

Kangaroo Island

Tourism Region Road Assessment



January 2017



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Executive Summary

RAA's Road Safety Department periodically evaluates the road network on Kangaroo Island on behalf of its local members. To complement RAA's Tourist Region Assessment (TRA) in September 2016, the Road Safety Department invited RAA members from Kangaroo Island to provide their opinions and attitudes towards various mobility issues.

Extreme weather events experienced in 2013 and again in 2016 have highlighted the fragile nature of the road network. Under a one in fifty year storm, roads in many areas flood, cutting off critical access for residents and limiting tourist movement around the island. Concerns about extreme weather access resonates within our member base, with 88 per cent of our members flagging concerns over weather access on the unsealed road network. RAA has recommended that an island-wide hydrology study be undertaken to assess critical access links that are at risk of flooding, and develop an infrastructure upgrade plan to ensure that key access is maintained through extreme weather events.

There have been recent calls to apply blanket speed limit reductions over the unsealed network and on all roads at night. Our members have indicated that they do not support blanket reductions but would consider speed limit reductions on approach to high risk intersections. This aligns with RAA's proposal that speed limit reductions should be considered on a case by case basis favouring a risk based methodology. As such, RAA has recommended that a risk assessment approach is adopted which also seeks to upgrade arterial roads such as the Playford Highway to ensure a consistent level of road safety infrastructure to support higher speeds expected of these roads.

Our member survey also indicated issues with the level of public transport and taxi services available on the island. Although most members knew about the service, fewer than five per cent claimed they or their families used the service and almost 50 per cent were unsure if it was meeting the needs of the residents. Our Road Safety team noted the presence of Rockhopper stops throughout the island, but their locations may present further connectivity issues.

RAA have been made aware of safety issues facing pedestrians at Jacks Creek. The verge at the creek is narrow, forcing pedestrians to cross the creek within only a meter or so of live traffic. The construction of a safer pedestrian crossing was supported by a majority of our members and RAA recommends funding is sought to allow further investigations and design work to be undertaken.

In our survey, our members identified a number of driver behaviour issues ranging from tourists driving on the wrong side of the road and stopping in risky locations to admire the countryside, to motorists speeding, performing risky overtaking manoeuvres and using their mobile phones. Kangaroo Island Council and the Department for Transport, Planning and Infrastructure (DPTI) have produced multilingual educational videos about driving on Kangaroo Island, which RAA consider to be very effective.

At the time of this report, the Road Safety Minister had approved a trial of pavement arrows to be applied to indicate the correct direction of travel. RAA feels that signage to supplement the line marking would also be beneficial. Further discussions between RAA, DPTI, Kangaroo Island Council, SA Police and the Motor Accident Commission (MAC) may be required to develop a strategy to address the broader behavioural issues.

The main concerns our members expressed regarding road conditions were potholes (85%) and uneven surfaces (79%). Since RAA's 2013 assessment, there has been a visible improvement on a number of unsealed roads. More accurate grading slopes has resulted in better drainage, providing a smoother and more coherent surface. There are many roads however that require attention and it is recommended that further investment is made in the grading program to improve the surface of roads and reduce ongoing maintenance.

Our members indicated that they wished to see a number of roads sealed, including Cape Willoughby Road, North Coast Road from Kingscote to Emu Bay, and Hickman Road between Vivonne Bay, Seal Bay and Parndana. While this may be a longer term strategy, strong support was shown for sealing the approaches to intersections, to improve safety. Through our assessment work, RAA have demonstrated skid resistance issues with the Ironstone material commonly used throughout the island and sealing approaches to intersections would significantly improve the vehicle's braking performance.

Following concerns raised about a section of South Coast Road adjacent to the Little Sahara Desert Complex, RAA undertook a joint Road Safety Audit with Kangaroo Island Council. The audit identified a number of improvements including shoulder sealing, barrier extension, additional signs and Audio Tactile Line Marking (ATLM) to reduce the risk of vehicles drifting off the curve. RAA also examined roads within Flinders Chase National Park and found that while the roads were in good condition for the posted limit, installation of further curve advisory speeds could provide a safety benefit.

In our member survey, we asked members about their views on other mobility and communication issues including the electric highway, cycling, fuel pricing and mobile phone coverage.

While many showed low levels of support for the electric highway, they may be persuaded to purchase an electric or hybrid vehicle in the future, subject to government grants. A larger number either currently cycled or may be encouraged to cycle if investments were made to provide safe and accessible cycling infrastructure.

Residents largely considered fuel pricing to be unfair and called for transparent, real-time pricing in the industry that would promote competition and allow them to determine if savings could be made by filling up when over on the mainland.

RAA found that although 97 per cent of residents regularly use their mobile phone, only 20 per cent have reliable coverage. Given the remoteness of some areas of the island, RAA consider a review into mobile coverage a worthwhile road safety exercise to provide reliable contact with emergency and breakdown services.

Background

RAA's Road Safety Department periodically evaluates the road network on Kangaroo Island on behalf of its local members. To complement RAA's Tourist Region Assessment (TRA) in September 2016, the Road Safety Department invited RAA members from Kangaroo Island to provide their opinions and attitudes towards various mobility issues.

This report will highlight the findings and provide insight to the proposed recommendations. Accompanying this report is a number of detailed Road Audits and Blackspot funding applications.

Recommendations

Maintaining Access in Severe Weather

- Commission an island-wide hydrology study to identify weather critical access routes.
- Develop an infrastructure upgrade plan that maintains critical access to settlements during extreme weather events.

Speed Limits

- Review speed limits on a case by case basis, adopting a risk based approach, instead of blanket day/night reductions.
- Consider extending the Kingscote 80km/h zone to the west of Tinsmith Corner.
- RAA will continue to undertake research into skid resistance on unsealed roads to understand the impact of speed under a range of conditions.
- Upgrade Playford Highway to achieve a consistent application of road safety infrastructure that supports a speed limit of 110km/h
- Handover of Playford Highway from Kangaroo Island Council to DPTI should be considered.

Alternative Transport Options

- RAA recommends comprehensive engagement with community to address the current lack of alternative transport available on Kangaroo Island, with the aim to provide flexible, responsive and affordable options for locals and tourists.

Jack's Creek Crossing

- Seek funding for further design investigation.
- Upgrade Jack's Creek Crossing to provide safe passage for pedestrians.

Road Safety

- Develop information that can be distributed through tourism SA offices.
- Install interactive kiosks on-board the ferry and in the ferry terminal.
- Consider setting the video as a condition of hire at local vehicle rental companies.
- Trial directional arrows on road to indicate correct direction of travel.
- Install supplementary signage to enforce correct direction of travel.
- Examine additional education and enforcement campaigns to address risky behaviour across all demographics.
- Identify and explore road safety campaigns focused on driving on gravel roads, particularly for international tourists, and driving with wildlife.

Road Maintenance

- Maintain ongoing road grading program to address surface drainage and promote smoother, coherent surfaces.
- Address remaining defects found on Cape Willoughby Road.

Unsealed Roads

- Identify and undertake road sealing on strategic routes.
- Adopt an intersection sealing program to improve safety on approach to intersections.
- Address remaining defects found on Cape Willoughby Road
- Identify high risk curves and consider safety infrastructure to reduce the likelihood and severity of a crash.

Little Sahara Access

- Extend W beam barrier on curve.
- Construct sealed shoulders on s-curve to a minimum width of 1m.
- Install Audio Tactile Line Marking (ATLM) on curves.
- Install additional Chevron Alignment Markers (CAMs) to improve delineation.

Flinders Chase National Park

- Conduct further assessment on substandard curves and install warning signs as required.

Electric Highway
<ul style="list-style-type: none"> Parallel to the development of collaborations with stakeholders for an extended electric highway, greater engagement with community is recommended to fully understand the benefits and potential associated with the electric highway.
Cycling
<ul style="list-style-type: none"> It is recommended Council consider the development of a detailed cycling plan providing safe linkages to key tourist destinations.
Fuel Pricing
<ul style="list-style-type: none"> RAA calls on the government to provide a centralised portal for motorists to easily compare and find the lowest fuel prices on their journey. By ensuring all retailers are engaged in price transparency, companies that provide a competitive price will be improving competition and will be rewarded in the market.
Mobile Phone Coverage
<ul style="list-style-type: none"> A comprehensive review of mobile phone coverage be undertaken and recommendations developed with particular attention to the safety of motorists in areas of limited or no coverage.

Demographics and Travel Patterns

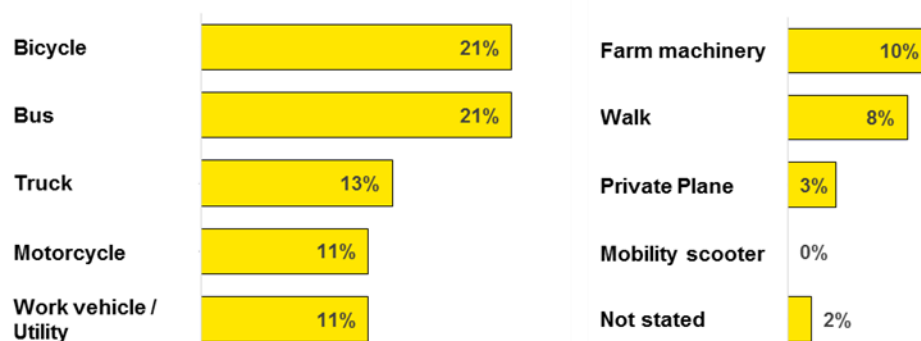
Demographics

RAA membership is spread across Kangaroo Island with the majority of members identifying with Kingscote, Penneshaw and Pardana. The majority of RAA members who completed the survey have lived on Kangaroo Island more than 10 years with nearly 40 per cent having lived on the Island for 25 years or more.

