# Innovative, low-cost road safety mass action in McLaren Vale

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## Abstract Summary

Extending across the southern fringe of metropolitan Adelaide, the City of Onkaparinga hosts a variety of urban and rural environs including the worldrenowned McLaren Vale wine region. McLaren Vale's grid-based road network with crossroad junctions provides good accessibility but also increases the potential for crashes and trauma.

A series of traumatic crash events prompted council to take action. Our audit, technical analysis and political advocacy resulted in \$5 million of funding from both the South Australian and Australian governments to upgrade safety at 21 intersections.

With community expectations, budget and timeframes posing significant challenges, council and South Australia's Department for Infrastructure and Transport (DIT) have worked collaboratively to complete a range of lower-cost, proactive road safety upgrades in 2024 including South Australia's first compact rural roundabout that utilises raised safety platforms.

This presentation will provide details on the initial scoping and treatment selection, the design phase and final delivery process. Communities can only thrive when they are able to move through their transport networks without the risk of being killed or seriously injured. This project demonstrates new engineering treatments which can be applied elsewhere to work towards a future of zero harm on our roads.

#### Background

The McLaren Vale wine region was surveyed in the nineteenth century, resulting in a predominantly grid based road network. Whilst this logical pattern provides a good level of accessibility the resultant abundance of four-way crossroad intersections increases the potential for crashes when drivers are distracted or are unfamiliar with the area. This issue is exacerbated in a region that has high levels of tourism.

Ongoing concerns about the prevalent collisions and close calls experienced by road users escalated following two separate crash incidents in February and March 2021, each of which tragically resulted in the deaths of two community members. A third crash involving serious injury also occurred during this same time period. As part of a broader response to these tragedies, an area-wide risk assessment conducted by council staff identified the presence of 21 four-way, crossroad intersections with a high potential for crash trauma, throughout the McLaren Vale wine region. A range of potential solutions, including innovative treatments were identified, resulting in Council including a \$4.2million program of work in our election advocacy plan. This resulted in the Member for Mawson, Hon Leon Bignell, pledging to provide funding to improve safety at these 21 intersections should Labor form the new government.

The subsequent South Australian state election result in March 2022 ensured that the program of works proceeded, which was boosted to a budget of almost \$5million with the addition of \$737,500 from the Australian Government's Black Spot Program.

## Scoping and Treatment Selection

The usual approach to reduce the risk of crashes at four-way intersections beyond simple signage and line marking is to either install a roundabout, or to stagger the side roads into two separate, offset T-junctions so that they no longer meet as crossroads. Due to the need to accommodate higher operating speeds and large design vehicles in rural areas, these traditional approaches usually require significant civil works and property acquisition. The costs to fund such upgrades results in many intersections remaining untreated, especially for authorities who manage large road networks.

Road safety researchers, policy writers and practitioners are continually seeking ways to improve practice so that more upgrades can be undertaken within available levels of funding. This program took inspiration from the latest advances and research being published by Austroads, as well through discussions with staff at the University of Adelaide's Centre for Automotive Safety Research (CASR).

Once the funding was secured, Council staff worked collaboratively with South Australia's Department for Infrastructure and Transport (DIT) to review each intersection, suggest appropriate feasible solutions and work through a joint communication plan to inform the community of the intent and opportunities associated with several of the innovative solutions. Following site inspections of all 21 intersections, the DIT Crash Investigation Team reviewed and assessed each intersection with council staff and proposed a range of treatment types based on site specific risks that included consideration of traffic volumes, reported crash history, sight distance, and site geometry. This resulted in the program being separated into three separate streams of work:

- Stream 1 Enhanced warning signage and pavement markings;
- Stream 2 Rural Junction Active Warning Signage (RJAWS); and
- Stream 3 Civil works (roundabout and teardrop islands).

#### Design Phase

**Stream 1** resulted in DIT compiling and publishing <u>Operational Instruction 2.48</u> <u>Overshoot Signage</u>, which provides advice regarding the application and installation of standard signage throughout South Australia for intersections with identified deficiencies resulting in a risk or a history of vehicles overshooting the intersection and failure to give way crash types.

Overshoot signage treatments typically involve the installation of standard intersection signage enhanced by a yellow backing board to improve sign conspicuity, as indicated in Figure 1.



Figure 1 Overshoot signage (Source: DIT Operational Instruction 2.48)

Pavement markings recommended for consideration in the Operational Instruction includes Enhanced Control Lines, Painted Corner Islands and Narrow Centre Medians.

Council's design team prepared detailed signage and pavement marking plans for each treated intersection to ensure that each proposed sign was appropriately located, for example not placed in the middle of a driveway or behind a tree. Summarised plans for public consultation were generated and all nearby residents were consulted on the proposed signage schemes, with minor amendments made to the final design plans where required. **Stream 2** involved the engagement of CASR and SAGE Automation, a local provider of industrial automation and control services, to design, develop, install and operate an intelligent warning system that detects when vehicles are approaching an intersection and activates warning lights when the potential for a collision has been identified.

Known in South Australia as 'Rural Junction Active Warning Signage' or RJAWS, this system was already in use at other locations however these involved the use of enforceable Variable Speed Limit signage, requiring a very high level of accuracy and reliability.

This system detects when vehicles are approaching on a side road and activates flashing warning lights for drivers on the main road to increase their awareness of the potential for a collision, and improve reaction times should a side road vehicle accidentally run through the intersection. The system is based on reducing collision speeds and the subsequent energy imparted onto the bodies of vehicle occupants, noting that the Safe System approach considers side-impact collisions to be potentially unsurvivable when the bullet vehicle is travelling above 50km/h.

