating to this intersection are included below.

¹¹ Austroads, 2016, *Austroads Guide to Road Design Part 3: Geometric Design*, publication no. AGRD03-16, pp 225 – 236.

The intersection turning into Hardwicke Bay – so many near misses, one day someone is going to get killed. You cannot see traffic coming around the corner coming up from Warooka. Urgent action needs to happen before anyone gets killed.

The junction into Hardwicke bay needs a slip lane for turning into Hardwicke Bay, many near misses occur with trucks running onto the dirt shoulder to avoid a collision with cars turning into Hardwicke Bay. Come and see the skid marks.

RAA members

On investigation of this issue, the primary safety concern is a lack of protected turning lanes. Sight distance from Beach Road looking both north and south was adequate, however, there were two sight distance concerns noted, including;

- Sight distance to northbound traffic for southbound vehicles turning right into Beach Road was quite poor, primarily due to vegetation growth on the inside of the curve (top image over page).
- Sight distance to southbound traffic stopped on the carriageway intending to turn right is restricted by the crest/curve combination for southbound vehicles approaching the intersection (bottom image over page).



Poor sight distance turning right into Hardwicke Bay (North of the intersection, looking south)



Vehicles stopped on the road turning right may be concealed by the of crest and left hand curve combination (150m north of the intersection, looking south)

RAA recommends the following treatments to improve safety at this intersection:

- Removal and maintenance of vegetation on the inside of the curve to maximise sight distance.
- Constructing protected right and left turn lanes, or as a minimum widening the shoulder to 3.0 metres to allow passing through the intersection.
- Improving delineation by installing RRPM's and refreshing line marking.
- Install R1-2 'give way' sign on Beach Road to complement existing give way holding line.

Marion Bay – Innes National Park

The section of Yorke Highway south of Marion Bay through to Innes National Park is in good condition, however, this section of road has very narrow sealed shoulders. Although a low priority compared to other recommendations for Yorke Highway, widening the shoulders would be a worthwhile safety improvement on this three kilometre section.

Key Recommendations

Yorke Highway – Key Recommendations		Authority
▪ Seal shoulders between Ardrossan and Marion Bay to a width of 1.0m.		DPTI
▪ Install ATLM to combat inattention and fatigue related crashes		DPTI
▪ Review 90km/h speed limit in Marion bay with consideration given to reducing the speed limit during peak tourism season.		DPTI
▪ <u>Intersection with Beach Road (Hardwicke Bay)</u> <ul style="list-style-type: none"> ○ Remove/Maintain vegetation on the inside of the curve ○ Construct protected left and right turn lanes ○ Install RRPM's and refresh line marking ○ Install R1-2 'give way' sign on Beach Road 		YPC/DPTI
▪ Consider widening of shoulder seal between Marion Bay and Innes National Park		YPC

Spencer Highway (Port Pirie – Minlaton)

Spencer Highway is one of the primary north-south routes through the Yorke Peninsula which extends for 202 kilometres between Port Pirie in the north and Minlaton in the south (via Port Broughton, Wallaroo, Moonta and Maitland).

Spencer Highway was the most mentioned road in the member survey. This is partially due to its length and significance to most people in the region, but also due to some particularly troublesome sections. The Maitland to Minlaton section was raised the most by members of the community (more than 100 mentions), making this the most mentioned section of road in the survey. Typical survey responses relating to Spencer Highway have been included below.

The condition of the Spencer Highway between Moonta and Wallaroo, the surface is dangerous when wet – it has an undulating surface and needs a bike lane.

Spencer Highway is extremely undulating & very dangerous.

The road between Minlaton and Maitland is in appalling condition: it is narrow and very bumpy. As Yorketown Hospital has had most of its services moved to Wallaroo, patients and volunteer community drivers have to take this road to get to Wallaroo. Not to mention the freight and general traffic of locals and tourists. It needs fixing!

The Maitland to Minlaton road needs major works, instead of just patching problems.

RAA members

Crash History

Between 2013 and 2017, 44 casualty crashes occurred on Spencer Highway between Port Pirie and Minlaton with one of these fatal, ten resulting in serious injury, and 44 resulting in minor injury.

Spencer Highway Crash Types

Crash Types	No. of Crashes	Apparent Errors
Hit Fixed Object	15	Inattention (11), died sick or asleep at wheel (3), D.U.I (1)
Right Angle	10	Disobey give way sign (7), disobey stop sign (1), D.U.I (1), reverse without due care (1)
Roll Over	8	Inattention (6), D.U.I (1), unspecified (1)
Rear End	4	Inattention (3), follow too closely (1)
Hit Pedestrian	3	Inattention (3)
Head On	2	Fail to keep left (2)
Left Road - Out of Control	1	Inattention (1)
Side Swipe	1	Overtake without due care (1)
Right Turn	1	Fail to stand (1)
All Crashes	44	Inattention (24), disobey give way sign (7), D.U.I (3), died sick or asleep at wheel (3), fail to keep left (2),

		reverse without due care (1), fail to stand (1), follow too closely (1), disobey stop sign (1), unspecified (1)
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Traffic Volumes

Estimated traffic volumes on Spencer Highway have typically increased by 20-30% along most sections of the highway since 2007. Traffic through townships, especially Wallaroo and Moonta appears to have increased even more significantly. This could be attributed to population growth in these urban centres with the Wallaroo and Moonta urban centres both recording a population increase in excess of 30% between the 2006 and 2015 Censuses. This is particularly relevant when compared to the 23% population increase recorded for the entire Copper Coast Council during the same time.

Spencer Highway Traffic Volumes

Segment	Length (km)	AADT	% Commercial Vehicles	2007 Estimated AADT
Aerodrome Road (Port Pirie) – Milcowie Road	8.0	900	8.5%	700
Milcowie Road – Clements Road	24.0	800	7.0%	600
Clements Road – Old Pirie Road	6.0	850	9.0%	750
Old Pirie Road – Bay Street (Port Broughton)	11.0	1200	10.0%	750
Port Broughton (Bay/Harvey St)	1.0	2100	9.5%	1300
Duffield Rd (Port Broughton) – Port Broughton Rd	28.0	750	8.5%	600
Port Broughton Road – Pommern Way (Wallaroo)	19.0	390	9.5%	N/A
Wallaroo	3.0	1200-3100	9-10%	900-1800
Cornish Tce (Wallaroo) – Cavanagh Rd (Moonta)	11.5	1700	7.5%	1000
Cavanagh Road – Mines Road (Moonta)	2.5	550	10.0%	400
Moonta	5.0	3400-4000	6.5%	3000
Pedler Road (Moonta) – Balgowan Road (Maitland)	27.0	600	8.5%	460
Maitland	5.0	2600	12.5%	2500-2700
South Tce (Maitland) – Yorke Valley Road	5.5	600	14.0%	470
Yorke Valley Road – Yorke Highway (Minlaton)	39.5	500	15.0%	400
Minlaton	1.0	3000-3400	9-11%	2700-2800

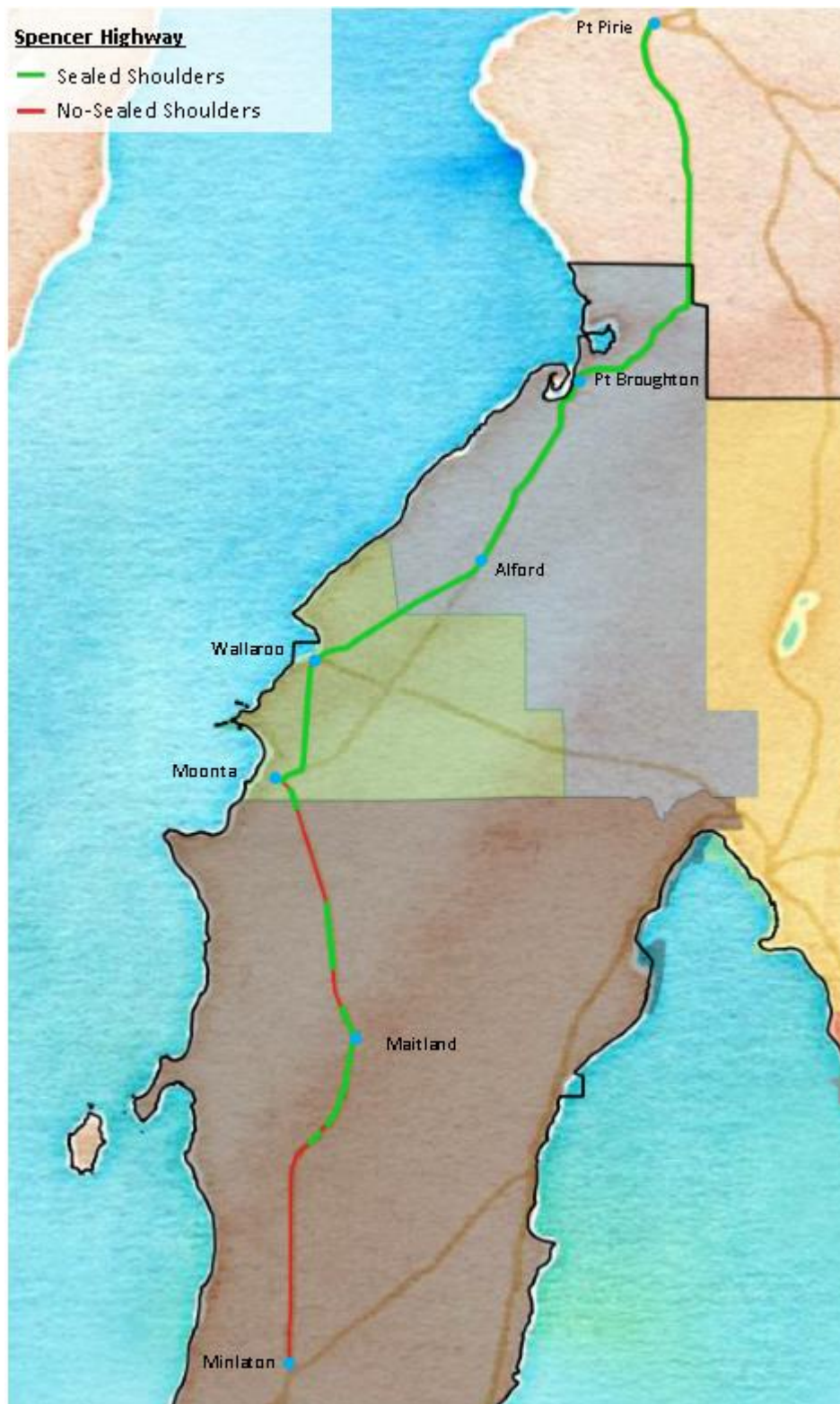
Road Widths

Spencer Highway between Port Pirie and Wallaroo is largely constructed to an acceptable width with 3.3m wide lanes and 1.0m wide sealed shoulders. Between Wallaroo and Moonta, lane widths are adequate, but shoulder seal is very narrow and almost non-existent in locations. Lane widths between Moonta and Maitland are narrow, with some sections including a narrow sealed shoulder.

Spencer Highway Widths

Segment	Lane Width	Sealed Shoulder Width	Total Seal Width
S of Diagonal Road (Port Pirie – Port Broughton)	3.3m – 3.4m	0.9m – 1.0m	8.6m
S of Sandy Road (Port Broughton – Alford)	3.2m – 3.3m	0.8m – 1.0m	8.3m
N of Kadina-Tickera Road (Alford – Wallaroo)	3.1m – 3.2m	1.0m – 1.3m	8.6m
N of Warburto Road (Wallaaroo – Moonta)	3.4m – 3.6m	0.2m – 0.3m	7.6m
N of Barnes Road (Moonta – Maitland)	2.9m – 3.2m	N/A	6.1m
N of McCauley Road (Moonta – Maitland)	3.1m	N/A	6.2m
S of Hean Road (Maitland – Minlaton)	3.0m – 3.1m	0.7m – 0.9m	7.7m
S of Urania (Maitland – Minlaton)	2.7m	N/A	5.4m
N of Butler Road (Maitland – Minlaton)	2.8m – 3.0m	N/A	5.8m

The map below outlines all sections of Spencer Highway with any level of shoulder seal as of October 2018, noting that shoulder seal is lacking for most of the highway between Moonta and Minlaton, and that the section between Wallaroo and Moonta only has a very narrow shoulder seal. RAA recommends that all remaining sections of Spencer Highway have shoulders sealed to one metre, and lanes widened to a minimum of 3.3 metres between Moonta and Minlaton. In addition, RAA recommends widening of the shoulder seal between Wallaroo and Moonta, however, as a lower priority than sealing of shoulders in other sections.