Transport Modes

Most members (93%) drive their car at least three to four days per week, this is consistent with members who live on the mainland. Nearly a quarter of RAA members use alternate methods of transport, with bicycle and bus being the most common (21% each). Interestingly, 10 per cent of members identified farm machinery as their alternative mode of transport, with three per cent also using private planes.

What is the most common mode of alternative transport you use?



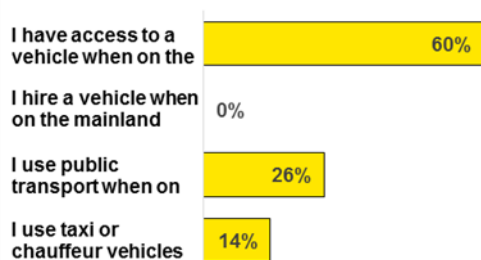
Mainland Travel

The majority of RAA members travel to the mainland on a regular basis, with 68 per cent travelling at least every two months and a further 28 percent travelling every six months. Sea Link Ferry provides 96 per cent of residents the link to the mainland and verbatim comments highlight the frustration at the high cost of this mode.

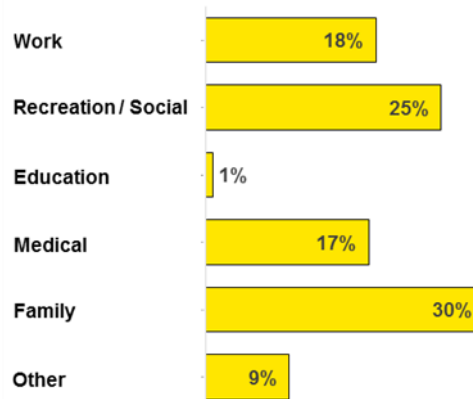
Of the members that do not drive to the mainland, 60 per cent have access to a vehicle when they arrive and a further 26 per cent use public transport.

It is often noted that country people plan multiple reasons when visiting a capital city. Kangaroo Island residents cite family (30%) as the main reason for mainland visits, followed by recreational / social (25%), work (18%) and medical (17%).

When on the mainland what best describes your travel routine:



What is your primary reason for visiting the mainland?



Maintaining Access in Severe Weather

2016 marked a number of exceptional weather events including one in fifty year storms which have caused state wide blackouts and flooding.

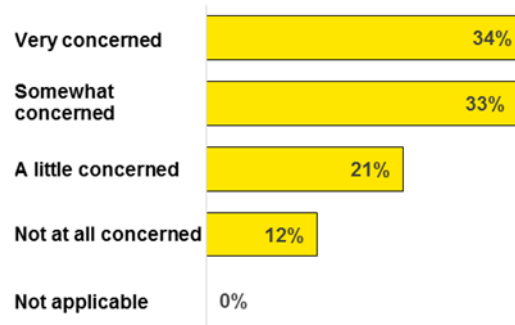
During RAA's TRA on Kangaroo Island, our team experienced 70mm of rain, 58 per cent of the Island's September rainfall in just five days. This is the second such event to occur within the past three years. Just prior to RAA's assessment on the island in September 2013, a

similar weather event left many roads on the island impassable and caused severe disruption and damage to infrastructure.

As significant weather events become more frequent, there is a need to assess road and drainage infrastructure to ensure that they are able to cope with the high volume of water generated by such storms. This is particularly important on Kangaroo Island where access to many parts of the island is only available via limited and vulnerable routes.

When consulting members, RAA asked how concerned they were about the effects weather has on reducing mobility and access on the gravel road network. 88 per cent of members highlighted a level of concern on their access and mobility on the gravel road network.

How concerned are you about the effects of weather on reducing your mobility and access on the gravel road network?



Members were given the opportunity to provide commentary on this and other topics, with many highlighting the weather variability (both high summer and wet winters) making it difficult for Council to keep up with maintenance. Others focused on the limited resources of Council and overall the roads reflect the need to prioritise constantly and not be able to do the proactive road work required. Members also highlighted that it is not only the gravel road network that provides challenges in wet weather, there are also deficiencies in some bitumen roads as well.

RAA's TRA identified a number of issues arising from the high levels of rainfall experienced:

- Lagoons overflowed, flooding the road and truncating the network
- Some roads had culverts and pipes that were too small to cope with the volume of water
- Water flowing across the road resulted in significant shoulder and pavement damage
- On at least one occasion, the embankment supporting the road was unable to cope with the force of the water and part of the road was swept away.

Kangaroo Island consists of a series of lagoons divided by the road network. There are no direct connections from the lagoons to the ocean, so water has to pass from one to the other, across the island before it can be discharged at sea. While the road network divides these lagoons, in many areas, drainage infrastructure has been constructed below the road to allow water to flow between the lagoons.

RAA's recent assessment suggests in some instances, the infrastructure is unable to cope with the volumes of water generated by one in fifty year storms and roads flood as a result. There is an added danger for tourists to the island because of the time lag between rainfall in the centre of the island and the water flowing to the coast. A road that looks safe to cross at the time of the rain could be cut-off hours later.

During our assessment, RAA found many roads had drainage infrastructure that was inadequate to cope with demand and as a result water flooded over the road. Two examples of this were on Mount Taylor Road and Harriet Road where each section that was flooding had a single pipe running under the road. Installing additional or larger pipes to cope with the excess water would reduce the risk of flooding and subsequent maintenance to the road surface.



Figure 1 – Flooding on Mount Taylor Road



Figure 2 – Water eroding the pavement and shoulder on Hog Bay Road near the intersection with Playford Highway.

At the sections of road prone to flooding, RAA found that water scouring the surface created significant damage that would require additional maintenance to address. Although drainage infrastructure is a high capital cost, initial investment would be recovered over time through the savings gained in the reduction of maintenance required after each significant weather event which appear to be occurring more frequently.

Our team travelled along Old South Coast following the heavy rains. About 700m northwest of West Road, the force of the flood waters had been so great, the road and embankment had washed out along with the large concrete storm pipe running under the road. This was the most extreme example of damage encountered during the assessment and demonstrates the need for increased capacity and management of the flood water. The washout observed may have occurred for a number of reasons but it is recommended that any remaining significant drainage structure is checked to ensure that it can withstand the high flows.



Figure 3 – Flood water completely washed away a section of Old South Coast Road, including the large concrete storm pipes.

To understand the extent of the flood problems, it is recommended that an island-wide hydrology study is undertaken. The study should identify the lagoon boundaries, the estimated catchment volume for appropriate high intensity storm events and assess critical points in the infrastructure that are likely to be affected.

A strategic infrastructure plan could be developed around these findings to ensure that vital transport links are maintained during periods of adverse weather and ensure that where possible, at least one alternate route exists. This would largely benefit the community by maintaining critical access, particularly for emergency services. In addition, key tourist areas could remain accessible to tourists during the wet season, potentially allowing growth of the tourism industry in the off-peak season.

Maintaining Access in Severe Weather Key Recommendations

- Commission an island-wide hydrology study to identify weather critical access routes.
- Develop an infrastructure upgrade plan that maintains critical access to settlements during extreme weather events.

Speed Limits

Prior to the survey being sent, there had been significant media calling for a blanket reduction of speed limits (on unsealed roads or at night) on Kangaroo Island. Historically, RAA members have not been in favour of this approach to setting speed limits.

In response to the member survey, our Road Safety team have considered the application and impact of various speed limit models for Kangaroo Island. The potential models include:

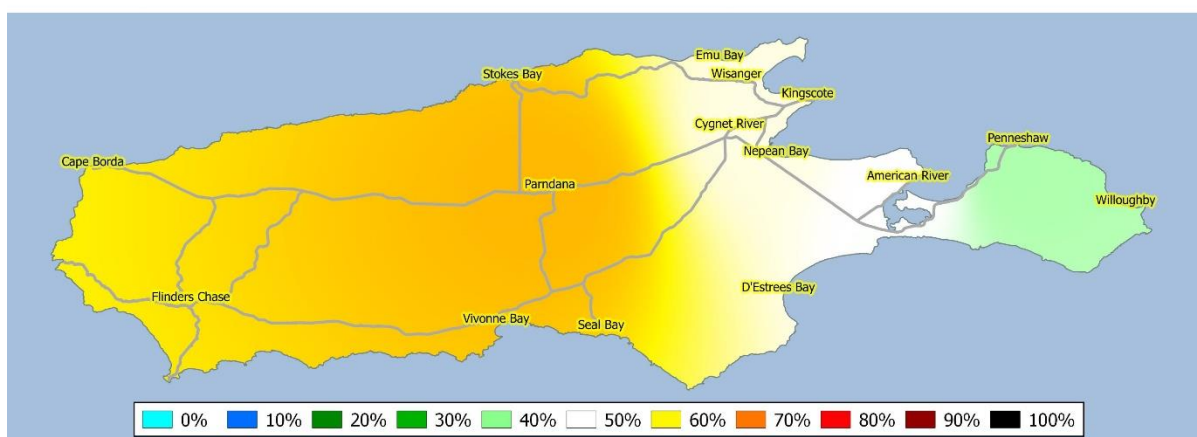
- Blanket reduction on unsealed roads.
- Blanket reduction of speed limits for night driving.
- Reduction on approach to high risk intersections.
- Risk based approach examining road infrastructure.