Our project, known as RJAWS 'Lite', expanded and modified a system initially trialled on T-junctions, and involves the use of non-regulatory warning signs, solar power and wireless communications which reduces the up-front cost to around a third of the price of a full RJAWS system which is usually mains powered and needs to have a very high level of reliability.

Further to this, if the RJAWS 'Lite' system detects that a vehicle approaching on a side road is not slowing down for the intersection it activates flashing lights on the Stop or Give Way sign to warn drivers of the presence of an upcoming intersection.

**Stream 3** involved the engagement of WGA, a local multi-disciplinary engineering and project management company, to investigate and design the following:

- A compact rural roundabout, which utilises raised safety platforms in lieu of the reverse curves which are typically provided on high speed, rural roads; and
- A compact offset staggered-T intersection using teardrop-shaped median islands on the side roads.

The compact rural roundabout was the first of its kind to be designed outside of Victoria, who had pioneered this type of treatment with the Lance Creek roundabout which was constructed in 2017.

A compact roundabout combines the safety benefits of roundabout control at an intersection with 'raised safety platforms', which are used to slow vehicles down as they approach the roundabout. This then allows the roundabout to be constructed with a much smaller footprint, which reduces costs and impacts to adjoining property owners.

For the purposes of comparison, Figure 2 below shows the indicative footprint of a conventional roundabout on the left, whereas the final design footprint for the compact roundabout version is shown on the right.





#### Figure 2 Concept design of conventional roundabout (left) and compact roundabout (right)

Raised safety platforms are more commonly used in urban areas, such as at wombat crossings, however their use on rural roads is relatively innovative in Australia despite being prevalent in some European countries. When applied to higher speed, rural roads they are designed to be more elongated and are installed in a series for vehicles approaching the roundabout.

In addition to the novel nature of this design approach in South Australia, there were further challenges such as the site having an average crossfall of around 6%, the presence of an adjacent heritage property, numerous services and the need for minor property acquisition. The initial design approach, based on the Lance Creek project, was further refined following advice from the team at Mornington Peninsula Shire Council who had recently designed and delivered on their local road network. This resulted in significant cost savings when compared to the initial design approach.

Whilst the teardrop island project was a more straightforward project by comparison, there were still design challenges such as another adjacent heritage property, numerous services, minor property acquisition, and the need to meet DIT pavement design requirements at this intersection was located on a state-controlled, arterial road.

## **Project Delivery**

The delivery of **Stream 1** works involved the manufacture and installation of all signage by Council's in-house Signshop team, with pavement markings installed by a local contractor, including the use of thermoplastic markings where durability was a concern.

This stream was delivered at 14 of the 21 intersections in July 2023.

**Stream 2** initially involved the preparation of a comprehensive RJAWS 'Lite' Design Guide by CASR to inform the project, with the eventual aim for this guide to be released publicly for future potential applications of this technology.

SAGE Automation applied the design guide to develop the system, who then manufactured all components and eventually installed and commissioned each system. Comprehensive tube classifier traffic data was collected before and after system activation to allow CASR to undertake detailed evaluation of the effectiveness of this technology, which is soon likely to be published.



Figure 3 Completed RJAWS 'Lite' system, with (activated) major road sign shown on the left and close up of Give Way sign flashing elements (not activated) on the right

RJAWS 'Lite' was installed at five separate intersections, including one where a change of priority was undertaken, with each site becoming operational between June and September 2024.

**Stream 3** involved more comprehensive civil works, with Council's day labour crews responsible for the delivery of the compact roundabout project and Kent Civil, a local construction contractor. procured to undertake the teardrop island project.

Initial site preparation works commenced in September 2024, with both sites needing to be complete by December 2024 due to stages of the annual Tour Down Under event travelling through the area in January 2025.



Figure 4 Drone image of completed compact rural roundabout



Figure 5 Aerial imagery showing before (left) and after (right) application of teardrop island treatment (Source: Nearmap)

#### **Further Applications**

The development of <u>Operational Instruction 2.48 Overshoot Signage</u> now informs all councils throughout South Australia of the potential to use this treatment at other high-risk, high-speed, rural junctions. The application of this treatment at 14 intersections throughout McLaren Vale will enable the ability to compare before and after reported crash rates at on a macro level to determine its effectiveness, and subsequently weather further improvements can be made.

RJAWS 'Lite' has significant potential for application throughout Australia due to its substantial cost savings when compared to the traditional approach which uses Variable Speed Limits. Following an initial trial of this technology by the City of Onkaparinga, which was separate to this 21 intersection program, reported crash rates were found to have dropped from 2.57 per year to 0.86 at the intersection which now has the compact rural roundabout.

Furthermore, SAGE Automation has adapted this technology as part of an <u>innovative level crossing technology trial</u> in partnership with TfNSW, ARTC, Weddin Shire Council and Narromine Shire Council.

Whilst there are now a number of examples of compact rural roundabouts in Victoria, this project produced the first of its kind in another state. This demonstrates the ability to adapt and learn from Victorian experience in a different jurisdiction, providing proof that a safe and effective roundabout can be constructed on higher-speed rural roads at around half the cost.

Where it is not currently feasible or practical to consider the installation of a roundabout, the teardrop island project demonstrates an alternative approach which requires little to no property acquisition to achieve an effective offset staggered-T treatment.

This collaborative project between the City of Onkaparinga and South Australia's Department for Infrastructure and Transport showcases the ability to undertake proactive mass-action road safety upgrades at lower cost and in a relatively short timeframe using a range of innovative treatments. McLaren Vale now serves as a testament as to what can be achieved when different levels of government work together and funding is made available that doesn't solely rely in trauma to have occurred before a site becomes eligible.