Attachment Under Separate Cover

Ordinary Council – 23 May 2022

Agenda Item 8.1 - Petition - Armstrong Road Speed Limit Reduction - Victor Harbor Men's Shed

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Armstrong Road, Victor Harbor

GREENHILLS ROAD AND HENDERSON ROAD

Audit Stage: Existing Conditions



December 2020

Road Safety Audit Report

*We are fully committed to working with our clients in achieving **Towards ZERO Together** in South Australia*

Prepared for:
City of Victor Harbor

Prepared by:
BE Engineering Solutions

Document History and Status

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A	Draft Report	SC, DL	-	-	16/12/2020
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1 INTRODUCTION

BE Engineering Solutions was engaged by City of Victor Harbor to undertake an existing conditions road safety audit (RSA) and assessment of Armstrong Road, Victor Harbor between Greenhills Road and Henderson Road.

This report presents the findings of the existing conditions road safety audit, which was carried out in daylight and night time conditions on Thursday 3 December 2020. At the time of both inspections, the weather conditions were clear and the existing road surface was dry.

The road safety audit team was led by Stephen Chan, an experienced Senior Road Safety Auditor and undertaken with Damian Landrigan, a qualified Road Safety Auditor.

1.1 Site Location

The Armstrong Road and Welch Road form part of the Victor Harbor Ring Road, approximately seven (7) kilometres in length. It provides an alternative route for traffic to bypass the key commercial area of Victor Harbor, and allows for the future development of areas that previously had poor accessibility. The subject section of road is shown in Figure 1 below.