Blanket Reduction on Unsealed Roads

RAA does not support blanket reductions to speed limits and believe any proposed reductions should be considered on a risk based approach. Less than two in five of RAA members on Kangaroo Island supported a blanket reduction of speed on unsealed roads demonstrating strong resistance to any blanket reductions.

Question: Would you support a blanket drop in the speed limit on all gravel roads on KI?

Answer: No



When applying blanket reductions, the quality of the network can vary significantly resulting in low quality, narrow roads being subject to the same limits as high quality, wide roads with a high level of road safety infrastructure.

Research has shown the speed motorists choose to drive at may be heavily influenced by the road environment. Environments that are enclosed and safety risks which are clearly evident result in self-enforcing lower speeds.

Simply erecting speed limit signs and relying on Police enforcement is not an effective road safety countermeasure in the long term. In order to achieve lower speeds, the environment must be altered to promote self-enforcement.

In the context of the unsealed road network, the conditions of the road may vary significantly throughout the year. Since the material varies and is difficult to see at high speed, the risk of low skid resistance in areas may not be as apparent to motorists.

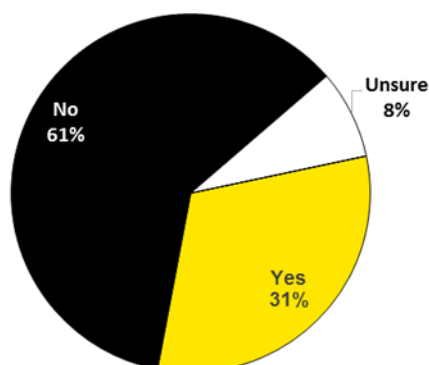
In New South Wales and Queensland, the state government has permitted the use of 80km/h regulatory speeds on unsealed roads. Although a blanket reduction on unsealed roads is not supported by RAA members on Kangaroo Island, other opportunities may exist to provide advisory speed signs in locations where there are potential hazards / risks. Trials of advisory 80km/h speed signs are currently being undertaken between DPTI and the District Council of Yankalilla.

During our assessment, we tested the skid resistance of wet Ironstone material and found that on some curves, the results suggested a high probability that a vehicle would start to slide when travelling at the maximum permitted limit of 100km/h. RAA intends to conduct further research into skid resistance on unsealed roads but initial testing suggests a need to provide additional warning to motorists of the need to reduce speed on these roads.

Blanket reduction of speed limits for night driving

A blanket reduction of night speed limits was another initiative recently suggested in the media, but has not been supported by our members on Kangaroo Island. Less than one third of members support a blanket reduction in speed limits for night driving and such a result is very significant, considering the intense local media on this issue in the weeks leading to this survey.

Would you support a blanket drop in speed limit when driving at night on Kangaroo Island?



In order to be effective, night limits traditionally require a high presence of police enforcement. This approach has been used in many parts of the United States, however in recent times a number of states, such as Texas have abolished night time limits due to their ineffectiveness.

Given the police resources required to support this initiative, a more effective measure for Kangaroo Island may involve running education campaigns on the risk of animal activity at night in order to encourage residents and tourists to drive to conditions.

Reduction on approach to high risk intersections.

Our members indicated their support for extending the 80km/h permitted speed limit at Kingscote to the intersection of Playford Highway, Bullock Track, North Coast Road and Tinsmith Road, locally known as Tinsmith Corner.

Currently all the roads at this intersection have 100km/h speed limits. Do believe the speed limit should remain unchanged or reduced as you approach this intersection?



Between 2011 and 2015 there have been four reported crashes at this intersection. As a result, one person has been seriously injured and three people have sustained minor injuries. There was no single cause of these crashes, with crash data attributing fail to give way, fail to stand and inattention as the causes.

A joint Road Safety Audit between RAA and Kangaroo Island Council highlighted that despite historic widening of Playford Highway at the intersection, risks remain present. A discrepancy between the asphalt joint and the line marking may cause confusion to motorists in respect to their position on the road. Ideally, the geometry of the intersection requires addressing, however a lack of crash history and the relative cost of realigning the intersection means that it is unlikely that this will prove a viable solution.



Figure 4 – Tinsmith Corner, heading westbound on Playford Highway.

A cost effective alternative could include the extension of the 80km/h zone from Kingscote to cover the intersection. This would reduce the crash risk, as well as the likely consequences should a crash occur.

Risk based approach examining road infrastructure.

When analysing potential speed limits on a risk assessment basis which considers the quality of the road infrastructure, a number of discrepancies were found between the roads on Kangaroo Island. As an example, Playford Highway has varying levels of road safety infrastructure between the Council and DPTI controlled sections, yet a speed limit of 110km/h has been applied throughout. The Council controlled portion of the highway has narrow shoulders and benefits from fewer raised reflective pavement markers.

When compared to the length of Playford Highway under DPTI control, or Kangaroo Island Council's Stokes Bay Road, which has good quality road safety infrastructure and wide shoulders (but subject to a 100km/h speed limit), there appears to be a disconnect between speed limit and safety infrastructure on the west side of the island.

As the Playford Highway services as an arterial road, the preferable solution would see the speed limit maintained at 110km/h and DPTI assume responsibility for the entire highway, allowing Council to focus maintenance on other key routes.

Speed Limits Key Recommendations
<ul style="list-style-type: none"> ▪ Review speed limits on a case by case basis, adopting a risk based approach, instead of blanket day/night reductions. ▪ Consider extending the Kingscote 80km/h zone to the west of Tinsmith Corner.

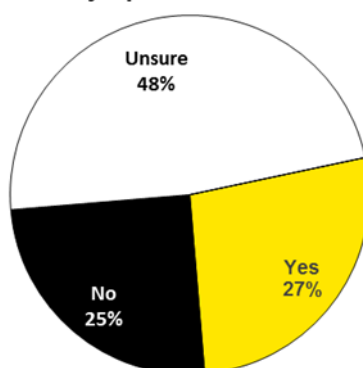
Speed Limits Key Recommendations
<ul style="list-style-type: none"> ▪ RAA to continue research into skid resistance on unsealed roads in order to understand the impact of speed under a range of conditions. ▪ Upgrade Playford Highway to achieve a consistent application of road safety infrastructure that supports a speed limit of 110km/h ▪ Handover of Playford Highway from Kangaroo Island Council to DPTI should be considered.

Alternative Transport Options

Regional public transport is problematic across South Australia, with low population densities and varying distances between services presenting delivery challenges. Three quarters of members on Kangaroo Island consider the lack of public transport as an issue. The Council operates a limited “Rockhopper” bus service and nearly 100 per cent of responders are aware of such.

Less than five per cent of respondents, including their families, had used the Rockhopper service. Approximately 50 per cent of members were uncertain whether the Rockhopper service was meeting the needs of residents with limited mobility options, highlighting the potential for improved communication regarding the service.

Do you believe the Rockhopper service is meeting the needs of residents who have limited mobility options?



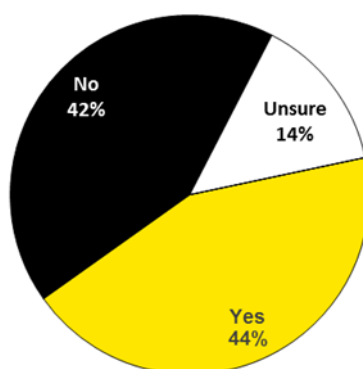
Member comments emphasised the issues regarding limited services and complexity of needs for both residents and tourists, including:

- Lack of visitor knowledge regarding the routine
- Schedule frequency
- Limited location services
- People left too long in one place
- Expensive
- No real advertising of service

When visiting Kangaroo Island, the RAA Road Safety team encountered Rockhopper service bus stops in a number of isolated locations, questioning the connectivity of services in providing end to end mobility for residents and tourists.

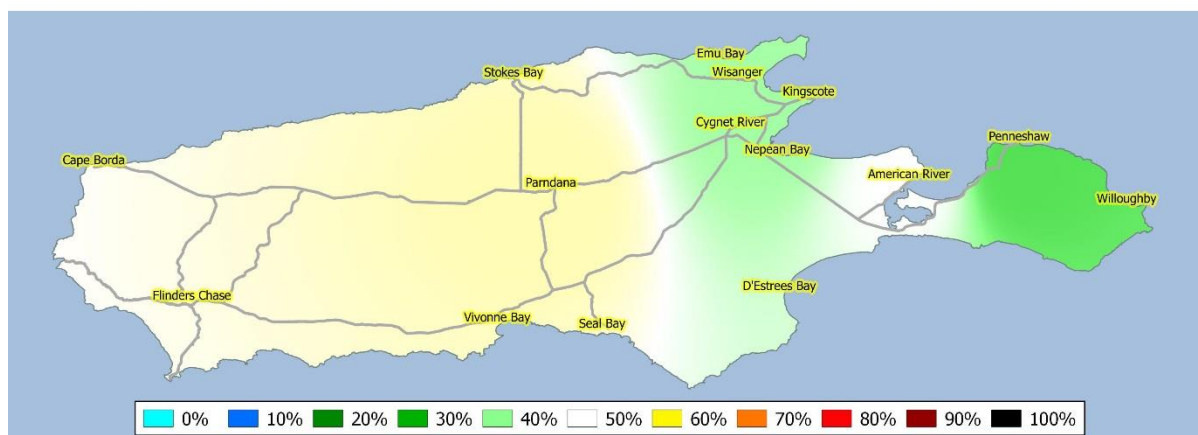
In light of there being no taxi services and limited alternative mobility options, while also taking into account the recent legalisation of ridesharing services, members were asked if an app-based ridesharing solution would be considered, should such be offered on Kangaroo Island. While the amount of positive and negative responses were similar, there is an indication that a segment of the population would favour such emerging technologies and alternative transport options.