Current sections of shoulder seal on Spencer Highway

Speed Limits

The speed limit for 50 kilometres between Port Pirie and Port Broughton is signposted at 110 km/h, with the open road speed limit between Port Broughton and Minlaton governed by the rural default of 100 km/h. Speed limits are reduced through townships via 80 km/h buffer zones, with the exception of Alford, where G9-79 'speed limit ahead' signs advise of the

approaching 50 km/h zone. The speed limit is also reduced to 80 km/h for 500 metres through Weetulta.

Spencer Highway Speed Limits

Segment	Length (km)	Speed Limit (km/h)
Port Pirie	4.5	60/80
Port Pirie – Port Broughton	49.5	110
Port Broughton	3.0	80/60/50/60/80
Port Broughton – Alford	25.0	100
Alford*	0.6	50
Alford – Wallaroo	20.0	100
Wallaroo	5.0	80/50/80
Wallaroo – Moonta	12.0	100
Moonta	4.5	80/60/50/80
Moonta – Weetulta	19.8	100
Weetulta	0.5	80
Weetulta – Maitland	14.0	100
Maitland	2.0	80/50/80
Maitland – Minlaton	42.5	100
Minlaton	2.0	80/60/50

*G9-79 'speed limit ahead' signage is used to reduce the speed limit each side of Alford

Observations

Port Pirie – Port Broughton

Spencer Highway between Port Pirie and Port Broughton is geometrically what we would expect to see from a rural arterial and freight route, largely due to a \$1M state government investment towards 32 kilometres of shoulder sealing on this section in 2016. Geometry is now sufficient for the current traffic volumes and level of freight use. The only exception being a section either side of Port Broughton, where shoulders are not sealed. RAA recommends that shoulders are sealed each side of Port Broughton to improve safety approaching and departing the township.

The surface condition was generally serviceable, with occasional slight bumps and undulations, however, nothing presenting a significant safety hazard at the time of assessment. It was also noted that a recent investment in barrier protection had improved safety on curves and drop offs north of Port Broughton.

Of concern was the join between the shoulder seal and previous seal. There was a slight depression in the shoulder seal at the join, which is likely to cause water to pond at what is already a weak point in of the road. Small potholes were beginning to form and as this is in the wheel path, it is likely that the pavement will continue to deteriorate. RAA recommends that drainage is reviewed and remediation measures are taken to prevent water ponding in the wheel paths.



Potholes forming on the join between the shoulder seal and previous seal

It is also noteworthy that the Broughton River Bridge is quite narrow. Barriers have recently been upgraded over the bridge and delineation has been improved, however, in the longer term this bridge should be considered for widening.

Port Broughton – Wallaroo

The standard of the Port Broughton to Wallaroo section of Spencer Highway has markedly improved since RAA's 2014 assessment, largely due to widening and shoulder sealing works completed between Port Broughton and Alford in October 2017. The surface is generally in good condition between Port Broughton and Alford, however, early signs of failure including cracking and minor undulations are present between Alford and Wallaroo.

The primary hazard on this section of road is steep drop offs where the road has been built up. RAA recommends that barrier protection is installed where the drop off exceeds two metres, with steep drop off around curves treated as a priority.



Steep drop offs on both sides of the highway just south of Port Broughton

The shoulder has been widened at the intersection with Port Broughton Road, just south of Alford. At this intersection, southbound vehicles continue straight to Kadina, or turn right to continue following Spencer Highway into Wallaroo. The shoulder widening and extra delineation is a welcome addition, allowing trailing vehicles to pass a vehicle waiting to turn right, however, a dedicated right turn lane would have been a preferable treatment at little additional cost. RAA recommends that installation of a dedicated right turn lane at this intersection is considered with a formalised through lane for vehicles travelling to Kadina.



A dedicated right turn lane is recommended at the intersection with Port Broughton Road

Wallaroo – Moonta

Signage through Wallaroo is inconspicuous and may pose difficulties for tourists travelling through Wallaroo to follow Spencer Highway, as the route makes a number of turns in the township. RAA recommends that route marking signage be reviewed through Wallaroo, particularly at the intersection with Irwine Street (Spencer Highway) and Hughes Street.

Spencer Highway between Moonta and Wallaroo has good lane geometry, however, lacks a wide sealed shoulder, with shoulders measured to be only 200 millimetres wide for the most part. Clear zones were good, with vegetation and hazards set back from the road edges. Ruts in the wheel paths were quite deep, and likely to cause water to pond on the surface following periods of rainfall. RAA recommends rut filling in the most prominent sections, or consideration of a reseal to improve safety in wet weather.



A typical section of Spencer Highway (Wallaroo – Moonta) with wide lanes, narrow shoulder seal and ruts

Minor undulations exist in the pavement, and while these do not pose a safety concern at this stage, the section south of Warburto Road for approximately 500 metres should be considered for reseal as undulations are excessive in this short segment.

Line marking is very faded at the intersection with Mines Road in Moonta, and RAA recommends that this be refreshed. Warning signs approaching the intersection are good, with the distance (200m) and the 'stop' condition clearly indicated.

Moonta – Maitland

Spencer Highway between Moonta and Maitland has significantly varying geometry and conditions. Some sections are quite good, and it was evident that recent work had been undertaken to improve safety, but other sections are in much poorer condition with narrow geometry. Delineation was generally good, with signs, guide posts and line marking all in use and in good condition. For most of the road, the surface is in serviceable condition, however, minor corrugated sections were noted as well as local sections of edge breakup which would be repaired if shoulders were sealed. For the 10 kilometres north of Maitland, the surface is uneven and undulating, and edge break up is more prominent. This should be the first section targeted for improvement between Moonta and Maitland, with consideration to reseal this 10 kilometre stretch of highway.

More than 50% of this section has no shoulder seal at all, with other sections having varying levels of shoulder seal, generally between 200mm and 500mm wide. RAA recommends that shoulders are sealed to one metre on the remaining 20 kilometres (approx.) of this section without any form of shoulder seal, and consideration should be given to widening existing shoulder seal. Increasing the lane width to 3.3 metres as a part of this work should also be considered.



Typical geometry between Moonta and Maitland

RAA welcomes the recent barrier installations between Moonta and Maitland, which reduces the likelihood of serious crashes involving vehicles driving down steep embankments or into fixed roadside objects.

Maitland – Minlaton

The Maitland to Minlaton section of Spencer Highway is one of the leading road infrastructure concerns in the region according to RAA members. When asked to specify which major road or transport improvements were needed in the region, over 100 mentions of this section were recorded in the survey. This section of road was also mentioned in other comment fields within the survey.

Following RAA's assessment of the road, it is evident that some recent work has been undertaken to improve the road, however, there are large sections with little to no evidence of maintenance or improvement since the road was first constructed. Two thirds of the total 45 kilometres do not have any form of shoulder seal, and other sections generally have a narrow shoulder seal, with a short section near Hean Road constructed to a more satisfactory geometry.

Immediately south of Maitland, the road is in very poor condition, with large undulations in the surface. There are a number of small patches, however this has done very little to improve the overall quality of the road. It is likely that full road reconstruction is required for this five kilometre section between Maitland and Yorke Valley Road. The remaining sections between Maitland and Minlaton are generally uneven and undulating and it is recommended that the road be resealed where required to address this.

Immediately south of Yorke Valley Road, and through to Urania, there have been some geometry improvements in the last decade, and it appears as though a reseal has been undertaken in some sections. With this being considered, undulations and rutting are already present on this section, particularly in the northbound direction, and there are still sections without sealed shoulders.

South of Urania, the road geometry is very poor, with lanes measured as narrow as 2.7 metres wide. Considering the maximum legal width of 2.5m for general access freight and 200 millimetre wing mirrors, this is not a satisfactory width. RAA recommends a minimum 3.3 metre lane width and desirable one metre shoulder seal for the entire length between Maitland and Minlaton. Edge breakup is prevalent in this section, which is to be expected on a road this narrow, and the surface is generally uneven and undulating, however, the predominant issue is the narrowness of the carriageway.



A very narrow carriageway and deteriorating surface are the primary issues between Maitland and Minlaton

Key Recommendations

Spencer Highway – Key Recommendations		Authority
<ul style="list-style-type: none"> ▪ <u>Port Pirie to Port Broughton</u> <ul style="list-style-type: none"> ○ Seal shoulders to 1.0m each side of Port Broughton for the sections where they are not currently sealed. ○ Review drainage and undertake remediation measures to prevent water ponding in the wheel paths. ○ Consider widening of the Broughton River Bridge. 		DPTI
<ul style="list-style-type: none"> ▪ <u>Port Broughton to Wallaroo:</u> <ul style="list-style-type: none"> ○ Install barrier protection where the edge drop off exceeds 2 metres, with curves treated as a priority. ○ Install a dedicated right turn lane for southbound vehicles at the intersection with Port Broughton Road. 		DPTI
<ul style="list-style-type: none"> ▪ <u>Wallaroo to Moonta:</u> <ul style="list-style-type: none"> ○ Review route marking signage through Wallaroo. ○ Seal shoulders to 1.0m. ○ Undertake rut filling in most prominent sections. ○ Consider reseal for approximately 500m, south of Warburto Road. ○ Refresh line marking at the intersection with Mines Road, in Moonta. 		DPTI
<ul style="list-style-type: none"> ▪ <u>Moonta to Maitland:</u> <ul style="list-style-type: none"> ○ Seal shoulders to 1.0m on approximately 20km of this section without sealed shoulders. ○ Increase lane width to minimum 3.3m. ○ Local repairs to edge breakup (will be addressed with shoulder seal). ○ Consider reseal for 10km, north of Maitland. 		DPTI
<ul style="list-style-type: none"> ▪ <u>Maitland to Minlaton:</u> <ul style="list-style-type: none"> ○ Reconstruct road for five kilometres, south of Maitland, and reseal other uneven sections of carriageway where full reconstruction is not required. ○ Increase lane width to minimum 3.3 metres. ○ Seal shoulders to one metre on approximately 30 kilometres of this section without sealed shoulders, and consider widening shoulders in other locations. 		DPTI

St Vincent Highway (Ardrossan – Warooka)

St Vincent Highway is a major freight corridor spanning the southern Yorke Peninsula between Warooka and Edithburgh, continuing along the east coast where it links into Yorke Highway just north of Pine Point. The Highway bypasses east coast townships including Port Vincent and Stansbury and is a vital road link to the Port Giles grain facility with b-triple traffic permitted through to Port Giles Road.

The main concern raised by survey respondents were the interactions with freight on the highway and a lack of overtaking opportunities. Narrow lanes and edge drop off were also raised as major issues, and are somewhat related to concerns regarding freight interactions. The below comments are typical of the responses received.

St Vincent Hwy requires upgrade in all respects as it is used as high volume road train route for silo to silo carting between Ardrossan & Port Giles

First 10 kilometres from Edithburgh to Yorketown are narrow and the edges are very poor. When a truck is approaching, it is hard to stay safely on the tarmac.

The section between Stansbury and Ardrossan needs defined overtaking lanes in some sections. Currently there is only one which is quite close to Ardrossan but another one should be located between Port Vincent and Sheaoak Flat to reduce traffic congestion.

RAA members

Crash History

Sixteen casualty crashes occurred on St Vincent Highway between 2013 and 2017, with two of these resulting in serious injuries and two resulting in fatalities.