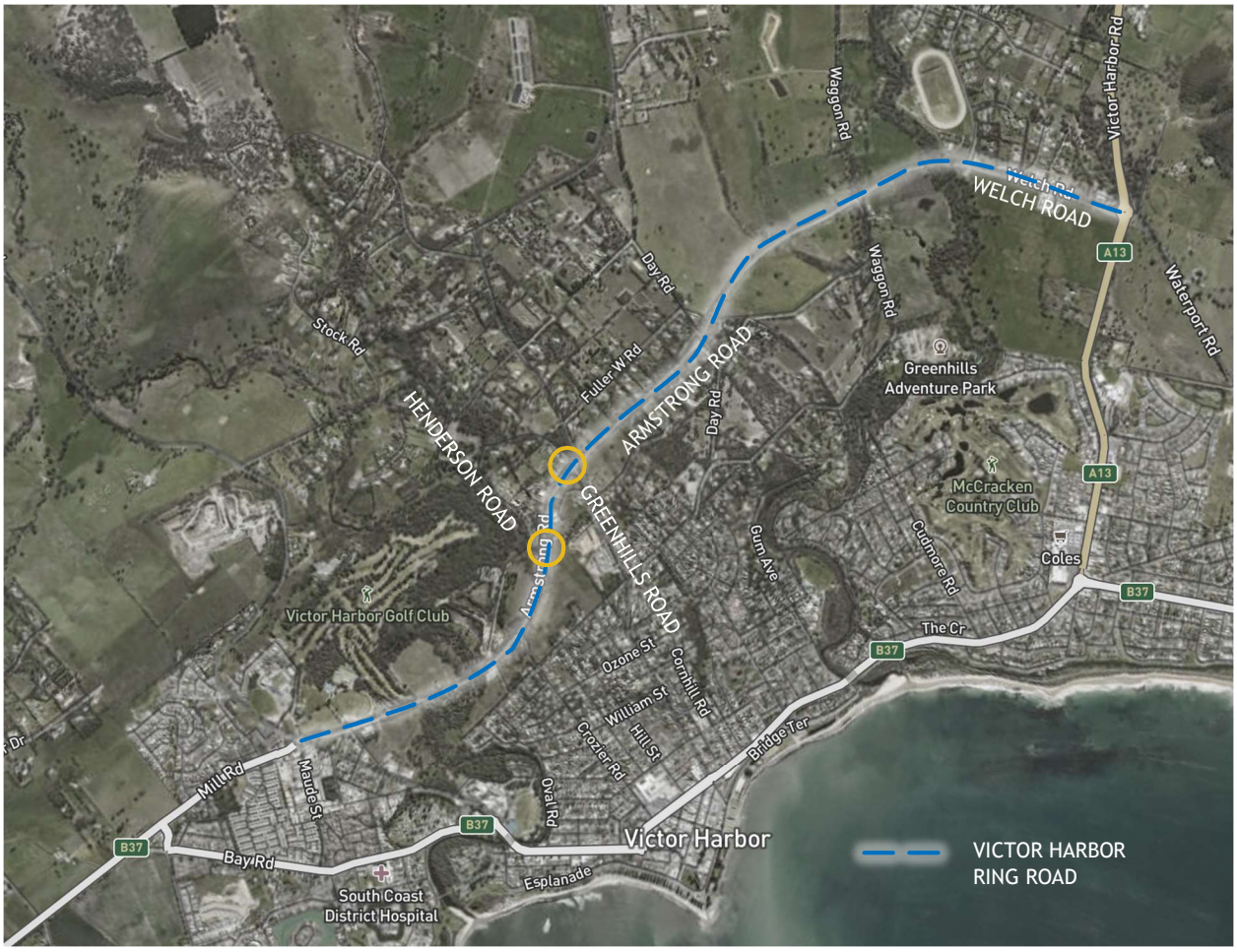


Figure 1: Victor Harbor Ring Road

The Ring Road is a rural road under the care and control of the City of Victor Harbor, and it is a western bypass of the key commercial area of Victor Harbor. It has a roundabout treatment at the intersections of Victor Harbor Road and at Mill Road/Inman Valley Road. The road comprises two traffic lanes (one in each direction) with 2.5-3.0m

sealed and unsealed shoulder on each side of the road. The road carries approximately 6,000 vehicles a day based on traffic volumes collected by Council in August 2018.

The Ring Road is a general access vehicle route, which can accommodate up to a 19m semi-trailer. This road has a posted speed limit of 100km/h between the Hindmarsh River and the Inman River.