Would you consider using an app-based ridesharing service if offered on Kangaroo Island?



The heat map below indicates that residents outside of key townships are more willing to trial an app-based ridesharing service.

Question: Would you consider using an app-based ridesharing service if offered on Kangaroo Island?
Answer: Yes



Alternative Transport Options Key Recommendations

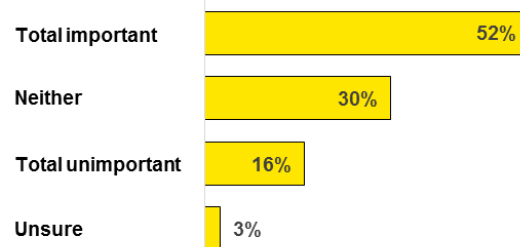
- RAA recommends comprehensive engagement with community to address the lack of alternative transport available on Kangaroo Island, with the aim to provide flexible, responsive and affordable options for locals and tourists.

Jacks Creek Crossing

Prior to RAA Road Safety Audit on Kangaroo Island, a number of concerns were raised regarding Jacks Creek Crossing, due to the narrow road corridor over the creek, constrained by the width provided by culverts running below the road.

Survey results indicate more than 90 per cent of respondents were aware of Jacks Creek Crossing location, with over 50 per cent of members highlighting the importance of installing a footbridge.

How important is it to you that a footbridge be installed for pedestrians at Jacks Creek crossing?



The Road Safety team examined the Jacks Creek Crossing on Hogs Bay Road where local concerns for pedestrians, who have to walk along the road side, within a metre of live traffic where supported. There is a particular risk with heavy vehicles passing pedestrians as they cross the creek due to the draught caused by the vehicles.



Figure 5 – Jack's Creek Crossing

Kangaroo Island Council are currently in possession of a steel gangway reclaimed from a jetty, which could potentially be implemented as a pedestrian bridge. Detailed evaluation would be required to check that this is fit for purpose and allow the design of the bridge abutments and tie in to a footpath.

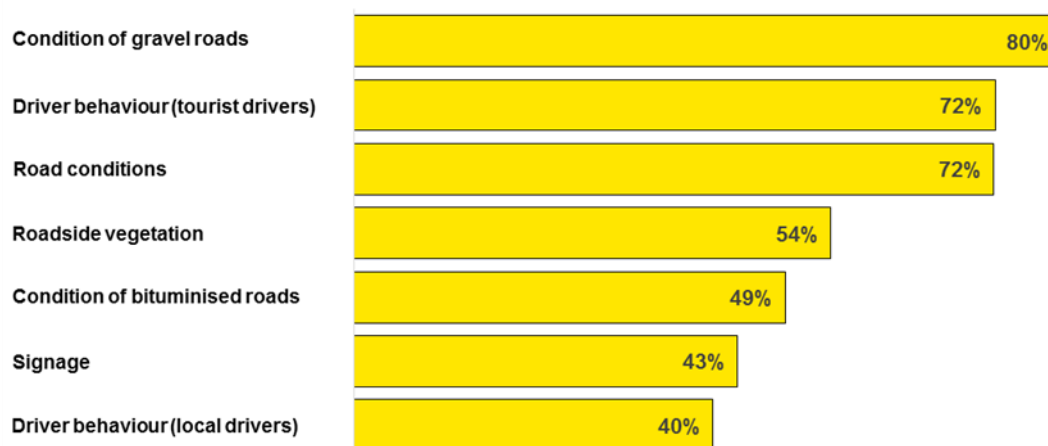
It is recommended funding is sought to carry out an initial study determining the ability of widening the road corridor and where appropriate, developing a design for the bridge abutments and ensuring the structure is fit for purpose. Given the risks associated with the close proximity of pedestrian and vehicle traffic, RAA considers this to be a worthwhile road safety project and one that should be offered priority.

Jack's Creek Crossing Key Recommendations	
<ul style="list-style-type: none"> ▪ Seek funding for further design investigation. ▪ Upgrade Jack's Creek Crossing to provide safe passage for pedestrians. 	

Road Safety

When asked to prioritise road safety issues, RAA members identified the condition of gravel roads as the highest road safety concern, followed by tourist driver behaviour and the condition of the roads. Signage and resident driver behaviour were of a lower concern.

Please prioritise the road safety issues listed:



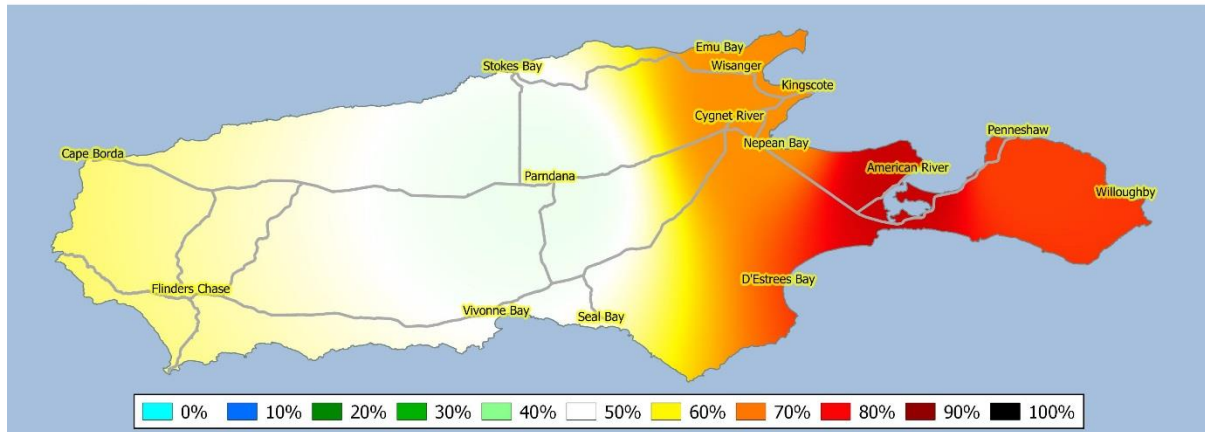
Three quarters of member respondents have reported witnessing unlawful or unsafe driving in recent times. Most common forms of risky behaviour identified include:

- Tourist drivers
- Stopping in the middle of the road or on blind corners to take photos of wildlife
- Driving on the wrong side of the road
- Overtaking in unsafe circumstances

- Speeding
- Motorists using mobile phones

Nearly 70 per cent of members identified unlawful / unsafe driving frequently occurring on a particular road. The heat map below indicates that members in the American River region, followed by Penneshaw believe that such behaviour occurs on particular roads.

Question: Do you believe unlawful / unsafe driving frequently occurs on a particular road / area on KI?
Answer: Yes

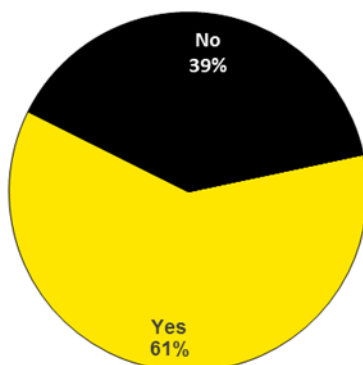


When asked where this unlawful / unsafe driving had occurred, Hog Bay Road (75%) was significantly more prominent, followed by Playford Highway (41%) and South Coast Road (37%).

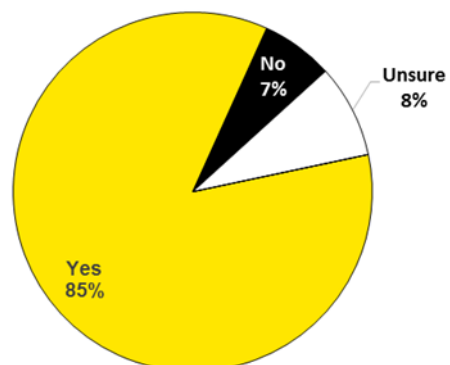
Road Safety and Tourists

Three in five members have witnessed driving on the right hand side of the road in the past 12 months. 85 per cent of respondents believe road authorities should introduce new measures to remind motorists of the requirement to drive on the left hand side of the road.

Have you witnessed someone driving on the right hand side of road on Kangaroo Island in the last 12 months?



Should road authorities implement new measures to remind all motorists to drive on the left hand side of the road?



While on Kangaroo Island, the team witnessed some of the risky behaviours identified by RAA members. Examples include tourists turning onto the wrong side of the road at an intersection, stopping in high risk locations to take photographs, or braking harshly after missing a turn off.

Following their community survey, Kangaroo Island Road Safety Committee (KIRSC) have recently lobbied State Government to install arrows on roads which would indicate the direction of travel. The Road Safety Minister has approved this process and sites are currently being assessed for the treatment.