Both fatal crashes occurred on narrow sections of the highway within 10 kilometres of Edithburgh. One of these was a head on crash and another involved a single vehicle leaving the carriageway and hitting a fixed object. Road widening and shoulder sealing would significantly reduce the likelihood of these crash types occurring in the future.

St Vincent Highway Crash Types

Crash Types	No. of Crashes	Apparent Errors
Hit Fixed Object	9	Inattention (5), D.U.I (2), died sick or asleep at wheel (2)
Roll Over	3	Inattention (2), died sick or asleep at wheel (1)
Head On	2	Fail to keep left (2)
Side Swipe	2	Fail to give way (2)
All Crashes	16	Inattention (7), died sick or asleep at wheel (3), D.U.I (2), fail to keep left (2), fail to give way (2)

Traffic Volumes

St Vincent Highway between Yorke Highway and Port Giles receives steady traffic volumes of around 1,000 vehicles per day on average, made up of a high percentage of freight. Traffic volumes between Edithburgh and Warooka are somewhat lower, primarily due to lower freight use.

St Vincent Highway Traffic Volumes

Segment	Length (km)	AADT	% Commercial Vehicles	2007 Estimated AADT
Yorke Highway – Black Point Rd	7.0	1200	15	1000
Black Point Rd – Port Julia Rd	8.0	950	17	1000
Port Julia Rd – Lime Kiln Rd (Pt Vincent)	12.5	950	16	1000
Lime Kiln Rd – Pt Vincent Rd	2.0	700	15.5	800
Pt Vincent Rd – Minlaton Rd	13.0	900	15.5	1000
Minlaton Rd – Brentwood Rd (Stansbury)	2.0	600	16.5	800
Brentwood Rd – Stansbury Rd	5.0	1000	16	900
Stansbury Rd – Port Giles Rd	8.0	450	18	300
Port Giles Rd – Beach Rd (Coobowie)	3.5	600	8	500
Beach Rd (Coobowie)– Giles Tce (Edithburgh)	3.5	650	9	650
Edithburgh	0.7	750	11.5	750-1250
Edith St (Edithburgh)– Anderson Tce (Yorketown)	15.0	650	11	550
Yorketown	1.5	1800	10.5	1200
Yorke Tce – Munkowurlie Rd	3.0	550	8	600
Munkowurlie Rd – Penhale St (Warooka)	16.0	600	11	600

Road Widths

The section between Yorke Highway and Port Giles consists of wide lanes suitable for use by road trains and b-triple freight combinations accessing Port Giles. Immediately south of Port Giles Road, geometry significantly worsens with a total seal width of approximately 6.2m through to Edithburgh. Between Edithburgh and Yorketown the road is even narrower, making for dangerous freight interactions.

St Vincent Highway Widths

Segment	Lane Width	Sealed Shoulder Width	Total Seal Width
South of Yorke Highway	3.4m	0.5m	7.8m
South of Port Vincent	3.4m	0.5m	7.8m
South of Minlaton Road	3.5m – 3.6m	0.7m	8.5m
South of Stansbury Road	3.3m – 3.4m	0.8m – 1.0m	8.5m
South of Port Giles Road	2.9m – 3.2m	N/A	6.1m
West of Edithburgh	2.7m – 2.8m	N/A	5.5m
West of Troubridge Hill Road	3.4m – 3.5m	0.4m	7.7m
West of Sunbury Road	3.0m – 3.2m	N/A	6.2m

The map below outlines all sections of St Vincent Highway with any level of shoulder seal as of October 2018, noting that shoulder seal is lacking for most of the highway between Port Giles and Warooka. As a priority, RAA recommends that St Vincent Highway has shoulders sealed to one metre where they are not currently sealed, followed by widening of the existing shoulder on the road train route between Yorke Highway and Port Giles Road to one metre.

RAA also recommends lane widening be undertaken between Port Giles and Warooka to provide 3.3m lanes in each direction.



Map showing sections of shoulder seal on St Vincent Highway

Speed Limits

St Vincent Highway is predominantly governed by a 100 km/h speed limit with reductions in speed through townships. Speed reductions are controlled by traditional buffer zones with the exception of Pine Point, where '50 ahead' signage is used approaching the town from the south and '60 ahead' signage is used approaching the town from the north.

St Vincent Highway Speed Limits

Segment	Length (km)	Speed Limit (km/h)
Yorke Highway – Pine Point	4.0	100
Pine Point	2.5	60/50
Pine Point – Coobowie	54.0	100
Coobowie	2.0	80/50/80
Coobowie – Edithburgh	2.0	100
Edithburgh	3.5	80/50/80
Edithburgh – Yorketown	13.5	100
Yorketown	2.5	80/50/80
Yorketown - Warooka	18.0	50/80/100
Warooka	1.0	80/50

Observations

Pine Point – Port Giles

Geometrically, St Vincent Highway between Pine Point and Port Giles is adequate for the current level of heavy vehicle use. Nevertheless, it would be beneficial to increase the sealed shoulder width to one metre, further improving the level of safety on this important freight route.

There were a number of concerns raised by survey respondents regarding a lack of overtaking lanes. There are no overtaking lanes on St Vincent Highway, however, there are overtaking opportunities available on long, straight sections of the highway. Given the type and volume of freight, and moderate traffic volumes on this section of road, RAA recommends that at least one overtaking lane is provided in each direction between Pine Point and Port Giles. This will provide one safe overtaking opportunity in each direction for the almost 60 kilometre journey between Pine Point and Port Giles.

Some minor undulations were noted between Pine Point and Port Giles, however, these did not present any major hazards at the time of assessment. Between Stansbury and Port Giles, the surface is showing early signs of failure with cracks and ruts forming, which should be monitored with surface rehabilitation works undertaken where necessary.



Highway geometry is reasonable between Pine Point and Port Giles

Port Giles – Edithburgh

St Vincent Highway between Port Giles and Edithburgh represents only a short section of the highway, and in contrast to the northern part discussed above, has relatively narrow lanes and no sealed shoulder. The surface of the road was noted to be in generally serviceable condition, but to improve safety on this section RAA recommends sealing shoulders to one metre wide. Moderate levels of edge drop-off were also observed, which would be addressed as part of shoulder sealing works.

Edithburgh – Yorketown

The Highway between Edithburgh and Yorketown was the poorest overall section of St Vincent Highway, primarily due to the very narrow sealed carriageway for 9.5 kilometres west of Edithburgh. As a priority, RAA recommends that lanes are widened to a desirable 3.3m and shoulders sealed to one metre between Edithburgh and the intersection with Troubridge Hill Road, where shoulder seal begins and continues for five kilometres into Yorketown. This shoulder seal was only 400 millimetres in width, and it would be desirable to widen this to one metre, however, this would come as a lower priority than the section near Edithburgh.



The very narrow carriageway just west of Edithburgh

Roadside hazards such as stobie poles and large trees within three metres of the road edges should be removed where possible, or otherwise protected by w-beam barriers.

Yorketown – Warooka

Between Yorketown and Warooka, the pavement of St Vincent Highway is in serviceable condition, and of a more winding geometry than other sections of the highway. The lanes are narrow with a total seal width of approximately 6.2 metres, therefore RAA recommends installing one metre wide sealed shoulders between Yorketown and Warooka to improve safety and reduce the likelihood of single vehicle runoff and head on type crashes.

Key Recommendations

St Vincent Highway – Key Recommendations		Authority
<ul style="list-style-type: none"> ▪ <u>Pine Point – Port Giles</u> <ul style="list-style-type: none"> ○ Install at least one overtaking lane in each direction. ○ Consider widening shoulder seal to one metre wide. 		DPTI
<ul style="list-style-type: none"> ▪ <u>Port Giles – Edithburgh:</u> <ul style="list-style-type: none"> ○ Install one metre wide sealed shoulders. ○ Roadside hazard removal or protection. 		DPTI
<ul style="list-style-type: none"> ▪ <u>Edithburgh - Yorketown:</u> <ul style="list-style-type: none"> ○ Widen lanes to 3.3 metres between Edithburgh and Troubridge Hill Road. ○ Seal shoulders to one metre wide between Edithburgh and Troubridge Hill Road. 		DPTI
<ul style="list-style-type: none"> ▪ <u>Yorketown - Warooka:</u> <ul style="list-style-type: none"> ○ Install one metre wide sealed shoulders. 		DPTI

Owen Road (Hamley Bridge – Hoskin Corner)

Owen Road is a state maintained road, and issues with the road have been regularly raised with RAA over the past two years, culminating with it being the fourth ranked road across the state in RAA's 'Risky Roads' survey conducted in 2017. The section between Templers and Hamley Bridge was assessed in RAA's 2017 assessment of the Barossa and Light region, and the section between Hamley Bridge and Hoskin Corner was assessed as part of the current Yorke Peninsula regional road assessment.

A considerable investment has been made to upgrade the road north of Hamley Bridge. Shoulder seal has been installed between Emu Road and Dog Leg Road, and a full reconstruction of the section north of Dog Leg Road has been undertaken.

During community and stakeholder consultation, concerns were raised about water ponding on the road, particularly on the recently constructed shoulders, as well as concerns that drainage and road runoff may be inadequate. It appears that local road authorities were not extensively consulted during the design and construction phases of the upgrade project, where they could have provided valuable local insight to DPTI who manage the road and are responsible for upkeep, and upgrade costs.

RAA recommends that the consultation process for projects on state maintained roads with local road authorities and road users be reviewed, with a focus on consulting with local road authorities to ascertain the key issues on the road and in the region to ensure future upgrades are as effective as possible. By consulting with council on projects such as this, DPTI could identify additional problem areas using the localised knowledge of council and possibly even feedback from ratepayers and elected members.

The road between Owen and Hamley Bridge needs considerable amount of work, as does the road from Owen to Balaklava. Both roads have severe potholes and the road from Owen to Hamley Bridge has severe undulations in areas.

RAA member

Crash History

Between 2013 and 2017, seven casualty crashes occurred on Owen Road, or at intersections with Owen Road between Hoskin Corner and Hamley Bridge. One of these resulted in a fatality, another resulted in serious injuries and the remaining five crashes resulted in minor injuries.

Owen Road Crash Types

Crash Types	No. of Crashes	Apparent Error
Hit Fixed Object	5	Died sick or asleep at wheel (2), inattention (2), D.U.I (1)
Hit Animal	1	Inattention (1)
Right Angle	1	Disobey give way sign (1)
All Crashes	7	Inattention (3), died sick or asleep at wheel (2), D.U.I (1), Inattention (1)

Traffic Volumes

Traffic on this section of Owen Road has increased by an estimated 20% since 2007, however, is still only a moderate level of use with up to 10% commercial vehicles utilising the route.

Owen Road Traffic Volumes

Segment	Length (km)	AADT	% Commercial Vehicles	2007 Estimated AADT
Hamley Bridge – Alma Road	13.0	550	8.5%	440
Alma Road – Traeger Road	15.5	550	10.0%	400

Road Widths

The newly constructed section is constructed to a good width, with wide shoulder seal and lanes suitable for current traffic volumes, however, this only lasts for approximately seven kilometres between Hamley Bridge and the intersection with McKenzie Road, where a very narrow shoulder seal is applied for two kilometres. The remaining 20 kilometres through Owen and on to the intersection with Traeger Road is narrower and has no shoulder seal.

Owen Road Widths

Segment	Lane Width	Sealed Shoulder Width	Total Seal Width
South of Fidge Road	3.3m	1.5m – 2.0m	10.1m
North of Burford Road	3.1 – 3.3m	N/A	6.4m



The recently upgraded 7 kilometre section of Owen Road in stark contrast to the untouched 20 kilometre section.

Speed Limits

The speed limit on the open road is 100 km/h between Hamley Bridge and Hoskin Corner. Through the town centres of Hamley Bridge and Owen, 80 km/h buffer zones are used to reduce the speed to 50 km/h.