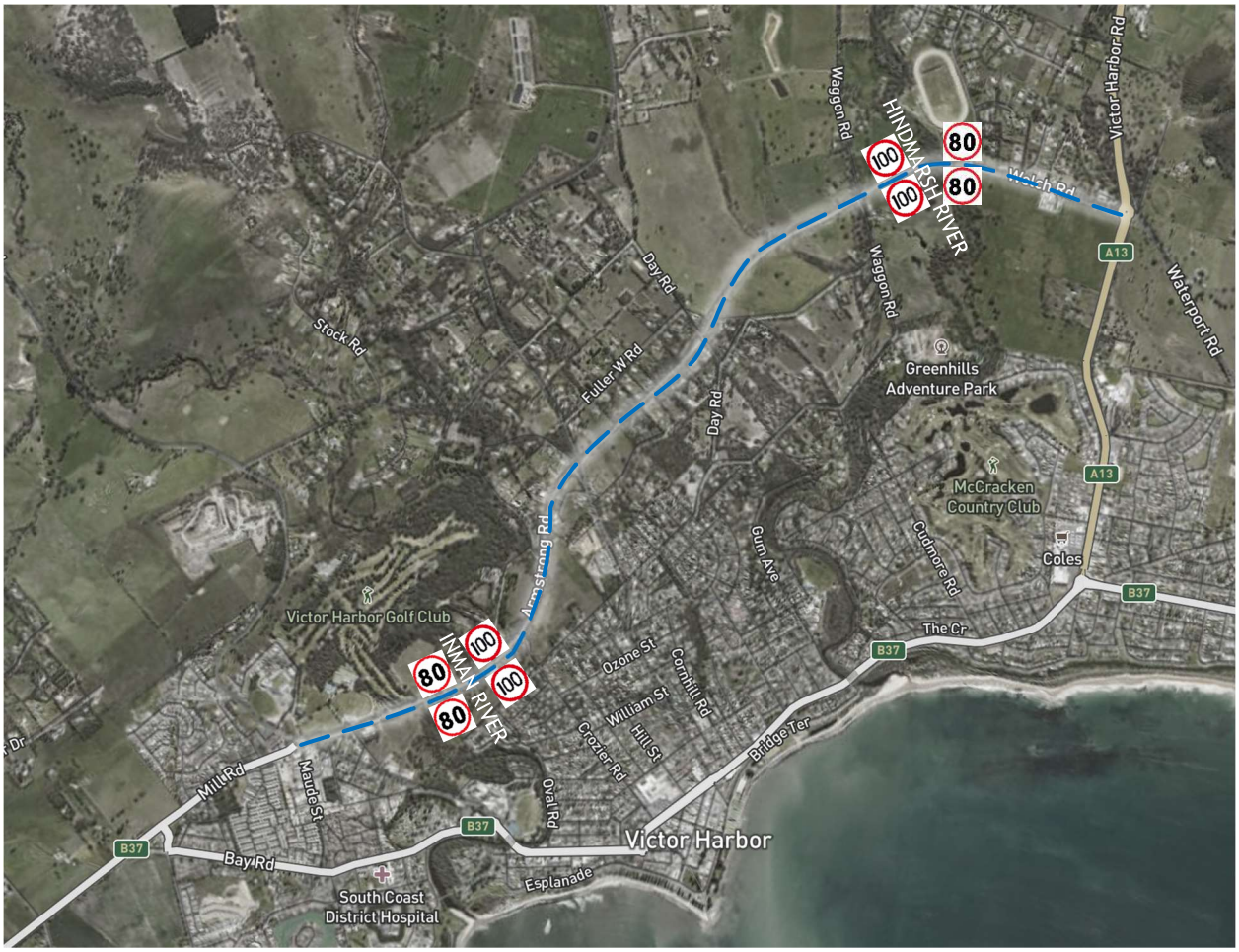


Figure 2: Posted Speed Limits on Victor Harbor Ring Road

1.2 Crash Statistics

Crash data for the most recent available 5-year period (2015-2019), was supplied by Council, and it indicated two minor injury crashes were occurred on the Ring Road between Greenhills Road and Henderson Road.

In November 2020, a fatal crash was occurred on Armstrong Road between Greenhills Road and Crozier Road and it was involved with a head on collision between a Mitsubishi sedan that had been travelling north and a Toyota ute that had been travelling south in a report from the South Australian Police.

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2 SPEED LIMIT REVIEW ON ARMSTRONG ROAD

2.1 Speed Limit Guidelines in South Australia

The speed limit setting is controlled by the Department for Infrastructure and Transport and guided by the Speed Limit Guidelines for South Australia.

Armstrong Road is a bypass road to the key commercial areas of Victor Harbor in a rural environment. The design standard of the road is suitable for 100km/h speed limit between the Hindmarsh River and the Inman River, approximately 6.0km in length with four (4) road intersections.

In accordance with the Speed Limit Guidelines, Armstrong Road is suitable for a posted speed 100km/h and this is supported by the Australian Standard AS 1742.4 Speed Controls, where the road surroundings are classed as "undeveloped" with number of access points less than five (5) per kilometre.

A speed limit assessment using the Austroads Infrastructure Risk Rating (IRR) tool has been undertaken. This assessment tool is designed to assess road safety risk as an input to the speed limit setting process.

2.2 Austroads Infrastructure Risk Rating

Infrastructure Risk Rating (IRR), a simple road assessment methodology designed to assess road safety risk at a network level, primarily as an input to the speed limit setting process. The assessment considers appropriate level, considering the function, design and safety of the road.

The following criteria have been considered:

Criteria	Armstrong Road Features	Comments
Land Use	Controlled Access	
Road Stereotype	Two Lane Undivided	
Shoulder Width	Narrow Shoulder	0.5 to 1.0m
Lane Width	Medium	3.0 to 3.5m
Roadside Hazards	Medium	Dense vegetation present approximately 5m from the traffic lane
Intersection Count	Less than 1 intersection per km	
Access Density	Less than 1 per km	
Traffic Volume	<6,000 vehicles day	
Speed Limit	100km/h	Current posted speed limit

Based on the above road features, the identified IRR Risk Rating score is 1.8, which is classed as MEDIUM risk, which is appropriate for the current posted speed limit.

3 AUDIT PROCESS

This road safety audit was undertaken in accordance with the Austroads Guide to Road Safety - Part 6: Road Safety Audits, and the Department for Infrastructure and Transport (DIT) Master Specification Part RD-GM-D2 Road Safety Audits (August 2020).

The road safety audit considered the existing and proposed road environment from a holistic basis as detailed within Austroads Guide to Road Design Part 2. The existing conditions and design review includes how the road will perform with consideration to the following three main elements:

a) vehicles, pedestrians, and cyclists;
b) road environmental factors; and
c) human factors.

The aim of this road safety audit was to identify and raise potential safety issues for future mitigation, to minimise the frequency and severity of crashes. It is important to note that the purpose of the road safety audit is intended to help deliver a safe road system and is not a review of compliance with standards.

The audited section of road was inspected by the audit team on 3 December 2020 during the daylight and nigh-time conditions. Photos were taken during the site inspection and are available for review and assessment. This site inspection forms the basis of the audit findings that are detailed in subsequent sections of this report.

3.1 Responding to the Audit Report

It is important to note that the responsibility for road design always rests with the designer/project manager and not with a road safety auditor. A project manager or road authority is under no obligation to accept every recommendation set out in this report nor is it the auditor's role to agree or approve of the road authorities audit response.

It is expected that this formal road safety audit report will be responded to in writing with reasoning given for rejections of any recommendations made in this report. Written confirmation outlining how or when accepted recommendations may be adopted should be provided wherever possible.

The table in Appendix A of this road safety audit report provides a means to document responses to the issues identified during the road safety audits.