Survey respondents were given the opportunity to comment on potential improvements to risky driving behaviour involving tourists and the following ideas were common:

- Directional Arrows – overwhelming support for arrows, especially at points of significance or corners that may be difficult for tourists to navigate.
- Educational Video – greater information available when on the ferry, but also a greater sense of responsibility from the car hire firms to minimise risky behaviour.
- Wrist Bands – handed out to all drivers to wear on the left hand as a subliminal reminder, alternatively an appropriately placed sticker on the steering wheel.
- Translated Brochures – expand the languages available and ensure they are available in all accommodation places.
- Pictorial Signs – increase directional, animal warnings ensuring signs are designed to be interpreted by international tourists.
- Driving Tests – specifically ensuring international tourists are aware of the appropriate side of the road to drive on, as well as the danger of stopping on roads despite low traffic volumes.

RAA would recommend that in addition to the line marking, the initiative is backed with strategically placed signs, as line marking requires periodic maintenance to remain prominent and if left to fade, the safety benefit will diminish. Additionally, the current line marking materials and practices used in South Australia often make it difficult for the line marking to be seen in situations of wet pavement and high glare.



Figure 6 – “Drive on Left” signs have already been trialled at Kangaroo Island Airport and Ferry Terminal.

A multilingual video presentation developed by DPTI, Kangaroo Island Council and members of the community is shown via a touchscreen display at the Kangaroo Island Airport. The video

provides a comprehensive overview on the risks of unsealed road driving and presence of wildlife, as well as essential tips for safe driving. RAA recognises that the video is shown as part of media on board the ferry, but believes that inclusion of multilingual touch screen displays in both the terminal and on the ship would be beneficial. RAA also recommends that that the video should be shown as a condition of hiring rental vehicles.

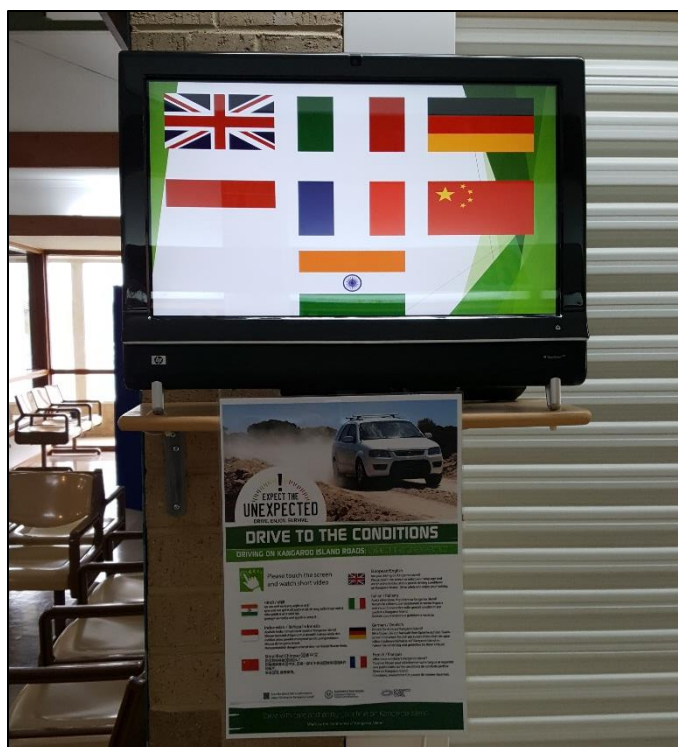


Figure 7 – Information Kiosk at Kangaroo Island Airport

Other alleged risky behaviours demonstrated by tourists are difficult to moderate, although education and enforcement are likely to be the primary measures to effectively control such.

A number of general issues identified, which are unlikely applicable solely to tourists include speeding and use of mobile phones while driving. RAA recognises the challenges faced by SAPOL in maintaining effective enforcement on the island. It is recommended that further consultation be held between Kangaroo Island Council, RAA, SAPOL and MAC to discuss these findings and any potential improvements.

Road Safety Key Recommendations
<ul style="list-style-type: none"> ▪ Develop information that can be distributed through tourism SA offices. ▪ Install interactive kiosks on board ferry and in the ferry terminal. ▪ Consider setting the video as a condition of hire at local vehicle rental companies. ▪ Trial directional arrows on road to indicate correct direction of travel. ▪ Install supplementary signage to enforce correct direction of travel.

Road Safety Key Recommendations	
<ul style="list-style-type: none"> Examine additional education and enforcement campaigns to address risky behaviour across all demographics. 	

Road Maintenance

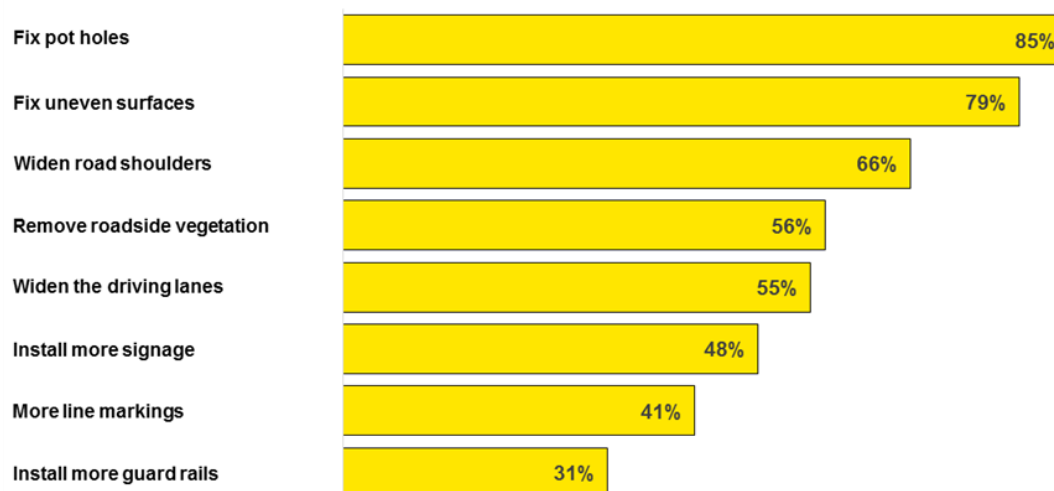
Since RAA's 2013 assessment on Kangaroo Island, road maintenance has visibly improved the conditions on a number of roads. This is particularly applicable on unsealed roads, as many have been graded with a higher level of precision, providing a crown to allow water running off the road rather than pooling.

Road surface has significantly improved as a result, reducing the instances of potholes and other deteriorations, as well as the need for ongoing maintenance. However, there are still many unsealed roads requiring this treatment. As such, maintenance of the grading program to improve drainage is recommended.

Nearly 65 per cent of survey respondents do not believe that the roads on Kangaroo Island are kept to an acceptable minimum standard. However, many were of the opinion that the seasonal impact on Kangaroo Island's roads, along with Council's limited resources are a constraint to any high level of proactive road maintenance.

Members' key concern regarding road conditions was the presence of pot holes (85%) and uneven surfaces (79%). Members were least concerned with installing more guard rails and increasing line marking, which is slightly contradictory when considering the significant support for directional road arrows.

Please rank the following road issues:



During the 2013 assessment, RAA found the sealed section of Cape Willoughby Road to be in an unacceptable condition. The surface was breaking and suffered from potholes, with some measuring up to 1m in diameter along certain sections. The latest assessment found that the unsealed section has now been reconstructed and offers a good surface with smooth ride quality. Such will improve safety for both residents and tourists, as well as encourage tourists to venture further east along the island. Once transitioning to the unsealed surface of Cape

Willoughby Road, it is evident that a number of areas could benefit from further grading to improve the surface and drainage. Sealing the remainder of this road should be considered as the long term goal.



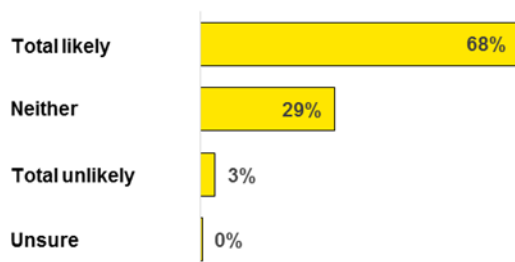
Figure 8 – The quality of Cape Willoughby Road has significantly improved since 2013 but some minor defects remain.

Road Maintenance Key Recommendations
<ul style="list-style-type: none">▪ Maintain ongoing road grading program to address surface drainage and promote smoother, coherent surfaces.▪ Address remaining defects found on Cape Willoughby Road.

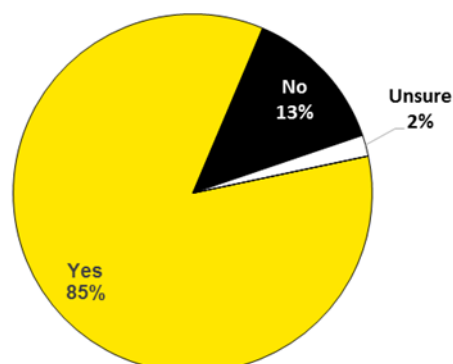
Unsealed Roads

Three in five members believe gravel roads on Kangaroo Island contribute to the visitor experience, while 85 per cent are of the opinion that they are less likely to crash on a gravel road when compared to tourists. When asked to consider the likelihood of a crash, 68 per cent of members consider a crash more likely to occur on a gravel road than a bituminised road. Such highlights the complexity in balancing safety, while also minimising infrastructure impacts on the natural environment.

Do you believe that a crash is more or less likely to occur on a gravel road than a bituminised road?