Owen Road Speed Limits

Segment	Length (km)	Speed Limit (km/h)
Hamley Bridge	1.6	50/80
Hamley Bridge – Owen	16.0	100
Owen	1.5	80/50/80
Owen – Hoskin Corner	10.0	100

Observations

Recent investment along Owen Road has made a notable difference to the quality of this road in localised areas; however, most of the road remains in a poor condition overall.

A particularly poor section is located just east of Owen and approximately 800 metres in length, between the intersections with Stockyard Road and Alma Road. This section was around a sweeping curve and had significant undulations that, when combined with the sweeping curve create a high crash or rollover risk, especially for heavy vehicles or vehicles towing a trailer or caravan. RAA recommends that this section of road be prioritised for reconstruction.



Map specifying the location of the dangerous curve between Stockyard Road and Alma Road

Other sections of the road should have shoulders sealed to one metre wide and localised pavement repairs undertaken to address failing sections of the carriageway.

Overgrown grasses on the verge concealing guide posts and signage in some cases was observed, and RAA recommends that Wakefield Regional Council review vegetation maintenance schedules for this section of Owen Road to ensure that this growth is maintained. This will have the added benefit of reducing fire risk during bushfire season.

Furthermore, RAA's recommendations from the 2017 Barossa and Light regional road assessment still stand. These recommendations included road widening and shoulder sealing, hazard protection and improvements to the road surface between Templers and Hamley Bridge.

Key Recommendations

Owen Road – Key Recommendations	Authority
<ul style="list-style-type: none"> As a priority, repair the failed 800 metre section between Stockyard Road and Alma Road. 	DPTI
<ul style="list-style-type: none"> For the 20 kilometres between McKenzie Road and Traeger Road, seal shoulders to one metre and widen lanes to 3.3 metres. 	DPTI

▪ Undertake localised pavement rehabilitation for other failing sections of the road.	DPTI
▪ Review roadside vegetation maintenance schedule to ensure roadside safety features are not concealed.	WRC
▪ Adopt RAA's 2017 recommendations for Owen Road, south of Hamley Bridge.	DPTI

Balaklava Road (Port Wakefield – Halbury)

Balaklava Road is a state maintained road connecting Port Wakefield and Auburn in the Clare Valley. The road passes through the townships of Balaklava and Halbury. For the purposes of this assessment, Balaklava Road was assessed between Port Wakefield and Blyth Plains Road, with the section between Blyth Plains Road and Auburn covered in RAA's 2018 assessment of the Clare and Goyder region.

The primary concern raised during member and stakeholder consultation was the intersection with Port Wakefield Road in Port Wakefield, which is very difficult for heavy vehicles to negotiate for access to the Bowmans site, particularly turning right onto Port Wakefield Road. As part of the Port Wakefield Road duplication project, heavy vehicle movements are being addressed and preliminary plans divert heavy vehicles away from this intersection altogether.

PBS level 3A (road train) vehicles are currently permissible between Port Wakefield and Bowmans, with PBS level 2A (b-double) vehicles permissible through to Blyth Plains Road.

Below are some member comments from the survey regarding Balaklava Road.

Port Wakefield to turn into from Balaklava is always so busy. Trucks have to wait forever to turn towards Yorke Peninsula.

Balaklava turn off through Port Wakefield. Large volume of trucks both entering and leaving the intersection onto the highway

RAA members

Crash History

Between 2013 and 2017, six casualty crashes occurred on the 35 kilometre section of Balaklava Road between Blyth Plains Road and Halbury, with crashes involving a vehicle hitting a fixed object making up half of these.

Balaklava Road Crash Types

Crash Types	No. of Crashes	Apparent Error
Hit Fixed Object	3	Inattention (2), D.U.I (1)
Head On	1	Fail to keep left (1)
Right Angle	1	Inattention (1)
Other	1	Inattention (1)
All Crashes	6	Inattention (4), D.U.I (1), fail to keep left (1)

Traffic Volumes

On average, more than 1,000 vehicles each day traverse this section of Balaklava Road, making it one of the key routes through Wakefield Regional Council and an important link between the Clare Valley and the Yorke Peninsula regions. Freight Volumes are high as Balaklava Road provides primary access to the Bowmans intermodal transport facility, which provides an efficient rail transport corridor to international shipping terminals at Port Adelaide and Port Pirie.

Balaklava Road Traffic Volumes				
Segment	Length (km)	AADT	% Commercial Vehicles	2007 Estimated AADT
Port Wakefield – Racecourse Road (Balaklava)	24.5	1000	20.0%	800
Racecourse Road – Gwy Terrace	0.5	1200	20.0%	500
Gwy Terrace – Dunn Road (Balaklava)	2.0	1500	16.0%	550
Dunn Road – Blyth Plains Road (Halbury)	8.0	1300	15.5%	1200

Road Widths

Geometry of Balaklava Road is adequate for current freight levels, however, this should be reviewed following the Port Wakefield overpass project to explore any potential changes to traffic on Balaklava Road. If PBS level 3 road train access is eventually provided through to the Clare Valley region, consideration should be given to widening lanes to 3.5 metres.

Balaklava Road Widths			
Segment	Lane Width	Sealed Shoulder Width	Total Seal Width
West of Neville Road	3.3m	1.1m – 1.2m	8.9m
East of Marriot Road	3.3 – 3.4m	0.9m	8.5m

Speed Limits

The speed limit on the open road between Port Wakefield and Halbury is 100 km/h, and 80 km/h buffer zones are used to reduce the speed limit through townships. Port Wakefield and Balaklava speed limits are 50 km/h, and the speed limit through Halbury is 60 km/h. There is also a short 80 km/h speed zone across the level crossing in Bowmans, which was recently implemented as part of DPTI's *rail crossing safety improvement program*.

Balaklava Road Speed Limits		
Segment	Length (km)	Speed Limit (km/h)
Port Wakefield	0.7	50/80
Port Wakefield - Balaklava	9.5	100
Balaklava	3.7	80/50/80
Balaklava – Halbury	9.0	100
Halbury	1.2	80/60

Observations

The surface of Balaklava Road is mostly in serviceable condition and recent upgrades including shoulder sealing and installation of w-beam safety barriers are welcome additions. It was noted that the join between the existing pavement and the shoulder seal is in the wheel path, which creates a weak point in the road on the most travelled section. This can lead to

faster deterioration of the road, water ponding in the wheel paths, and more frequent maintenance requirements. As discussed earlier in this report, the shoulder sealing process should be reviewed with an aim of joining the shoulder seal and existing pavement outside of the wheel paths.

East of Balaklava, roadside vegetation can be quite dense and at a distance of 2 – 3 metres from the edge lines. A number of unprotected roadside drop offs were also observed. RAA recommends widening the clear zone where possible, or installing additional barrier protection for roadside hazards east of Balaklava.



Unprotected drop-off and dense roadside vegetation east of Balaklava

Between Balaklava and Port Wakefield a row of stobie poles are present on the south side of the road. Although set back by five metres, protecting these stobie poles from errant vehicles should be a gradual safety improvement project along this busy corridor.

RAA also noted that line marking at the intersection with Gwy Terrace in Balaklava was faded and needs refreshing. This intersection does have some confusing elements, and although no casualty crashes were recorded between 2013 and 2017, a number of safety improvements should be considered such as a roundabout or realignment or closure of the Edith Terrace junction.



Line marking in poor condition at the Gwy Terrace intersection.

RAA recognises that constructing a roundabout would represent significant realignment of roads, and possible relocation of services and drainage. When coupled with the requirement to facilitate b-double turning movements, this option may not be financially feasible at this stage.

Key Recommendations

Balaklava Road – Key Recommendations	Authority
<ul style="list-style-type: none"> East of Balaklava, widen clear zone where possible or install additional barrier protection for roadside hazards. 	DPTI/WRC
<ul style="list-style-type: none"> Protect stobie poles between Balaklava and Port Wakefield. 	DPTI
<ul style="list-style-type: none"> Refresh line marking at the intersection with Gwy Terrace in Balaklava and consider this intersection for future safety upgrades. 	DPTI

Mallala Road (Two Wells – Mallala)

Mallala Road is a major state maintained thoroughfare between Mallala and Two Wells, and the primary route from Mallala (and surrounding townships) to Adelaide before turning onto Port Wakefield Road. There was little mention of Mallala Road itself during the member survey, however RAA still assessed the route due to its significance to the region.

Crash History

Between 2013 and 2017, 18 casualty crashes occurred on Mallala Road, or intersections with Mallala Road with three of these resulting in serious injuries and the remaining 15 resulting in minor injuries. Six of these crashes occurred at the intersection with Port Wakefield Road, which is discussed earlier in this report.

Mallala Road Crash Types

Crash Types	No. of Crashes	Apparent Errors
Hit Fixed Object	7	Inattention (5), D.U.I (1), died sick or asleep at wheel (1)
Right Angle	3	Disobey give way sign (3)
Right Turn	3	Fail to Stand (3)
Hit Parked Vehicle	2	Inattention (2)
Head On	1	Inattention (1)
Side Swipe	1	Inattention (1)
Left Road - Out of Control	1	Inattention (1)
All Crashes	18	Inattention (10), disobey give way sign (3), fail to stand (3), died sick or asleep at wheel (1), D.U.I (1)

Traffic Volumes

Traffic volumes are high on Mallala Road as it is an alternative to the busier Port Wakefield Road or Horrocks Highway routes from the Adelaide Plains and Clare Valley regions. Mallala Road is also part of the Port Wakefield detour route that is advertised during peak seasons to avoid congestion through Port Wakefield.

Mallala Road Traffic Volumes

Segment	Length (km)	AADT	% Commercial Vehicles	2007 Estimated AADT
Two Wells – Mallala	17.5	2200	12.0%	2000

Road Widths

Mallala Road is constructed to a good geometry for its class, with 3.3 metre lane widths on average and shoulders sealed to one metre wide for the entire length.

Mallala Road Widths

Segment	Lane Width	Sealed Shoulder Width	Total Seal Width
North of Temby Road	3.3m – 3.4m	1.0m – 1.1m	8.8m
North of Cawrse Road	3.2m – 3.4m	1.0m – 1.1m	8.7m

Speed Limits

The speed limit on the open road between Mallala and Two Wells is 100 km/h, with a reduction to 80 km/h on approach to Port Wakefield Road in Two Wells and a 50 km/h speed limit in Mallala.

Mallala Road Speed Limits

Segment	Length (km)	Speed Limit (km/h)
Two Wells	1.0	80
Two Wells – Mallala	15.5	100
Mallala	1.1	80/50

Observations

South of the Korunye level crossing, the road surface is in good condition with no major defects. There is a substantial edge drop off from the shoulder seal to the gravel outer shoulder, which RAA recommends be addressed by bringing in fresh material and building it up to the same level as the road.



Substantial edge drop-offs were prevalent south of the Korunye rail crossing.

The sweeping curve when approaching Two Wells (southbound) was poorly delineated, and RAA recommends that chevron alignment markers are installed on the outside of this curve in accordance with AS1742.2. Barrier protection should be considered, however property access points and the Stockyard Road intersection will limit the effectiveness of any barrier installed on the outside of the curve.

An advisory speed limit of 60 km/h is signposted for the recently upgraded Korunye level crossing, and this speed was deemed comfortable to travel at through the S bend in a passenger vehicle, however, heavy vehicles may need to slow down further to safely traverse the crossing. The alignment of the new crossing along the length of Mallala Road is a substantial improvement to the previously tight alignment.

North of the Korunye level crossing, the road surface is showing initial signs of failure with ruts and cracking commonplace. Previous patchwork is deteriorating and localised undulations are present. Edge drop-off was also observed outside of the sealed shoulders. RAA recommends that surface rehabilitation works be undertaken between Mallala and Korunye.



Cracking in the ruts is leading to the formation of potholes when water builds up

RRPMs are not currently installed along Mallala Road. As the area is flood prone, RAA recommends installation of RRPMs as a worthwhile addition to delineate the edge and centre lines during wet weather.