3.2 Safe System Findings

The Austroads Guide to Road Safety Part 6 (2019): Managing Road Safety Audits states that "For *any project, there is a responsibility on the road authority to maximise alignment with Safe System principles"* . The Guide continues to offer two methods for achieving this:

- Undertake a Safe System Assessment in the early stages of a project; and
- Integrate Safe System principles into the Road Safety Audit process.

The DIT Master Specification RD-GM-D2 Road Safety Audit (August 2020) states that;

- In accordance with the Australian National and Department State Road Safety Strategies this policy adopts a Safe System approach to the delivery of a road safety audit service by placing emphasis on fatal and serious crash risk.

- The road safety audit process is an assessment of road engineering projects and as such the Safe System sphere of influence is limited to two of the four cornerstones of the Safe System approach, namely, Safe Roads and Roadsides, and Safe Speeds.

The integration of safe system principles into the Road Safety Audit process is achieved by focusing the audit process on considering safe speeds and by providing forgiving roads and roadsides. This is to be delivered through the process by accepting that people will always make mistakes and by considering the known limits to crash forces the human body can tolerate with the aim to reduce the risk of fatal and serious injury crashes.

Table 1: Safe System Kinetic Energy

Crash Type	Tolerable (10% Speed) (passenger vehicle)
Head-On Collision	70 km/h
Side Impact Collision	50 km/h
Side Impact Collision with a tree or pole	30 km/h
Pedestrian/Cyclist Collision	30 km/h

This RSA has been undertaken to conform with AGRS Part 6 (2019): Managing Road Safety Audits and as such, an assessment has been undertaken for each RSA finding to determine if the potential kinetic energy associated with the possible crash is above tolerable levels (as set out above); with each of the audit recommendations categorised into one of the Austroads Safe System treatment categories described in **Table 2**.

Table 2: Safe System Treatment Categories

Safe System Treatment Categories	
Primary	Road planning, design and management considerations that practically eliminate the potential of fatal and serious injuries occurring in association with the foreseeable crash types.
Supporting (step towards)	Road planning, design and management considerations that improve the overall level of safety associated with foreseeable crash types, but not expected to virtually eliminate the potential of fatal and serious injury occurring. Improves the ability for a primary treatment to be implemented in the future.
Supporting	Road planning, design and management considerations that improve the overall level of safety associated with foreseeable crash types, but not expected to virtually eliminate the potential of fatal and serious injury occurring. Does not change the ability for a primary treatment to be implemented in the future.
Non-Safe System Other Elements	Road planning, design and management considerations that are not expected to achieve an overall improvement in the level of safety associated with foreseeable crash types occurring. Reduces the ability for a primary treatment to be implemented in the future

4 SAFETY AUDIT FINDINGS

Whilst it is important to ensure that a traffic control treatment and road environment is designed to a consistent standard, there are times when this cannot be achieved due to physical or financial constraints. The recommendations contained within this report are solely based upon safety aspects, with no financial considerations provided for the recommended treatments.

The following section describes each of potential issues identified during the audit.

4.1 Existing Conditions

The Armstrong Road and Welch Road form part of the Victor Harbor Ring Road, approximately seven (7) kilometres in length. It provides an alternative route for traffic to bypass the key commercial area of Victor Harbor. The road comprises two traffic lanes (one in each direction) with 0.5m sealed shoulder on each side of the road.

Within the section of road with 100km/h posted speed limit, there are four (4) at-grade junctions including

- Waggon Road junction, approximately 1.5km from Adelaide Road,
- Greenhills Road junction, approximately 3.6km from Adelaide Road,
- Henderson Road junction, approximately 4.2km from Adelaide Road, and
- Crozier Road junction, approximately 4.6km from Adelaide Road.

Currently, all the above road junctions have a basic right turn (BAL) treatment on the main road (i.e. the Ring Road). This BAL treatment is a road junction design that allows slower right turning traffic to decelerate on the main road, potentially stop on the road before finding a suitable gap in the opposing traffic stream to enter the minor road. This treatment also enables the through traffic to bypass slow turning vehicles.