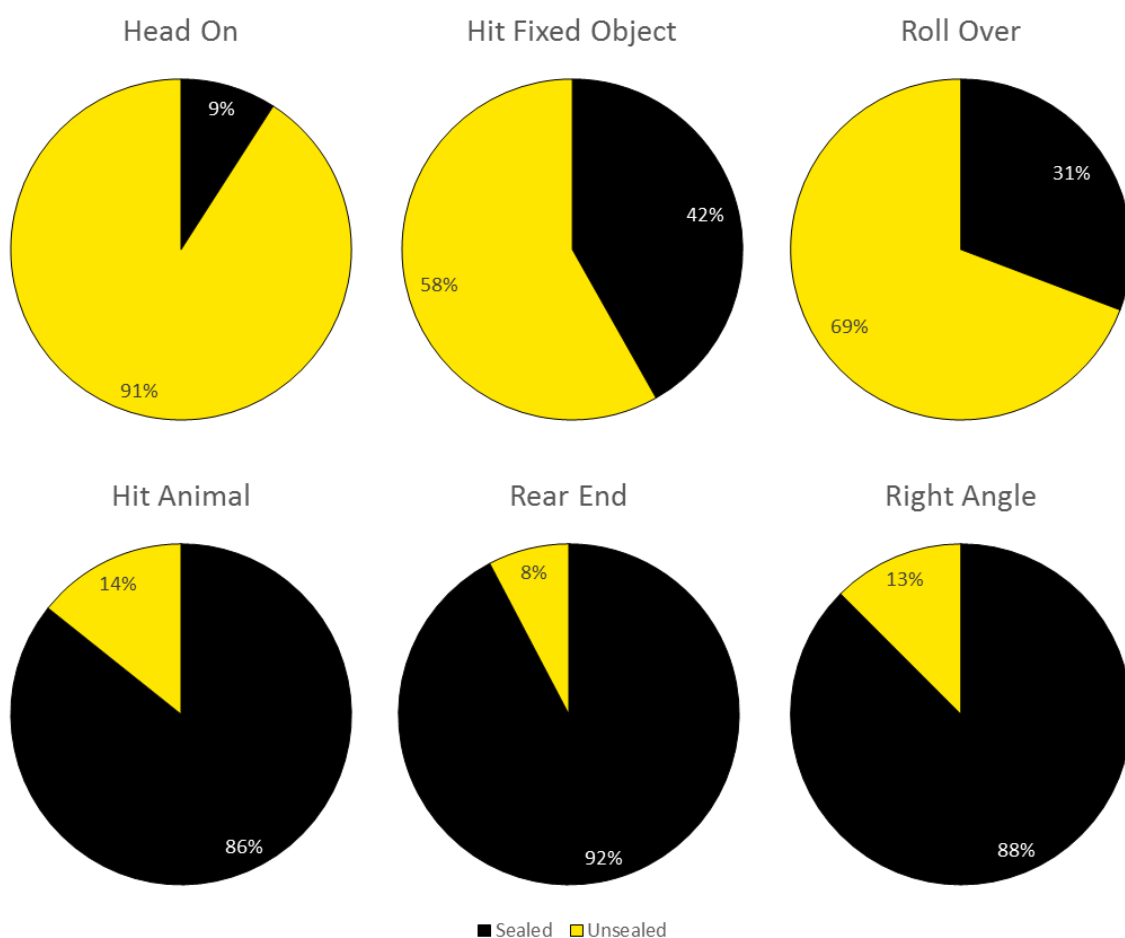
Do you believe as a resident of Kangaroo Island you are less likely to crash on a gravel road than a tourist?



Between 2011 and 2015, 45 per cent of all reported crashes occurred on unsealed roads. This accounted for 31 minor injuries, 13 serious injuries and four fatalities, as well as 76 property damage crashes.

When comparing the six most common crash types, head on, rollover, and hit fixed object crashes were much more common on unsealed roads. Conversely, hit animal, rear end and right angle crashes dominated on sealed roads.

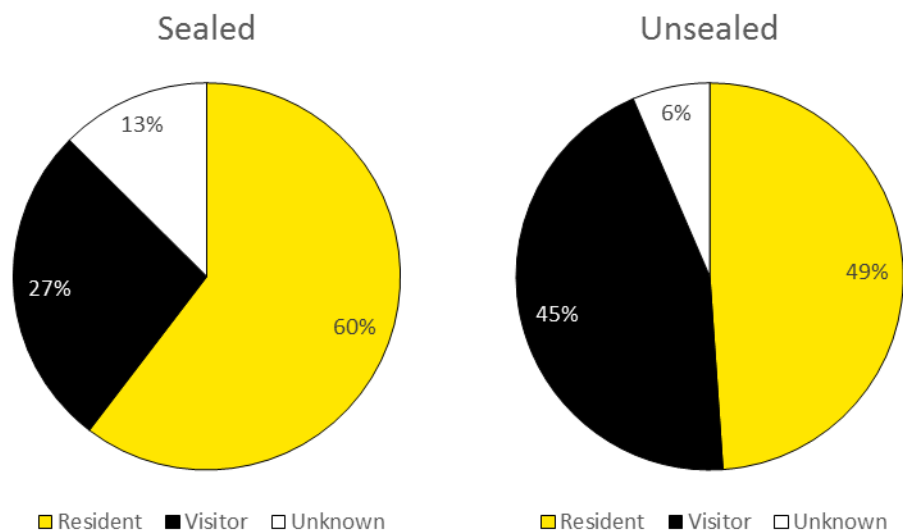
Crash Type



Postcode information was used to determine whether a person involved in a crash is a resident or a visitor. Residents were identified by postcode 5220, 5221, 5222 and 5223 on the crash report, while others were deemed to be visitors. In a minor number of crashes, the postcode was listed as unknown, and as such recorded separately.

Analysis of all crashes using postcode information indicates that residents are more likely to be involved in crashes on sealed roads. However, crash levels occurring on unsealed roads are similar for both residents and visitors. It should also be noted that on average, there are more residents on the island than visitors.

Crashes on Differing Surface



The majority of members (67%) consider a gravel road intersecting with a bituminised road as a road safety risk. Furthermore, three quarters of members are of the opinion that bituminising a gravel road before it intersects with a main road would reduce such a risk.

This intersection shown below is a typical example where a bituminised main road intersects with a gravel road. Do you believe that intersections like this pose a road safety risk?



Taking into consideration the five key gravel roads tested, members placed priority on bituminising Cape Willoughby Road, North Coast Road from Kingscote to Emu Bay, and Hickman Road between Vivonne Bay, Seal Bay and Parndana, while Bullock Track was less of a concern.

Please rank how important bituminising the following roads are to you:

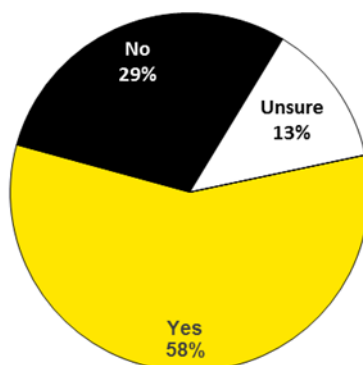


Member comments also suggest bituminising additional roads to support tourism. Hire vehicles often have limitations on where they can be driven, potentially preventing tourists from accessing certain areas of the island or requiring them to take longer routes.

Over 90 per cent of members were in support of increasing the availability of information for tourists in relation to driving on gravel roads. With a larger gravel road network, respondents

were asked if they consider the roads to be a part of the visitor experience. Approximately 60 per cent believe this to be true, while nearly 30 per cent believe otherwise.

When considering the gravel roads on Kangaroo Island do you believe that they add to the visitor experience?



The majority of the unsealed road network is constructed from Ironstone material, which forms marble-like pieces when crushed. Other unsealed roads on the island are constructed using the more traditional limestone material found throughout most parts of the mainland.

In regards to road construction and maintenance, it is uneconomical to ship materials from the mainland and as such, these must be quarried from local borrow pits on private land. The reason for the high number of Ironstone roads is that Ironstone is the dominant geological layer on the island, particularly on the western side.

As part of the TRA, RAA Road Safety team performed a number of skid resistance tests across the Kangaroo Island network in order to determine the level of grip that motorists can expect from the surface. Table 1 summarises the findings for the intersection at Pig's Head Corner and indicates that when compared to common types of pavement surface, Ironstone can offer a significantly inferior level of grip.

Table 1 – Comparison of test results to Other Wet Weather Pavement Materials

Test Site (Ironstone) Wet Weather Average (G)	Typical Wet Weather Unsealed Limestone (G)	Typical Wet Weather Sealed Road (G)
0.294	0.500 - 0.600	0.800 – 0.900

Using these results, it can be estimated that on certain substandard curves, a vehicle may begin to slide at a speed of approximately 100km/h, which is a common speed used on the unsealed network. This is particularly a risk for local motorists who perceive themselves as being familiar with these roads. Such raises questions regarding the appropriateness of national limits on the unsealed network or alternatively lowering speed limits, as well as

providing advisory speed signage. In NSW and Queensland, the state government has approved 80km/h regulatory limits for unsealed roads.

RAA supports the application of a speed limit that reflects the road and conditions, rather than a mandated speed limit. RAA will continue research on pavement skid resistance on unsealed roads in order to examine possible options for minimising risks associated with speed.

Unsealed Roads Key Recommendations
<ul style="list-style-type: none">▪ Identify and undertake road sealing on strategic routes.▪ Adopt an intersection sealing program to improve safety on approach to intersections.▪ Address remaining defects found on Cape Willoughby Road.▪ Identify high risk curves and consider safety infrastructure to reduce the likelihood and severity of a crash.