Long grasses on the verge were observed concealing important warning signs and guide post delineators, and RAA recommends that Adelaide Plains Council review their vegetation maintenance scheme along Mallala Road between Two Wells and Korunye where this issue was prevalent.



Long grasses concealing signs and guide posts

Key Recommendations

Mallala Road – Key Recommendations		Authority
▪ Repair edge drop-off along the length of the road by building up the level of the unsealed section of the shoulder.		DPTI
▪ Install CAMs to delineate the curve at Two Wells.		DPTI
▪ Rehabilitate surface between Mallala and Korunye.		DPTI
▪ Install RRPMs to delineate edge and centre lines in wet weather.		DPTI
▪ Review vegetation maintenance scheme along Mallala Road to ensure long grasses do not conceal warning signs and delineation devices.		APC

Traeger Road (Mallala – Balaklava)

Traeger Road is a state maintained road connecting Mallala and Balaklava. The road was not raised as a major issue in the member survey, however RAA assessed the road due to its importance to the region.

Crash History

Between 2013 and 2017, seven casualty crashes occurred on Traeger Road, or intersections with Traeger Road. Two of these resulted in serious injuries and the remaining five in minor injuries with vehicles hitting a fixed object being the most common crash type. As the majority of these crashes are due to fatigue and inattention, RAA recommends that consideration be given to installing ATLM along Traeger Road.

Traeger Road Crash Types

Crash Types	No. of Crashes	Apparent Errors
Hit Fixed Object	4	Inattention (2), died sick or asleep at wheel (2)
Right Angle	2	Fail to give way (1), disobey give way sign (1)
Right Turn	1	Fail to stand (1)
All Crashes	7	Inattention (2), died sick or asleep at wheel (2), disobey give way sign (1), fail to give way (1), fail to stand (1)

Traffic Volumes

Traffic volumes are relatively high on Traeger Road as a key route between Balaklava and the Clare Valley through to Adelaide. It is estimated that traffic volumes have increased by 20% or more in the past 10 years, with an increase in both commuter and commercial traffic over this time.

Traeger Road Traffic Volumes

Segment	Length (km)	AADT	% Commercial Vehicles	2007 Estimated AADT
Mallala – Calomba Road	2.0	1800	10.5%	1400
Calomba Road – Pinery Road	15.0	1600	16.5%	1300
Pinery Road – Owen Road (Hoskins Corner)	10.0	1500	14.0%	1000
Owen Road – Dunn Road (Balaklava)	5.0	1900	15.5%	1500
Dunn Road – Balaklava Road	3.0	1600	15.5%	500

Road Widths

Traeger Road is constructed to a good geometry for its level of use, with 3.3 metre lane widths, and shoulders sealed to one metre wide for the entire length.

Traeger Road Widths

Segment	Lane Width	Sealed Shoulder Width	Total Seal Width
Northwest of Owen Road	3.3m	1.0m	8.6m
South of Pinery Road	3.3m	1.0m	8.6m

Speed Limits

The speed limit on the open road between Mallala and Balaklava is 100 km/h, with 80 km/h buffer zones used to reduce the speed limit to 50 km/h into townships.

Traeger Road Speed Limits

Segment	Length (km)	Speed Limit (km/h)
Mallala	1.1	50/80
Mallala – Balaklava	32.0	100
Balaklava	2.0	80/50

Observations

Traeger Road varies in condition along its length with some sections in good condition, whilst maintenance is lacking in others. When heading south from Balaklava, ruts and cracking in the surface is prevalent. RAA suspects that water ponding in the ruts will be an issue after periods of rainfall, leading to the formation of potholes and creating a risk of vehicles aquaplaning.



The generally poor surface south of Balaklava

Recent shoulder widening south of Owen Road is a welcome addition, however, as has been observed on other roads, the join where the existing road meets the new shoulder seal is in the wheel path creating a weak point in the road on the most travelled section.

South of Pinery Road, surface conditions worsen, and RAA suspects this damage may be due to the extreme temperatures subjected to the bitumen during the 2015 Pinery bushfires. RAA recommends surface rehabilitation and localised resealing to address the problematic areas on Traeger Road.

Between Tank Road and Fidge Road, the previous edge line remains visible from before lane widening took place, and south of Fidge Road, the carriageway narrows, but the total seal

width remains roughly the same. This appears to have been done so that the join where shoulder widening meets the existing pavement is on the edge line.

Key Recommendations

Traeger Road – Key Recommendations		Authority
▪ Consider installing ATLM due to fatigue related crashes.		DPTI
▪ Localised surface rehabilitation and resealing		DPTI

Bute Road (Kadina – Bute)

Bute Road is a state maintained road connecting Bute and Kadina. It serves an important purpose for freight, tourism and local residents alike. Bute Road was raised during stakeholder consultation with issues regarding the level of freight that uses the corridor and the road not being wide enough for the current freight task with near misses reportedly occurring regularly.

Crash History

Between 2013 and 2017, five casualty crashes occurred on Bute Road, with two of these resulting in serious injuries. There were no commonly occurring crash types or errors on this road.

Bute Road Crash Types

Crash Types	No. of Crashes	Apparent Error
Hit Animal	1	Unspecified (1)
Hit Fixed Object	1	Inattention (1)
Right Angle	1	Disobey give way sign (1)
Roll Over	1	D.U.I (1)
Hit Pedestrian	1	Fail to give way (1)
All Crashes	5	Inattention (1), disobey give way sign (1), D.U.I (1), fail to give way (1), unspecified (1)

Traffic Volumes

Estimated traffic volumes on Bute Road have not changed substantially since 2007, with over 13% of all journeys for freight or commercial purposes.

Bute Road Traffic Volumes

Segment	Length (km)	AADT	% Commercial Vehicles	2007 Estimated AADT
Kadina - Bute	30	440	13.5%	460

Road Widths

Bute Road has narrow lanes and no sealed shoulder, with geometry not suitable for current freight use, which includes b-doubles as long as 26 metres and, on occasion, oversized agricultural machinery. RAA recommends that shoulders are sealed to one metre wide on Bute Road

Bute Road Widths

Segment	Lane Width	Sealed Shoulder Width	Total Seal Width
Near Willamulka Road	3.0m – 3.1m	N/A	6.1m

Speed Limits

Bute Road is subject to a 100 km/h speed limit, with reductions to 50 km/h in Kadina and Bute by way of an 80 km/h buffer zone.

Bute Road Speed Limits		
Segment	Length (km)	Speed Limit (km/h)
Kadina - Bute	30.0	50/80/100/80/50

Observations

The surface of Bute Road is in fair condition with no significant undulations present, however, there are sections where the edges of the road are beginning to crumble and deteriorate.

Vegetation generally grows close to the edges of the road and is often as close as two metres from the edges. RAA recommends that Barunga West Council and DPTI work together to widen this clear zone to a minimum of three metres in addition to sealing shoulders.



Vegetation encroaching on the shoulders of Bute Road

Intersection warning signs are outdated and at times, incorrect. An example of this is when approaching the intersection with Willamulka Road near Bute. Prior to the intersection, an outdated W2-1 'crossroad' warning sign is used, however, there is no cross road, but a series of staggered T intersections. In this location, a W2-11 'successive side road intersections' sign is better suited indicating the presence of the staggered T intersections on the curve.

Key Recommendations

Bute Road – Key Recommendations		Authority
▪ Seal shoulders to one metre wide.		DPTI
▪ Widen clear zone to minimum three metres.		DPTI / BWC
▪ Review and update intersection warning signs.		DPTI
▪ Review signage at Willamulka Road intersection and replace W2-1 'crossroad' warning signs with W2-11 'successive side road intersections' signs.		DPTI

Harry Butler Road

Harry Butler Road is a state maintained road extending for 26 kilometres between Minlaton and Yorketown, and was raised by a number of RAA members responding to the survey.

Widening of Harry Butler Road, fixing of dangerously bumpy Spencer Highway

Yorke Highway and Harry Butler Road Minlaton. Recently upgraded and has been upgraded for the worse, should have kept the merging Lane just made it longer. You can't see very well when turning off Yorke highway, and when cars are traveling at 100km towards you, you have to pull out and hope no one comes up behind you quickly.

A slip lane, better reflective paint, road reflectors or lighting of major intersection at the Minlaton Warooka turnoff recently changed.

RAA members

Crash History

Five casualty crashes occurred on Harry Butler Road between 2013 and 2017, with one of these resulting in serious injuries, and the remaining four in minor injuries. Four out of five crashes were attributed to driver inattention, three of which were single vehicle crashes. RAA recommends that ATLM be considered along the edge lines of Harry Butler Road to reduce crashes due to driver inattention.

Harry Butler Road Crash Types

Crash Types	No. of Crashes	Apparent Error
Hit Fixed Object	2	Inattention (2)
Rear End	1	Inattention (1)
Right Angle	1	Disobey give way sign (1)
Roll Over	1	Inattention (1)
Total	5	Inattention (4), Disobey give way sign (1)

Traffic Volumes

Harry Butler Road sees an average of over 400 vehicles each day, which has increased by approximately 20% since 2007. The predominant traffic is commuter traffic, with only 8% of the total traffic made up of commercial vehicles utilising the route.

Harry Butler Road Traffic Volumes

Segment	Length (km)	AADT	% Commercial Vehicles	2007 Estimated AADT
Minlaton - Yorketown	26.5	430	8.0	350

Road Widths

Harry Butler Road is very narrow with a total seal width of less than six metres consistent along the length of the road. Although freight volumes are low, interactions with these vehicles is risky as they take up the full width of their lane and tend to straddle the centre line. RAA

recommends widening lanes to 3.3 metres and sealing shoulders to a desirable one metre wide (minimum 0.5 metres)

Harry Butler Road Widths

Segment	Lane Width	Sealed Shoulder Width	Total Seal Width
North of Cutline Road	2.8m – 3.0m	N/A	5.8m

Speed Limits

Harry Butler Road is subject to a 100 km/h speed limit between Minlaton and Yorketown.

Harry Butler Road Speed Limits

Segment	Length (km)	Speed Limit (km/h)
Minlaton – Yorketown	26.5	100

Observations

The primary concern with Harry Butler Road is the narrow width of the carriageway, however, it is also noted that the northbound lane is in particularly poor condition in some sections, with ruts and cracking forming very close to the shoulder. Edge breakup is occurring consistently along the corridor. RAA also noted potholes beginning to form in the ruts, and recommends localised surface rehabilitation take place to address these deficiencies.



Failing section of Harry Butler Road (northbound lane)

There are sections where the pavement is still in serviceable condition, and only road widening and shoulder sealing is needed for these sections.

Key Recommendations

Harry Butler Road – Key Recommendations		Authority
▪ Widen lanes to 3.3 metres.		DPTI
▪ Install one metre wide sealed shoulders.		DPTI
▪ Consider application of ATLM to combat inattention related crashes.		DPTI

Stansbury Road

Stansbury Road is the primary route between Yorketown and Stansbury, Wool Bay and Coobowie on the eastern coast of the Yorke Peninsula. At the intersection with Port Giles Road, vehicles travelling to Wool Bay or Coobowie from Yorketown will continue onto Port Giles Road, with traffic heading to Stansbury or further north continuing along Stansbury Road. Multiple survey respondents raised safety concerns at this intersection.

Stop signs are needed at the intersection of Stansbury road and Port Giles Road (Penton Vale Corner).

RAA member

Crash History

Three casualty crashes occurred on Stansbury Road, with each of these resulting in minor injuries.

Stansbury Road Crash Types

Crash Types	No. of Crashes	Apparent Error
Hit Fixed Object	2	Inattention (2)
Side Swipe	1	Fail to give way(1)
Total	3	Inattention (2), fail to give way (1)

Traffic Volumes

Traffic volumes are high between Yorketown and Port Giles Road with almost 1,000 vehicles using this section of Stansbury Road every day. North of Port Giles Road, traffic volumes dip to around 500 vehicles per day.