Figure 3: BAL Treatment at Greenhills Road

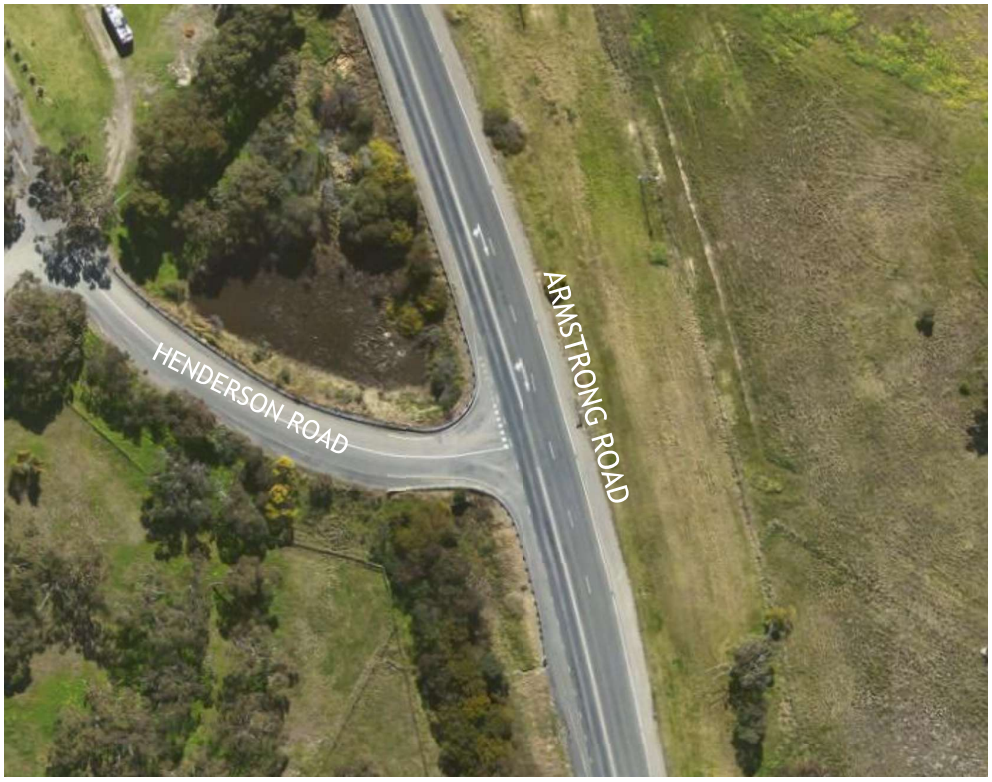


Figure 4: BAL Treatment at Henderson Road

Only at the Crozier Road junction, it has an additional auxiliary left turn lane treatment on the main road for left turning vehicles to stay away from the through traffic and slow down before entering the minor road. It is understood that Crozier Road is a direct access into the Victor Harbor town centre.



Figure 5: AUL and BAL Treatments at Crozier Road

4.1.1 Existing Traffic Controls

Similar to many rural road intersections, the minor roads (i.e. Greenhills Road and Henderson Road) are traffic controlled by GIVEWAY sign and line marking. A hazard board is present on the opposite side of the terminating road highlighting the end of road.



Figure 6: Henderson Road and Armstrong Road Junction



Figure 7: Greenhills Road and Armstrong Road Junction

4.1.2 Existing Street Lighting

Currently, street lighting is present at the Greenhills Road junction increasing the driver awareness of the junction at night. There is no street lighting at the Henderson Road junction.