Little Sahara Access

Community concerns were raised through Kangaroo Island Council in relation to the section of South Coast Road adjacent to the Little Sahara Dunes complex. In response to the concerns raised, the RAA Road Safety team undertook a joint Road Safety Audit with Kangaroo Island Council at the access point to the complex, in order to enable a Blackspot funding application to be lodged. As the access point connects to South Coast Road following an S-curve, there are evident sight distance issues. The connection onto South Coast Road is also unsealed, presenting safety risks for vehicles braking and turning into the complex, as well as vehicles accelerating from the access point into traffic. The S-curve has faced a number of issues, which is evident from multiple vehicles striking the guard rail on the curve.

Between 2011 and 2015 there were six crashes through this particular S-Curve, three resulting in minor injuries, and three resulting in property damage only. The key cause of crashes was inattention and resulted in hitting a fixed object (most likely to be the guard rail).

The audit identified a number of recommendations including extending the guard rail, sealing the shoulders on the curve and installing Audio Tactile Line Marking (ATLM) to reduce the risk of vehicles drifting from the traffic lane. The upgrades should be considered a priority and will improve safety for local and tourist traffic alike.

Little Sahara Access Key Recommendations
<ul style="list-style-type: none"> ▪ Extend W beam barrier on curve. ▪ Construct sealed shoulders on s-curve to a minimum width of 1m. ▪ Install Audio Tactile Line Marking (ATLM) on curves. ▪ Install additional Chevron Alignment Markers (CAMs) to improve delineation.

Flinders Chase National Parks

While on Kangaroo Island, the Road Safety team examined roads within Flinders Chase National Park. The park is managed by the Department of Environment, Water and Natural Resources (DEWNR) and construction and maintenance of the road network also falls within DEWNR's remit. A 60km/h speed restriction has been applied throughout, which reasonably reflects the risks associated with narrower winding roads, poor sight distance (particularly on Shackle Road) and the high probability of encountering wildlife.

The roads surfaces were reported to be in good condition and the network considered acceptable given the reduced speed limit. The network along Shackle Road could not be reviewed at the time due to flooding issues. The only notable safety improvement that is recommended includes a review of the curve advisory speeds along Shackle Road. While many curves have been fitted with curve advisory signs, there were a number of substandard curves that did not have appropriate warning.

Flinders Chase National Park Key Recommendations
<ul style="list-style-type: none"> ▪ Conduct further assessment on substandard curves and install warning signs as required.

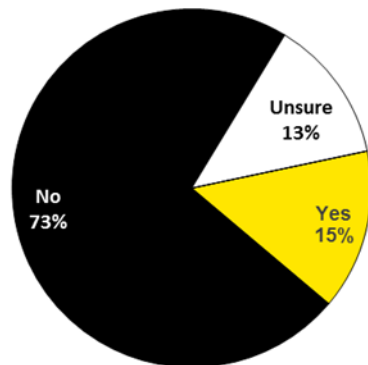
Electric Highway

Kangaroo Island was successful in obtaining a grant from Renewables SA in 2011, allowing for the installation of solar collection at the Kingscote Airport. Included in the grant was funding for charging stations across the Island's main centres and the purchase of three Nissan LEAF vehicles for council and hire use, making Kangaroo Island Council a leading region in electric vehicle use and promotion.

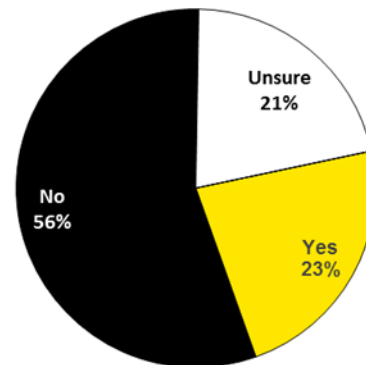
It has been suggested that a number of Kangaroo Island residents have now purchased electric or hybrid vehicles. While only one per cent of respondents reported driving such a vehicle regularly, 15 per cent indicated that they would consider an electric or hybrid vehicle in the future, and a further 13 per cent were unsure at this stage. Responses varied slightly with the suggestion of possible State Government incentives in purchasing an electric vehicle,

whereby positive consideration increased to 23 per cent and the number of unsure responses also increased to 21 per cent.

Would you consider an electric or hybrid electric vehicle in the near future?

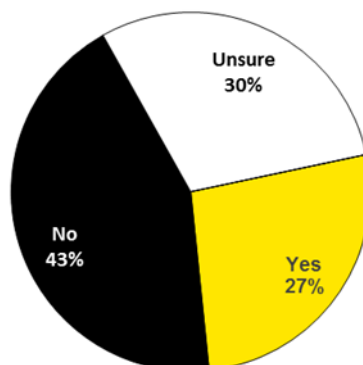


If the State Government offered incentives to purchase an electric vehicle, would you consider it?



Residents were divided when asked if they believe Kangaroo Island should be one of the first regions to promote the use of electric vehicles. Nearly one third of respondents are unsure if Kangaroo Island should be a leading region in electric vehicles, with a further 43 per cent not supporting the idea.

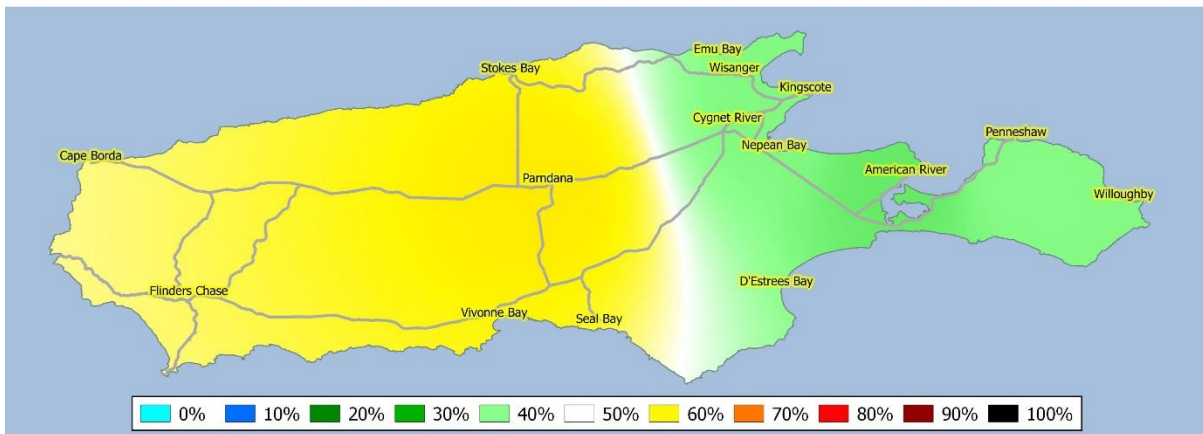
Do you believe Kangaroo Island should be one of the first regions to promote the use of electric vehicles?



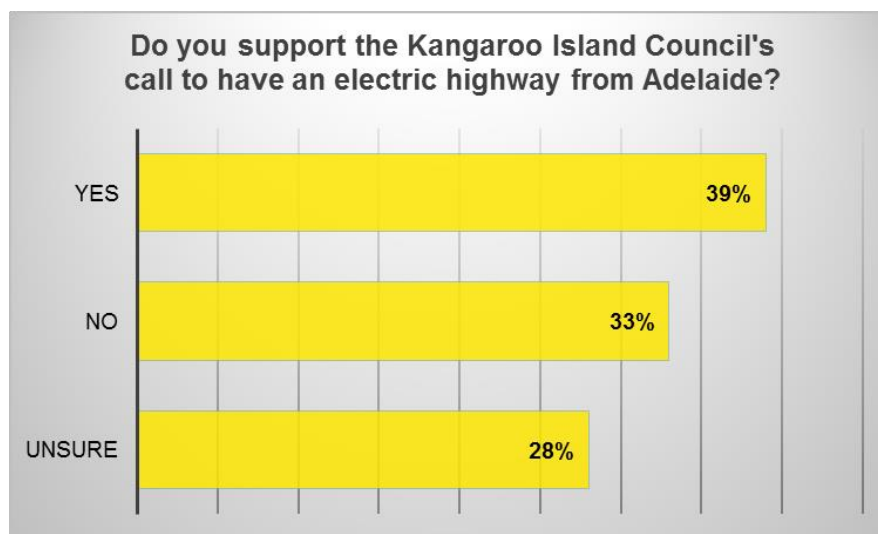
Electric vehicles have long been identified as having limited range, creating “range anxiety” for some motorists when limited charging options are available, along with the time taken to fully charge the vehicle for a limited number of kilometres.

When considering the negative responses geographically it is not surprising the more remote aspects of the Island have a greater negative feel than the more populated centres such as Kingscote and Penneshaw.

Question: Do you believe KI should be one of the first regions to promote the use of electric vehicles?
Answer: No



The chart below highlights support for the Kangaroo Island Council's call for an extended electric highway from Adelaide. While yes gained the most support at 39 per cent, results showed lack of support for the project at 33 per cent. With nearly 30 per cent of members unsure about their support, it is important for Council to consider why such a large number are undecided.