Stansbury Road Traffic Volumes

Segment	Length (km)	AADT	% Commercial Vehicles	2007 Estimated AADT
St Vincent Hwy – School Rd (Yorketown)	0.8	1400	9.5	1000
School Rd – Pt Giles Rd	4.7	900	8.5	750
Pt Giles Rd – St Vincent Hwy (Stansbury)	11.0	490	10	410

Road Widths

Stansbury Road is narrow with 3.1 metre lanes, however it feels wide in comparison to most roads on the southern Yorke Peninsula due to their narrowness. RAA recommends that shoulders be sealed to one metre wide along the entire length with consideration given to widening lanes to 3.3 metres at the same time.

Stansbury Road Widths

Segment	Lane Width	Sealed Shoulder Width	Total Seal Width
West of Port Giles Rd	3.1m	N/A	6.2m
Near Green Flat Rd	3.1m	N/A	6.2m

Speed Limits

Stansbury Road is predominantly controlled by a 100 km/h speed limit with an 80 km/h buffer zone used at Yorketown.

Stansbury Road Speed Limits

Segment	Length (km)	Speed Limit (km/h)
Edithburgh Rd – School Rd (Yorketown)	0.8	50/80
School Rd – Port Giles Rd	4.7	100
Pt Giles Rd – St Vincent Hwy (Stansbury)	11.0	100

Observations

Stansbury Road is generally in serviceable condition, with no major failures or defects in the pavement at the time of the current assessment.

A row of stobie poles runs along the south side of the road between Yorketown and Port Giles Road, and barrier protection should be considered to prevent errant vehicles colliding with the stobie poles on this being one of the busiest sections of road in the southern Yorke Peninsula.

At the intersection with Port Giles Road, RAA identified a number of safety issues. Pavement at the intersection is polished and RAA suspect this would negatively impact braking in wet weather and potentially lead to aquaplaning. Line marking is in poor condition, RRPMS are damaged and missing, and there is only one small T intersection warning sign when approaching from the north. In addition, there are no intersection warning signs installed on the eastern or western approaches to the intersection. Survey respondents suggested that 'stop' signs are needed at the intersection, however, these should only be installed when sight distance is poor, and RAA believes they will provide no additional safety benefit at this intersection as it has good sight distance.



RAA have a number of safety concerns at the intersection with Stansbury Road and Port Giles Road

RAA recommends the following improvements to the intersection with Stansbury Road and Port Giles Road:

- Test skid resistance on all approaches to the intersection, and reseal or remediate the pavement to provide better skid resistance if necessary.
- Refresh line marking and replace/re-install RRPMS where required.
- Install R1-2 'give way' signs at the intersection with duplicated W3-2 'give way sign ahead' warning signs with '200m' and '400m' distance plates. As a minimum, duplicated W2-3 't-intersection, straight approach' signs should be installed with '200m' and '400m' distance plates.
- Install W2-4 'side road intersection' warning signs on both the eastern and western approaches to the intersection.
- Widen and extend the left turn lane for eastbound vehicles turning left to continue northeast on Stansbury Road.

Key Recommendations

Stansbury Road – Key Recommendations		Authority
▪ Seal shoulders to one metre wide.		DPTI
▪ Consider widening lanes to 3.3 metres wide concurrently with shoulder sealing.		DPTI
▪ Consider barrier protection for stobie poles between Yorketown and Port Giles Road.		DPTI
▪ <u>At the intersection with Port Giles Road:</u> <ul style="list-style-type: none"> ○ Test skid resistance on all approaches, and remediate as necessary. ○ Refresh line marking and reinstall RRPMS. ○ On the southbound approach, install R1-2 'give way' signs and duplicated W3-2 'give way sign ahead' signs with 200m and 400m distance plates. ○ On the eastern and western approaches, install W2-4 'side road intersection' warning signs. ○ Widen and extend the left turn lane for eastbound vehicles turning left to continue northeast on Stansbury Road. 		DPTI

North Coast Road

North Coast Road is an unsealed road maintained by the Yorke Peninsula Council extending 11 kilometres between Point Turton and Point Souttar. When asked in the member survey about unsealed roads that should be considered for sealing, North Coast Road was, by far, the most mentioned road attracting more than 30 responses, as well as other mentions throughout the survey. This level of response for a single unsealed road is unprecedented when compared to previous regional road assessments, and indicates a very high level of concern from the community. Yorke Peninsula Council have allocated \$100,000 to rehabilitate a two kilometre section of North Coast Road in the 2018/19 capital works programme.

Crash History

Two casualty crashes occurred on North Coast Road between 2013 and 2017. Tragically, one of these resulted in a fatality.

North Coast Road Crash Types

Crash Types	No. of Crashes	Apparent Error
Hit Fixed Object	1	Inattention (1)
Right Angle	1	Disobey – give way sign (1)
All Crashes	2	Inattention (1), disobey – give way sign (1)

Traffic Volumes

RAA does not have reliable traffic volume data for North Coast Road, however, comments in the member survey indicate that over 2000 vehicle movements were counted in a council traffic survey in the 2018 Easter period.

North Coast Road. In holiday periods, council traffic counters recently recorded 2274 vehicle movements over Easter 2018.

RAA member

Road Widths

No formal width measurements were taken, however, the width of the unsealed road is considered appropriate.

Speed Limits

Sections of North Coast Road are controlled by the 100 km/h default for unsealed roads, with the eastern end of the road controlled by a 50 km/h speed limit. This is an unusual treatment, as it is generally considered good practise to not post speed limits on unsealed roads due to the variability in road conditions and the fact that a posted speed limit will often be inappropriate. Australian Standard AS1742.4 indicates that speed limits other than the default urban or default rural speed limit shall not be applied to unsealed roads. In the case of North Coast Road, the 50km/h section is adjacent to significant roadside development, which would constitute an urban area by definitions in Australian Standards and the Australian Road Rules. RAA considers signposting the 50 km/h speed limit to be appropriate.

Observations

A number of deficiencies were observed on North Coast Road at the time of the current assessment, despite evidence of recent grading. A highly corrugated surface was observed

in many locations causing significant vibrations through the vehicle with the potential to dislodge loads in the vehicle, or within a trailer or caravan being towed. This can also contribute to a loss of traction and make it difficult for drivers to maintain full control of their vehicle.



Corrugations on North Coast Road, and a build-up of loose surface material around a curve

The wearing course is slippery with loose gravel present in high volumes. Maintaining traction, even in the RAA Road Safety Subaru with an all-wheel drive drivetrain, was challenging at speeds well below the default 100 km/h. For a driver inexperienced with unsealed road conditions, or driving an inappropriate vehicle, the risk of being involved in a crash due to these conditions is high.

RAA recommends that North Coast Road be sealed in full to a minimum carriageway width of 6.6 metres. Sealed shoulders (Minimum 0.5 metres) should also be strongly considered as part of the design to provide a total sealed carriageway width of 7.6 metres as a minimum. Funding should be sought from state and federal funding pools to assist council with the financial burden, whilst continuing to provide regular maintenance across the rest of the council maintained road network.

Delineation along North Coast Road is generally poor with no additional delineation provided for most curves and crests. Many curves lacked the appropriate warning signs, and intersections had outdated warning signage, or no warning signage at all in some cases. RAA recommends that signage be reviewed, with emphasis on providing adequate curve and intersection warning signs. RAA also recommends that delineation be improved by installing guide posts at 150 metre intervals, and at more regular intervals around curves and crests as specified in Australian Standard 1742.2 (2009). CAMs may be more suitable on tighter curves, and should be considered as an additional delineation measure.

The curve at the western end of North Coast Road where it meets Point Souttar Road at 90 degrees is also considered problematic, particularly for westbound vehicles due to the crest on approach to the corner. The following deficiencies were observed:

- W1-1 'turn' sign is twisted and barely visible on the westbound approach.
- Very little delineation is provided, particularly on the westbound approach (current D4-1-1 unidirectional hazard markers are not a standard or appropriate treatment).
- Surface is slippery and offers poor skid resistance.

The 90 degree corner was inconspicuous from less than 100 metres away, which when travelling at speeds up to 100 km/h and taking into account a 2.5 second reaction time creates a very high crash risk.



The 90-degree corner is still inconspicuous from less than 100m away (westbound).

RAA recommends the following treatments on this corner:

- Replacing, and duplicating W1-1 'turn' sign on the westbound approach to the corner. This should also be installed further in advance to the corner than its' current placement.
- Install D4-6 'chevron alignment markers' around the curve from both approaches as specified in AS1742.2 (2009).
- Improve skid resistance at the intersection. Consider sealing the corner as a priority whilst funding is sourced for the remainder of North Coast Road.

Key Recommendations

North Coast Road – Key Recommendations		Authority
▪ Seal North Coast Road to 6.6 metres and strongly consider concurrent shoulder sealing to a minimum width of 0.5 metres to provide a 7.6 metre wide sealed carriageway.		YPC
▪ Improve and update curve and intersection warning signs.		YPC
▪ Improve delineation by installing guide posts at regular 150 metre intervals and at more regular intervals around curves and over crests as specified in AS 1742.2 (2009). Consider CAMs as an additional delineation measure on tighter curves.		YPC
▪ <u>At the intersection with Point Souttar Road:</u> <ul style="list-style-type: none"> ○ Relocate and duplicate W1-1 'turn' sign on westbound approach. ○ Install D4-6 'chevron alignment markers' on both approaches as specified in AS 1742.2 (2009). ○ Improve skid resistance. Consider sealing the corner as a priority whilst funding is sourced for the remainder of North Coast Road. 		YPC

Other Roads Assessed

Condowie Plain Road

Condowie Plain Road was not raised as an issue during consultation, but as a state maintained road between Brinkworth and Snowtown, this was assessed by RAA. Traffic volumes are generally very low with an estimated AADT of 100 vehicles for the 15 kilometres between Magpie Creek Road and Brinkworth, and a speed limit of 110 km/h.

Lanes were measured to be 3.1 metres wide with a 0.2 – 0.3 metre sealed shoulder. Although it is desirable to increase this geometry, very low traffic volumes, and no recent crash history will make this a low priority. As a long term recommendation, RAA recommends 3.3 metre wide lanes and one metre wide shoulder seal along the length of Condowie Plain Road.

Rail Corridor Road

Rail Corridor Road is a key route between Brinkworth and Blyth and is used by approximately 310 vehicles per day with almost 15% for commercial purposes. Lane width measured on the northern half of the road was very wide at 3.7 metres, however, only a 200 millimetre wide sealed shoulder was provided at most, with the edge line on the edge of the pavement at times. Total seal width was measured at 7.4 metres.

South of Hart Road, the carriageway narrows to approximately 3.3 metres, with a more consistent 200 millimetre sealed shoulder, and it is noted that repairs were recently undertaken on small sections of the road. The 1.5 kilometre section of road, between Benbournie Road and Blyth is narrower again and has no sealed shoulder or edge line. RAA recommends sealing the shoulder and painting an edge line for this short section of Rail Corridor Road.

Blyth Plains Road

Blyth Plains Road is a significant freight route and is of importance to both the Yorke Peninsula and Clare Valley regions. RAA assessed this state maintained road in January 2018 as part of the Clare and Goyder regional road assessment. Poor drainage is an issue contributing to the issues on Blyth Plains Road, and in the longer term the road may need to be completely reconstructed to provide better drainage. The road has deteriorated further since RAA's Clare and Goyder assessment, and rehabilitation works are urgently required. Ruts, cracks and potholes were prevalent when the route was assessed as part of the current Yorke Peninsula regional road assessment.



The surface of Blyth Plains Road has significantly deteriorated since the beginning of 2018.

Lanes are generally too narrow for regular freight use, and there is only a short section with narrow shoulder seal near Tucker Road, north of Hoyleton.

RAA's previous recommendation of one metre sealed shoulders and additional w-beam barrier protection still stands. RAA also recommends that rehabilitation works be undertaken as a priority.