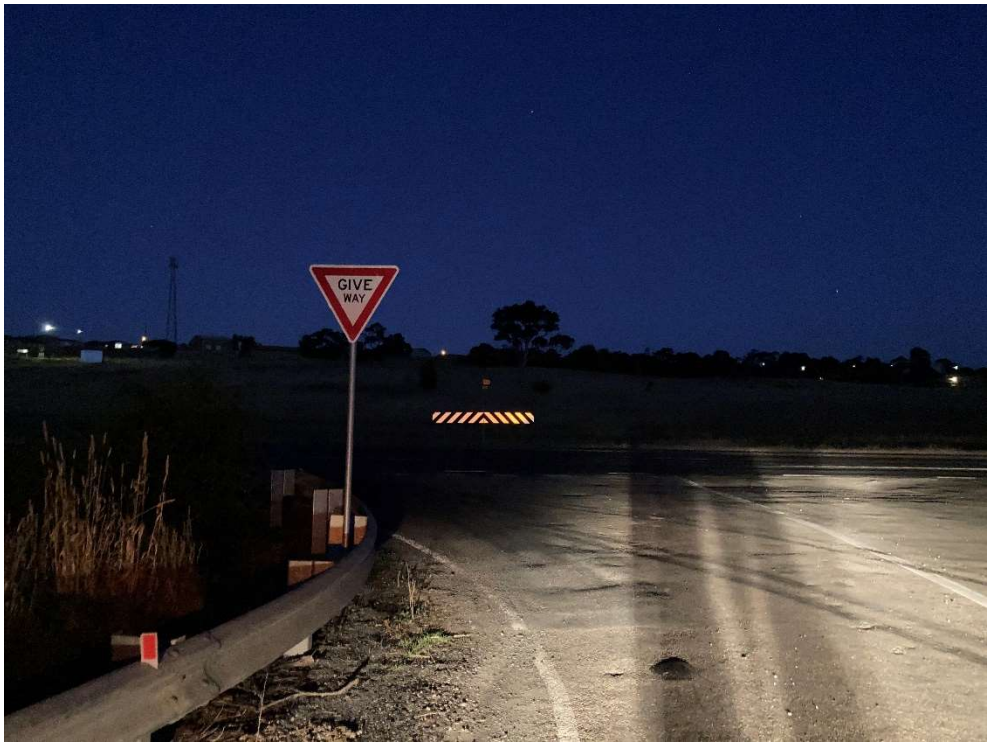


Figure 8: No Street Lighting at Henderson Road and Armstrong Road Junction

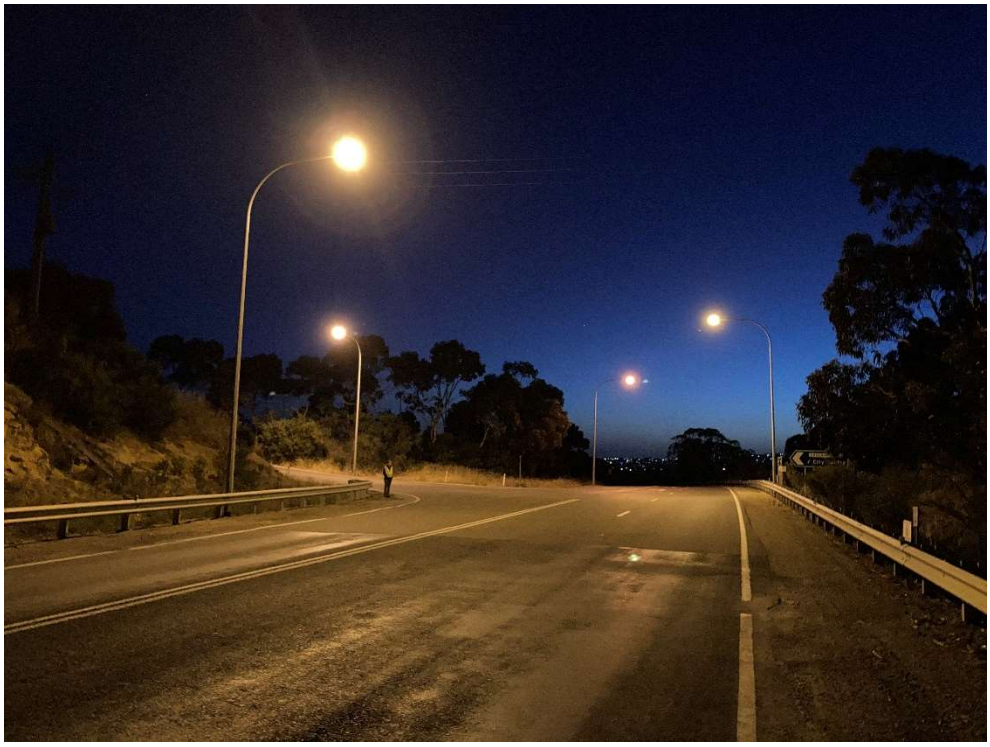


Figure 9: Street Lighting at Greenhills Road and Armstrong Road Junction

4.2 Audit Findings - Greenhills Road Junction with Armstrong Road

4.2.1 Driver Sight Distance at Greenhills Road

Driver sight distance has been measured during the site inspection and the sightline to the left and right onto Armstrong Road were compromised by the road geometry to the left and the bridge support structure to the right. The measured sight distance to the left was 130m to the left and 145m to the right.



Figure 10: Sight Distance at Greenhills Road Junction

It was also observed that the driver behaviour on Armstrong Road northbound approaching the Greenhills Road junction was impatient when following a slower right turning vehicle. The through traffic had speed up when the slower right turning traffic entered the BAL treatment. Coupled with the curvature of the road, the driver sightline along Armstrong Road approaching the Greenhills Road junction could also be obscured.



Figure 11: Sight Distance approaching the Greenhills Road Junction (northbound)

Recommendation: At the minimum, install continuity line and prune vegetation to improve sightline and allowing traffic to position closer at the junction. (Supporting Step Towards)



4.2.2 Signage

The inspection observed that the advance intersection direction and the intersection direction signage on Armstrong Road at the junction with Greenhills Road was partially covered by overgrown roadside vegetation reducing the visibility to motorists travelling in the southbound direction.



Figure 12: Greenhills Road City Centre 300m on Left Sign (southbound)



Figure 13: Greenhills Road City Centre sign (southbound)

Recommendation: Prune vegetation to ensure visibility of these signs increasing the awareness of Greenhills Road. (Supporting)

The existing GIVE WAY sign on Greenhills Road is located well to the left of the junction and it is not clearly visibility for motorists turning right onto Armstrong Road.