When someone chose no, they were given an opportunity to provide why they felt this way. Verbatim comments had clear focus on the following themes:

- Power charges and the rising cost of power
- Current road conditions and electric vehicle suitability to Kangaroo Islands roads
- Speed limitations of the vehicles, and range anxiety
- Not a priority or considered not a priority relative to improving road conditions
- Cost of the vehicles
- Cost to Kangaroo Island rate payers

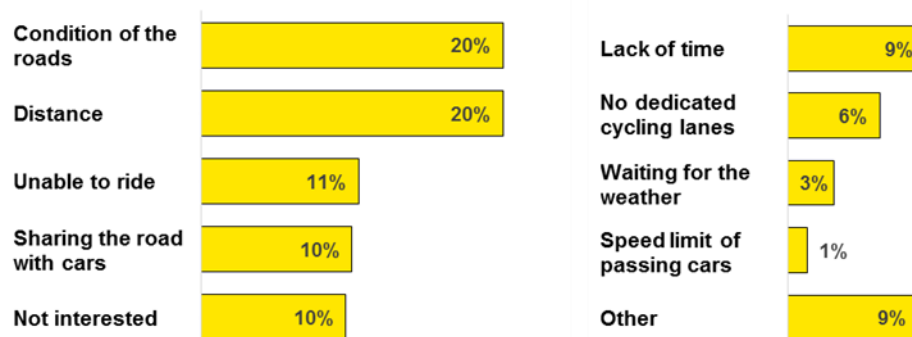
Electric Highway Key Recommendations

- Parallel to the development of collaborations with stakeholders for an extended electric highway, it is recommended greater engagement with community to fully understand the benefits and potential associated with the electric highway.

Cycling

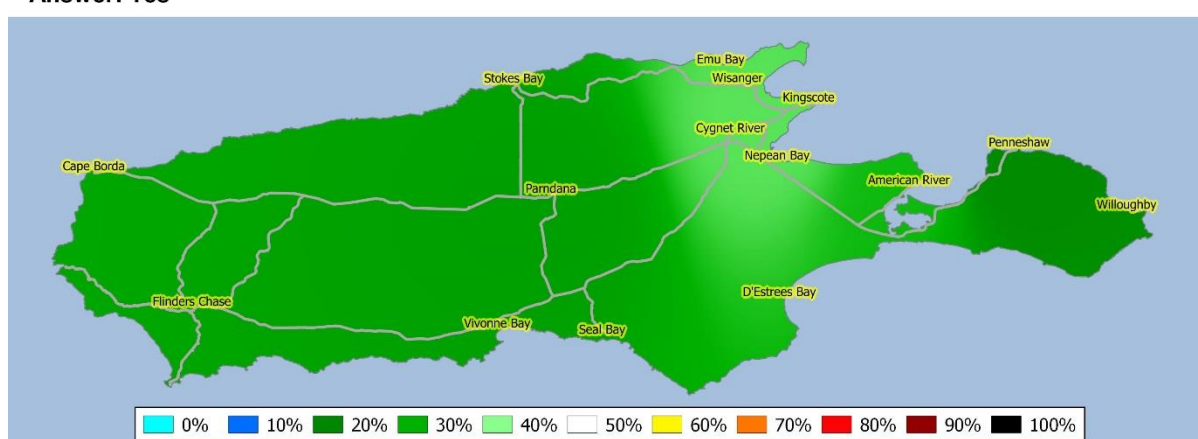
Cycling is increasing in popularity, nearly 15 per cent of members indicated that someone in the household cycled at least once per week. Of the 86 per cent that indicated they did not, the following reasons were cited.

What is the primary reason for why no one in your household uses a bicycle?



Nearly 55 per cent of respondents did not believe as a general rule that cycling on Kangaroo Island was safe for children. When these results were mapped across the island, the area surrounding Kingscote was more likely to agree cycling was safe for children.

Question: As a general rule do you consider cycling on Kangaroo Island to be safe for children?
Answer: Yes



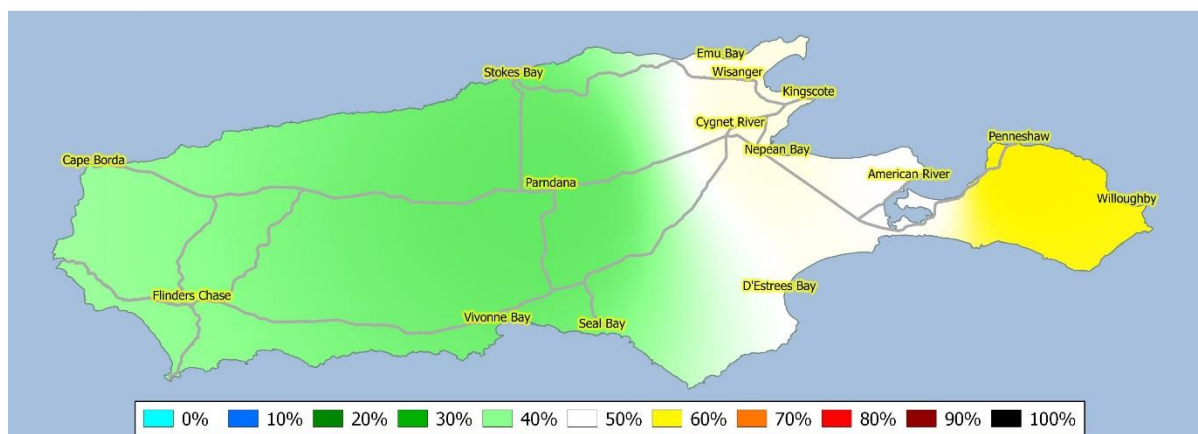
On the mainland, many Local Councils are dedicating resources to the provision of connected cycling infrastructure, providing safer options for cyclists. Kangaroo Island residents believe that the current road network does not encourage cycling (82%) with only six per cent of respondents believing the network does encourage cycling.

Creating special cycling routes between main destinations is believed to encourage more cycling by 50 per cent of Kangaroo Island members, with 30 per cent not agreeing this to be the case.

When the results for the affirmative were mapped there is clear majority support in the Penneshaw region, followed by Kingscote and American River regions.

Question: Do you believe cycling routes should be created to encourage more cycling on KI?

Answer: Yes



Cycling Key Recommendations

- It is recommended Council consider the development of a detailed cycling plan providing safe linkages to key tourist destinations.

Fuel Pricing

Fuel has long been considered a grudge purchase, of which the price is determined by many factors not fully understood or made clear to the purchaser. Fuel price variability and volatility add to the concerns of motorists in gaining fair and reasonably priced fuel.

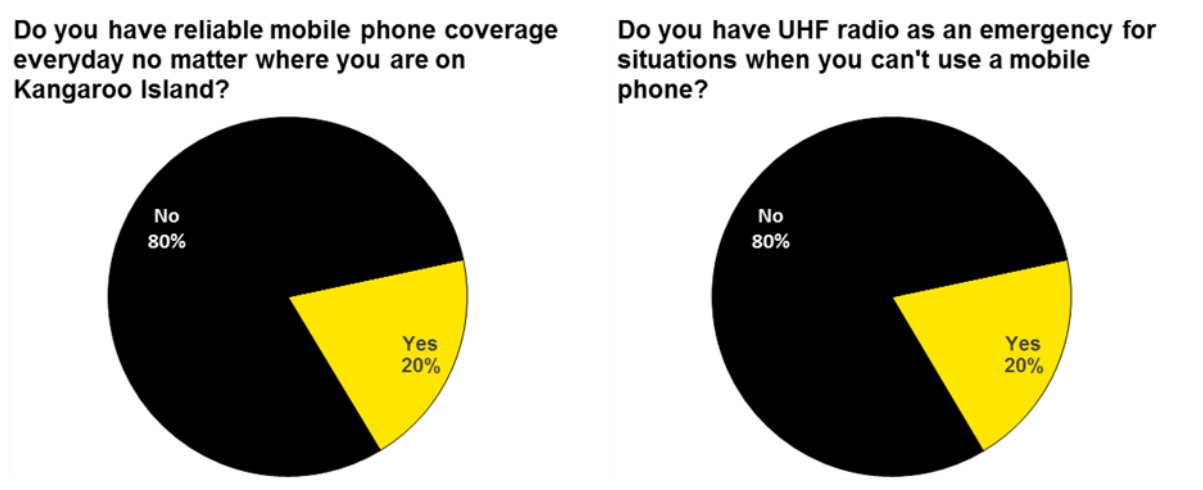
Kangaroo Island residents do not believe (88%) fuel prices on Kangaroo Island are fair compared to prices on the Fleurieu Peninsula. Furthermore 77 per cent of RAA members on Kangaroo Island do not believe the size of the price gap can be explained by the extra transport costs in getting fuel to the Island.

RAA currently does not have any access to local Kangaroo Island fuel prices, therefore cannot represent its members in this space. 86 per cent of members would like RAA to receive frequent price information from retailers to better represent members on local fuel prices. Furthermore, if real-time fuel price information was available three quarters of survey respondents would use it to figure out where to fill up en-route to Adelaide.

Fuel Pricing Key Recommendations
<ul style="list-style-type: none"> ▪ RAA calls on the State Government to provide a centralised portal for motorists to easily compare and find the lowest fuel prices on their journey. By ensuring all retailers are engaged in price transparency, companies that provide a competitive price will be improving competition and will be rewarded in the market.

Mobile Phone Coverage

Mobile coverage is more than just coverage for a phone call now, with smartphone technology and GPS based apps, mobile reception is becoming a much relied on technology. Kangaroo Island residents indicated 97 per cent regularly use a mobile phone, yet only 20 per cent have reliable mobile phone coverage every day, no matter where they are on the Island. One in five respondents have a UHF radio for emergency use if the mobile phone is not able to be used.



Mobile Phone Coverage Key Recommendations
<ul style="list-style-type: none"> ▪ A comprehensive review of mobile phone coverage be undertaken and recommendations developed with particular attention to the safety of motorists in areas of limited or no coverage.