Bay Road

Bay Road is under the jurisdiction of Copper Coast Council and is the primary link between Moonta and Moonta Bay. Bay Road can experience heavy traffic, especially during periods of peak tourism and is generally in very poor condition, as raised by a large number of survey respondents.



Bay Road is currently in very poor condition

Bay Road is scheduled for major rehabilitation and reconstruction works in 2019, which RAA trusts will rectify the underlying issues on this road. RAA will re-assess the condition of the road at a later date, following the completion of these works.

Barunga Gap Road

Barunga Gap Road is a state maintained road connecting Bute and Snowtown, governed by a 100 km/h speed limit. Traffic volumes are low, with less than 200 vehicles per day using the corridor, on average. The total seal width was approximately 6.4 metres with lane widths of 3.2 metres, on average. Shoulders were narrow, unsealed and overgrown with grass in places.

The western end of the road is heavily rutted and polished and RAA suspects this will cause water to pond in ruts following periods of rainfall. Vegetation is within 2 – 3 metres of the road, without any form of barrier protection, and there were numerous steep drop offs. It was also noted CAMs would better delineate curves on the road as there are a number of tight curves on the route.

There is no warning signage indicating the intersection with Augusta Highway. As a major intersection with a busy national highway, RAA recommends that W2-3 't-intersection, straight approach' signs are installed in advance of the intersection with '400m' and '200m' supplementary plates.

As traffic volumes are low, it is difficult to justify prioritising Barunga Gap Road over busier roads in the region. As a minimum, signage upgrades mentioned above are required at the intersection with Augusta Highway. As a longer-term aim for this road, shoulder sealing, barrier protection and curve delineation improvements must be considered.

Sand Pit Road

Sand Pit Road was not raised in the survey, however, was investigated following a 'Report A Road' nomination by a RAA member in 2017. Sand Pit Road is under the care and control of Barunga West Council and runs in an east-west direction just north of Kulpara. RAA did not identify any major issues with the surface at the time of assessment, however, it was noted that the road was quite narrow on the eastern end and roadside hazards were more prevalent on this end of the road. The cost of removing hazardous vegetation would not be justified at this time considering the very low traffic volumes, and any funding could be more effectively spent elsewhere on the council maintained road network.

Port Broughton Road (Kadina – Alford)

More than 500 vehicles per day, on average, traverse Port Broughton Road connecting Kadina and Alford. Between 2013 and 2017, there were four casualty crashes on the road, with three of these roll overs due to inattention. The road ends at the intersection with Spencer Highway, just south of Alford, where it continues north as Spencer Highway. members raised the road width as an issue, particularly when towing. The road is 16.5 kilometres in length, and recently, shoulders have been sealed to 1.1 metres wide for 4.5 kilometres of the total road immediately north of the intersection with Adams Plain Road.

Kadina to Port Broughton is too narrow when towing, needs more shoulder room.

RAA member

Lanes were measured to be 3.1 – 3.2 metres wide where shoulders weren't sealed, and 3.3 metres wide where shoulder seal had been applied. RAA recommends that shoulders are sealed to one metre wide for the remaining 6.5 kilometres between Kadina and Adams Plain Road, and the remaining 5.5 kilometres south of Spencer Highway.

The surface was mostly in serviceable condition, however, undulations were noted approximately six kilometres south of the Spencer Highway intersection, which should be repaired.

Mines Road (Kadina – Moonta)

Mines Road is a state maintained road connecting Kadina and Moonta, with an average of 2,400 vehicles travelling the road every day. Between 2013 and 2017, seven casualty crashes occurred on Mines Road resulting in one fatality and six minor injuries. Fatigue and inattention are the most commonly occurring apparent errors in crashes, and RAA recommends installing ATLM to combat these crashes.

The 1.3 kilometre section of Mines Road between Martinga Road and South Terrace in Kadina is undulating and narrow. RAA recommends pavement rehabilitation and shoulder sealing on this section.



The section in Kadina is narrow and undulating

RAA encountered numerous local commuters travelling between Kadina and Moonta at speeds substantially lower than the signposted 100 km/h. Overtaking was made difficult due to high traffic volumes, and with an increasing population in the Copper Coast Council district, traffic volumes are expected to rise. Whilst the road is relatively short and most use the road to commute between Moonta and Kadina, RAA notes that local drivers are more prone to making risky decisions on roads they are familiar with. For this reason, RAA recommends that consideration be given to installing an overtaking lane in each direction.

Thrington Road

There were multiple mentions of Thrington Road in the member survey. RAA's assessment indicated that the road was in good condition and it was apparent that work had been undertaken recently to improve this road. Between Moonta and Kadina – Cunliffe Road, lanes were 3.4 metres wide, with 300 millimetre wide sealed shoulders, and east of Kadina – Cunliffe Road, lanes were 3.7 metres wide with no edge line marking. RAA recommends marking edge lines east of Kadina – Cunliffe Road to further delineate the edges. This should coincide with refreshing of the centre line marking, as this was beginning to fade.



Thrington Road west (top image) compared to east (bottom image) of Kadina – Cunliffe Rd

Maitland Road (Maitland – Ardrossan)

Maitland Road is a state maintained road connecting Maitland and Ardrossan and is particularly significant to freight during harvest with vehicles transporting grain to the Viterra silo site in Ardrossan. One casualty crash occurred on Maitland road between 2013 and 2017, and was due to a vehicle disobeying a give way sign at an intersection.

The total seal width was 7.5 metres, and shoulders are sealed to an average width of 0.5 metres along the entire length of road. The surface was polished and minor ruts were forming in sections due to heavy vehicle use, however, at this stage this should only be monitored for further deterioration.

A give way sign currently controls the intersection with Yorke Highway in Ardrossan. Additional safety features include give way ahead warning signs, a pavement bar treatment and additional guide posts for delineation. There was a suggestion in the survey to install a stop sign at this intersection, however, stop signs should only be used when sight distance is poor. Give way signs are the correct treatment at this intersection and RAA is of the opinion that stop signs will not improve road safety at the intersection, as sight distance is satisfactory.

Port Victoria Road (Maitland – Port Victoria)

Port Victoria Road is a state maintained road connecting Port Victoria and Maitland. Port Victoria Road sees around 500 vehicles every day, most of which is commuter traffic rather than freight. The road was noted to be in serviceable condition at the time of RAA's assessment, with line marking clearly visible, gravel shoulders in good condition with little edge drop, and a well maintained clear zone.

Our measurements indicate 3.1 – 3.2 metre lane widths with a total seal width of 6.3 metres. To improve safety on this road, shoulder sealing of a minimum 0.5 metres and desirably one metre should be considered. Crash History indicates three single vehicle casualty crashes between 2013 and 2017 with two of these attributed to driving under the influence of alcohol or drugs. Due to recent crash history, and the generally good condition of the road, RAA understands that shoulder sealing may be seen as a lower priority than other safety upgrades required in the region.

Port Giles Road (Yorke town – Port Giles)

Port Giles Road is a state maintained road connecting Yorketown (at the intersection with Stansbury Road) and Port Giles. West of St Vincent Highway, the road sees an average of 230 vehicles per day, and the eastern section only sees around 130 vehicles per day. Freight comprises approximately 35% of traffic volumes, as this is the primary route to access the Port Giles Silos. The eastern section is also b-triple approved for access to and from the silos.

RAA observations on site indicate that the road is in serviceable condition, with the eastern end suitable for b-triple access. In the longer term, shoulders should be sealed between Stansbury Road and St Vincent Highway, however low traffic volumes indicate that shoulder sealing should be prioritised on other roads in the region at this point in time.

Point Turton Road

Point Turton Road is four kilometres long and maintained by Yorke Peninsula Council as the primary access to Point Turton from Yorke Highway. The road surface is in good condition, with lanes estimated to be 3.3 metres wide, without any shoulder sealing.

Curve delineation between Little Sheoak Road and Yorke Highway was poor and RAA recommends that CAM's be installed to delineate the two opposing curves. RAA also suggest that a W3-2 '*t-intersection, straight approach*' sign is installed on approach to Yorke Highway, and that council consider providing a minimum 0.5m wide shoulder seal in the longer term.

Marion Bay Road

Marion Bay Road was not raised during community or stakeholder consultation, however, was en route to other destinations being assessed. The surface of Marion Bay Road is in very good condition, with 3.5 metre wide lanes provided along the length and gravel shoulders flush with the road surface. Delineation was also good, with guide posts provided along the length of the road, and extra guide posts installed to delineate curves and crests.

The centre line was quite faded and RAA recommends that this be refreshed and council consider painting edge lines to further delineate the carriageway.

Arthurton Road

Arthurton Road extends 25 kilometres between Moonta and Arthurton. The northern four kilometres is under the jurisdiction of the Copper Coast Council through to the intersection with Pedler Road. The remaining 21 kilometres is under the jurisdiction of Yorke Peninsula Council. Four casualty crashes occurred on the road between 2013 and 2017, with one of these resulting in serious injuries. Three of the four casualty crashes were single vehicle crashes involving a rollover or hitting a fixed object due to inattention.

Characteristics of the road varied across the length with a 6.3 metre seal width measured in the Copper Coast Council maintained section and 6.8 metre seal width measured in the Yorke Peninsula Council maintained section. Between Agery Road and Arthurton, significant undulations and edge drop-off were encountered. RAA recommends that localised pavement rehabilitation is undertaken to address the undulating sections and edge drop-off is monitored and repaired when required. In the longer term, shoulders should be sealed for the entirety of Arthurton Road.

Guide posts effectively delineate the road in the Yorke Peninsula Council maintained section, however, these are lacking north of Pedler Road. RAA recommends that guide posts be installed by Copper Coast Council through to Moonta. Intersection warning signs are outdated and need to be reviewed and updated by both the Copper Coast and Yorke Peninsula Councils.

South Coast Road

A sizable number of survey respondents raised South Coast Road when asked if there were any unsealed roads in the region that should be considered for sealing. At the time of RAA's assessment, the road was in good condition, and guide posts were used well to delineate edges and curves. RAA recommends that CAMs are used to delineate some of the tighter curves along the road.

Roads to Recovery funding has recently been used to upgrade the road east of Wild Dog Hill Road, however it was noted that there is high volume of loose material on the surface in this section causing traction issues around curves.



Ridges of loose material are prevalent on some sections of South Coast Road

Roadwork was taking place east of Sturt Bay Road, and some sections were in poor condition, however, RAA trusts that work was underway to rehabilitate these sections at the time.

The cost to fully seal South Coast Road cannot currently be justified, and funding could be better used in other locations across the Yorke Peninsula.

Corny Point Road

Corny Point Road is managed by the Yorke Peninsula Council and was raised by survey respondents as being in a general state of poor maintenance. Almost \$200,000 of funding was allocated in Councils 2018/19 capital works programme to address a two kilometre section of Corny Point Road. RAA did not assess the entire length of Corny Point Road due to time constraints, however, the road was assessed between Corny Point and Brutus Road.

Grading had recently been undertaken between Hayes Road and Hundred Line Road, and this three kilometre section was in good condition. The unsealed sections both west of Hayes Road and east of Hundred Line Road were in very poor condition, with potholes and deterioration of the wearing course prominent.



Many shallow potholes littered the surface of sections of Corny Point Road.

RAA recommends that a heavy grade of Corny Point road be undertaken, with additional material added where required to build up a crown and provide better drainage.

RAA also recommends installation of guide posts along the length of the road to improve delineation along the edges of the carriageway and that council update outdated W2-1 'crossroad' warning signs along the road to conform to current Australian Standards (AS1742.2 (2009)).

Pine Point Road

Pine Point Road is an unsealed road maintained by Yorke Peninsula Council, and survey respondents indicated a strong level of demand for sealing this road. The 29 kilometre road links Maitland and Pine Point and is predominantly unsealed, with 4.5 kilometres of the road sealed in Maitland. In the 2018/19 financial year, \$1.5M of funding has been allocated in Councils capital works programme to address issues on 9.5 kilometres of Pine Point Road.