Figure 14: GIVE WAY sign and Speed Limit sign on Greenhills Road

Recommendation: Relocate the GIVE WAY to the light pole and remove the 100km/h speed limit sign. (Supporting)

4.2.3 Road Shoulder

There are deep tyre marks in the unsealed shoulder at the northeast corner of the Greenhills Road and Armstrong Road junction. This is an evidence of vehicles are cutting the corner when turning left into Greenhills Road. Deep tyre mark can cause drivers to be surprised, especially at night, by the sudden drop of a wheel, increasing the risk of runoff road related crashes.



Figure 15: Deep Tyre Mark at the northeast corner of Greenhills Road junction

Recommendation: Repair damaged unsealed shoulder and seal shoulder in proximity of junction to increase trafficable area for left turning vehicles. (Supporting Step Towards)

4.2.4 Roadside Safety Barrier

The existing guard fence safety barrier system along the western side of Armstrong Road opposite to Greenhills Road junction is appeared to be driven into the ground. The fill surrounding the support have evidence of erosion and it can impact the effectiveness of the barrier system at the time of collision.



Figure 16: Evidence of Erosion around the support of the Guard Fence

Recommendation: Stabilised the fill embankment to reduce further erosion and reinstall the unstable supports (Supporting Step Towards)

4.2.5 Roadside Fixed Object

The existing street lighting pole at the southeast corner of the Greenhills Road junction is a non-frangible object, increasing risk of injury at high speed impact.



Figure 17: Street Lighting Pole at Greenhills Road Junction

Recommendation: Replace the street light with a frangible slip base pole. (Supporting Step Towards)

4.3 Audit Findings - Henderson Road Junction with Armstrong Road

4.3.1 Driver Sight Distance at Henderson Road

The driver sight distance at the Henderson Road was measured and they are 230m to the left and 210m to the right. The sight distance exceeds the minimum stopping sight distance requirements at an intersection in accordance with Austroads Guide to Road Design.





Figure 18: Sight Distance at Henderson Road Junction

4.3.2 Potholes at Henderson Road

There were a few potholes on Armstrong Road at Henderson Road junction left turn apron.



Figure 19: Potholes at Henderson Road Junction

Recommendation: Repair potholes. (Supporting)

4.3.3 Pavement Marking at Henderson Road

Faded pavement marking was observed at the Henderson Road junction at the time of inspection. This will affect the vehicle holding position at the junction, especially at night-time, when waiting to enter Armstrong Road.



Figure 20: Faded Pavement Marking at Henderson Road Junction

Recommendation: Reinstate pavement marking at Henderson Road junction. (Supporting)

4.4 Audit Findings - General

4.4.1 Loose Gravels at intersection

There are loose gravels on the road at the Greenhills Road junction and it is particularly dangerous to motorcycles causing them to lose control and increasing the risk of runoff road related type of crashes.

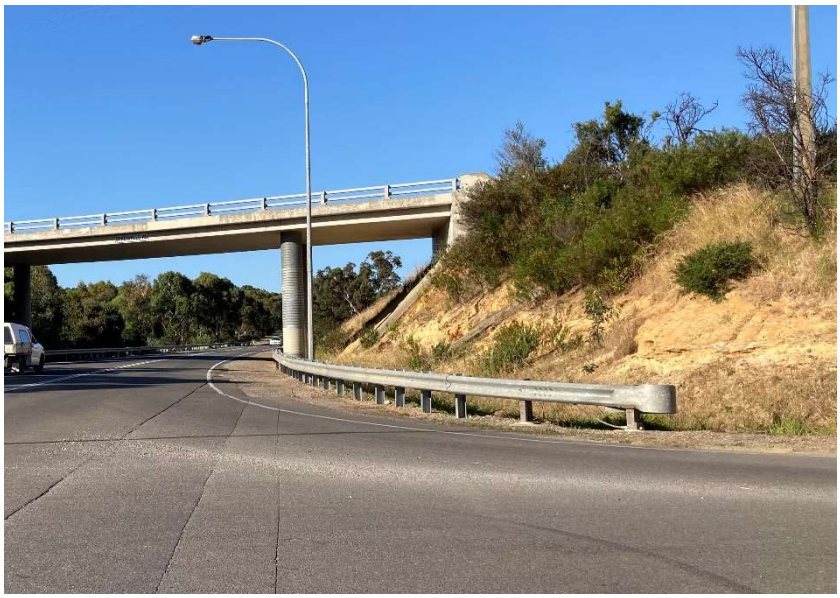


Figure 21: Loose Gravels at Greenhills Road junction



Figure 22: Loose Gravels at Henderson Road junction

Recommendation: Sweep the road junction on a regular basis to reduce risk of loose gravels present at intersection (Supporting Step Towards)

4.4.2 Intersection Hazard Board Marker

The existing hazard board marker at both Greenhills Road and Henderson Road junctions are old standard. The current standard should be using bi-directional hazard broad marker.