Following RAA's assessment of the Pine Point Road, it was concluded that the road is currently well maintained, and the cost to seal the road is not likely to be justifiable. RAA recommends a number of cost-effective signage and delineation improvements to improve safety on Pine Point Road;

- Install W3-2 'give way sign ahead' on the westbound approach to Yorke Highway.
- Update outdated W2-1 'crossroad' warning signs to conform to current Australian Standards.
- Install guide posts along the length of the road to improve delineation, particularly at night.
- Install W2-9 'side road intersection on a curve' signs on the approaches to McFarlane Road, and consider additional delineation improvements such as CAMs.

Cutline Road

Cutline Road was raised by multiple survey respondents when asked if there were any unsealed roads in the region that should be considered for sealing. At the time of RAA's assessment, Cutline Road was in good condition, with low levels of dust produced, and no significant loose or slippery material on the surface. Delineation was generally poor, and RAA recommends that guide posts are installed at regular intervals along Cutline Road to better delineate edges, particularly at night.

Some W2-1 'crossroad' warning signs are outdated and RAA recommends that these be reviewed and updated to conform to current Australian Standards (AS1742.2 (2009)).

RAA recommends that a W3-2 'give way sign ahead' sign is installed prior to the intersection with Harry Butler Road and that vegetation on the south side of the road is trimmed back on approach to Yorke Highway as this is concealing the give way ahead warning sign on approach to this major road.

RAA sees no immediate need to seal this corridor due to the vast cost of sealing a thirty kilometre route, its' low traffic volumes, and its current state of good maintenance.

Edithburgh – Port Moorowie Tourist Drive

This route follows the southeastern coast of Yorke Peninsula, between Edithburgh and Port Moorowie. The route is primarily unsealed, and there are a number of destinations including the SS Ranald Shipwreck Memorial, the Troubridge Point Lighthouse, campgrounds, and spectacular views over Gulf St Vincent as well as access to Ballywire Farm near Port Moorowie.

The route was travelled from Port Moorowie to Edithburgh along the following roads:

- New Honiton Road
- Boothill Station Road
- Diamond Lake Road
- Clan Ranald Road
- Troubridge Point Drive
- Heel Road
- Wattle Point Road

A number of survey respondents raised safety concerns along the route, including the comment below.

Wattle Point Road, Heel Road, Edithburgh is a high traffic zone for tourists wanting to visit the Wattle Point Wind farm. During holiday periods, these roads have constant traffic flow towards the scenic drive, beaches and wind farm. Many caravans turn around after 1km of being on Wattle Point Road from Edithburgh direction."

RAA Member

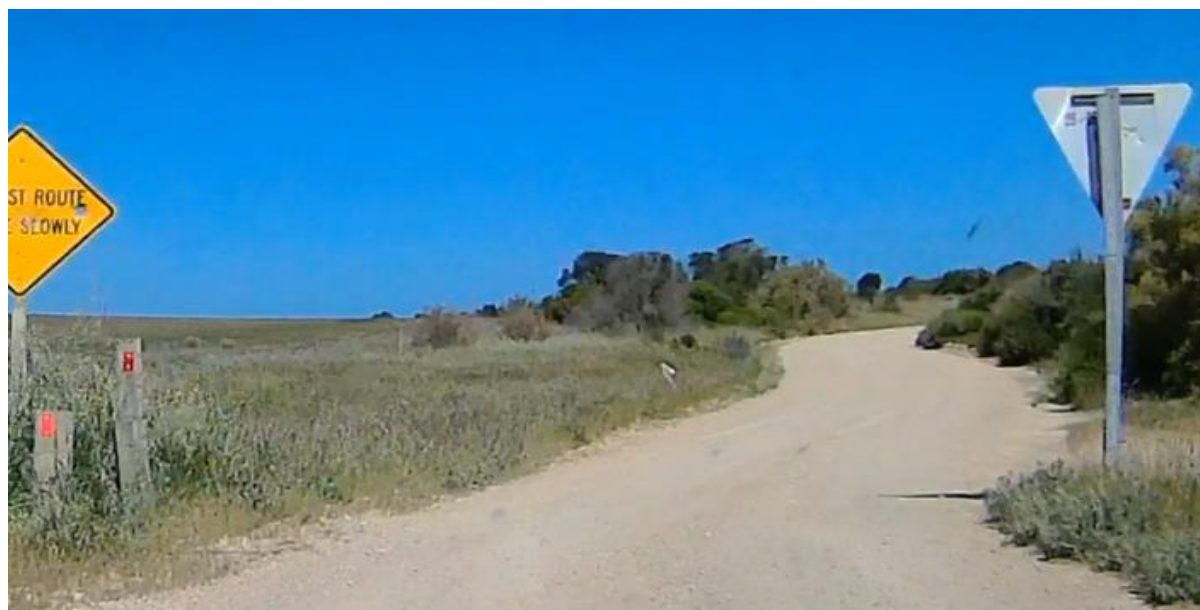
RAA observations were that the roads were mostly in serviceable condition, with the exception of:

- Troubridge Point Drive (north eastern end)
- Heel Road
- Wattle Point Road

All three of these roads were significantly corrugated, causing issues maintaining traction. RAA recommends that council review maintenance schedules for these three roads so that they are not left to deteriorate to this condition between routine grading.

Tourist route signage is placed at the start of the route on Clan Ranald Road, however, was not seen replicated at various intervals. RAA suggests that similar reminder signs could be placed along the route to assist wayfinding, acknowledging that placing a significant number

of signs along the route will detract from the natural beauty that makes this region so popular amongst tourists.



Tourist route signs on Clan Ranald Road

Delineation of the route was also poor and installation of guide posts should be considered to delineate road edges.

Key Recommendations

Other Roads – Key Recommendations		Authority
▪ On Condowie Plain Road, in the longer term – widen lanes and shoulders to 3.3 metres and one metre respectively.		DPTI
▪ On Rail Corridor Road, seal shoulders between Blyth and Benbournie Road.		DPTI
▪ On Blyth Plains Road; <ul style="list-style-type: none"> ○ Undertake rehabilitation works as a priority. ○ Adopt previous RAA recommendations to install one metre wide sealed shoulders and additional w-beam barrier protection. 		DPTI
▪ On Barunga Gap Road; <ul style="list-style-type: none"> ○ Install W2-3 't-intersection, straight approach' signs with '200m' and '400m' supplementary plates at the intersection with Augusta Highway. ○ In the longer term, seal shoulders, provide barrier protection for roadside hazards and drop offs, and improve curve delineation. 		DPTI
▪ On Port Broughton Road; <ul style="list-style-type: none"> ○ Seal shoulders to one metre wide for remaining sections. ○ Repair the undulations occurring seven kilometres south of Spencer Highway intersection. 		DPTI
▪ On Mines Road; <ul style="list-style-type: none"> ○ Install ATLM to combat fatigue and inattention related crashes. ○ Pavement rehabilitation and shoulder sealing for the 1.3 kilometre section between South Terrace and Martinga Road, in Kadina. ○ Consider installing an overtaking lane in each direction. 		DPTI
▪ On Thrington Road; <ul style="list-style-type: none"> ○ Install edge lines and refresh centre line marking east of the intersection with Kadina – Cunliffe Road. 		CCC

<ul style="list-style-type: none"> ▪ On Port Victoria Road, seal shoulders to a desirable one metre wide (minimum 0.5 metres). 	DPTI
<ul style="list-style-type: none"> ▪ On Port Giles Road, seal shoulders between Stansbury Road and St Vincent Highway as a longer term goal. 	DPTI
<ul style="list-style-type: none"> ▪ On Point Turton Road; <ul style="list-style-type: none"> ○ Install CAMs to delineate the two opposing curves between Little Sheoak Road and Yorke Highway. ○ Install a W3-2 '<i>t-intersection, straight approach</i>' sign on approach to Yorke Highway. ○ In the longer term, install minimum 0.5 metre wide shoulder seal. 	YPC
<ul style="list-style-type: none"> ▪ On Marion Bay Road, refresh centre line marking and consider painting edge lines to further delineate the carriageway. 	YPC
<ul style="list-style-type: none"> ▪ On Arthurton Road <ul style="list-style-type: none"> ○ Localised Pavement rehabilitation between Agery Road and Arthurton. ○ Monitor and repair edge drop-off. ○ Review and update intersection warning signage. ○ Install Guide Posts between Pedler Road and Moonta. ○ Seal shoulders as a longer term priority. 	YPC CCC/YPC CCC CCC/YPC
<ul style="list-style-type: none"> ▪ On South Coast Road, use CAMs to delineate tighter curves. 	YPC
<ul style="list-style-type: none"> ▪ On Corny Point Road; <ul style="list-style-type: none"> ○ Grade poor sections of the road and bring in additional surface material where required to form a crown and improve runoff. ○ Install guide posts to delineate the edges of the carriageway. ○ Update outdated W2-1 '<i>crossroad</i>' warning signs to conform to current Australian Standards. 	YPC
<ul style="list-style-type: none"> ▪ On Pine Point Road; <ul style="list-style-type: none"> ○ Install W3-2 '<i>give way sign ahead</i>' on the westbound approach to Yorke Highway. ○ Update outdated W2-1 '<i>crossroad</i>' warning signs to conform to current Australian Standards. ○ Install guide posts along the length of the road to improve delineation, particularly at night. ○ Install W2-9 '<i>side road intersection on a curve</i>' signs on the approaches to McFarlane Road, and consider additional delineation improvements such as CAMs. 	YPC
<ul style="list-style-type: none"> ▪ On Cutline Road; <ul style="list-style-type: none"> ○ Install guide posts at regular intervals along the length of the road ○ Update outdated W2-1 '<i>crossroads</i>' warning signs to comply with current Australian Standards. ○ Install W3-2 '<i>give way sign ahead</i>' warning sign on the westbound approach to Harry Butler Road. ○ Cut back vegetation concealing give way ahead warning sign on the westbound approach to Yorke Highway. 	YPC
<ul style="list-style-type: none"> ▪ On the Edithburgh – Port Moorowie tourist drive: <ul style="list-style-type: none"> ○ Review maintenance schedules to address to formation of corrugations on Troubridge Point Drive, Heel Road and Wattle Point Road. ○ Consider additional tourist route signs to assist wayfinding ○ Consider installation of guide posts to delineate road edges 	YPC

Appendix A – List of Roads Assessed

- Arthurton Road
- Augusta Highway (Port Wakefield – Port Pirie)
- Balaklava Road (Halbury – Port Wakefield)
- Barunga Gap Road, including
 - intersection with Augusta Highway
- Bay Road
- Blyth Plains Road
- Boothill Station Road (part of)
- Bute Road
- Clan Ranald Road
- Condowie Plain Road
- Copper Coast Highway, including
 - Intersection with Yorke Highway
 - Intersection with Upper Yorke Road
 - Intersection with Athena Drive (Wallaroo 5-way)
- Corny Point Road (part of)
- Cutline Road
- Diamond Lake Road (part of)
- Harry Butler Road
- Heel Road (part of)
- Maitland Road
- Mallala Road
- Marion Bay Road
- Mines Road
- New Honiton Road (part of)
- North Coast Road, including
 - Intersection with Point Souttar Road
- Owen Road (Hamley Bridge – Hoskin Corner)
- Pine Point Road
- Point Turton Road
- Port Broughton Road
- Port Giles Road
- Port Victoria Road
- Port Wakefield Road (Virginia – Port Wakefield), including
 - Intersection with Mallala Road
 - Intersection with Copper Coast Highway
- Rail Corridor Road
- Sand Pit Road
- South Coast Road
- Spencer Highway
- Stansbury Road including
 - Including intersection with Port Giles Road
- St Vincent Highway
- Thrington Road
- Traeger Road
- Troubridge Point Drive
- Upper Yorke Road
- Wattle Point Road
- Yorke Highway, including
 - Intersection with Beach Road (Hardwicke Bay)