Recommendation: Replace existing hazard broad at intersections with bi-directional hazard board. (Supporting)

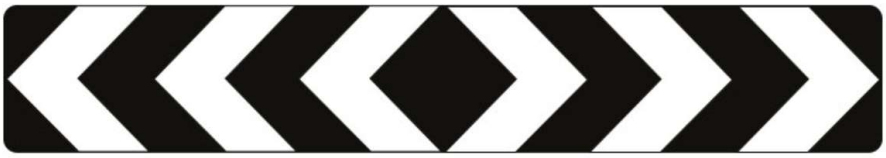


Figure 23: Photo of bi-directional hazard board marker

4.5 Ranking System

The auditor has raised issues in respect to road safety that should be given due consideration. To assist and gauge the relevant importance of each of the safety issues documented in this report, the following risk matrix has been considered and a priority ranking system shown in Table 6 has been adopted.

Table 3: Likelihood Rating

Likelihood	Description
Highly probably	It is likely that more than one crash of this type could occur within a five-year period.
Occasional	It is likely that less than one crash of this type could occur within a five-year period.
Improbably	Less than one crash of this type could occur within a 10-year period.

Table 4: Severity Rating

Severity	Description
Major	The crash is likely to result in a fatality or serious injuries
Moderate	The crash is likely to result in minor injuries or large scale of property damage.
Minor	The crash is likely to result in minor property damage or many near miss crash events.

Table 5: Safety Issue Ranking System

	Improbable	Occasional	Highly Probable
Minor	Low	Low	Medium
Moderate	Low	Medium	High
Major	Medium	High	High

Table 6: Safety Issue Ranking System

Safety Issue Ranking	Likelihood of a crash resulting in serious or fatal injury
Priority 'A' (High)	A major concern that should be addressed and requires changes to avoid serious safety problems.
Priority 'B' (Medium)	A significant safety concern that requires consideration of changes to improve safety.
Priority 'C' (Low)	A safety concern of lesser significance, but which should be addressed as it may improve overall safety.
Comment	A concern or an action that may be outside the scope of the RSA, but which may improve the overall design or be of wider significance. The responsibility for any action on comments may fall to the responsible road authority.

4.6 Summary of Recommendations

The road safety audit findings and suggested actions detailed throughout this report have been summarised in Table 7.

Table 7: Audit Recommendations Summary

Item	Deficiency	Suggested Action	Risk Rating
1	Driver Sight Distance at Greenhills Road junction	Install continuity line and prune vegetation to improve sightline and allowing traffic to position closer at the junction. Refer details in section 4.2.1.	B
2	Signage at Greenhills Road junction	Prune vegetation to ensure visibility of these signs increasing the awareness of Greenhills Road. Refer details in section 4.2.2.	B
3	Signage at Greenhills Road junction	Relocate the GIVE WAY to the light pole and remove the 100km/h speed limit sign. Refer details in section 4.2.2.	C
4	Road shoulder at Greenhills Road junction	Repair damaged unsealed shoulder and seal shoulder in proximity of junction to increase trafficable area for left turning vehicles. Refer details in section 4.2.3.	B
5	Roadside safety barrier at Greenhills Road junction	Stabilised the fill embankment to reduce further erosion and reinstall the unstable supports. Refer details in section 4.2.4.	B
6	Roadside fixed object at Greenhills Road junction	Replace the street light with a frangible slip base pole. Refer details in section 4.2.5.	B

7	Potholes at Henderson Road junction	Repair potholes. Refer details in section 4.3.2.	C
8	Faded pavement marking at Henderson Road junction	Reinstate pavement marking at Henderson Road junction. Refer detailed in section 4.3.3.	C
9	General observations	Sweep the road junction on a regular basis to reduce risk of loose gravels present at both Greenhills Road and Henderson Road junctions. Refer to details in section 4.4.1.	B
10	General observations	Replace existing hazard broad at intersections with bi-directional hazard board marker at both Greenhills Road and Henderson Road junctions. Refer to details in section 4.4.2.	C

5 AUDITOR STATEMENT

The above safety audit findings and suggested actions are the opinion of the audit team, and are aimed at changes that may be implemented in order to improve safety. The issues raised in this report, together with recommendations, should be considered for implementation.

Stephen Chan

Senior Road Safety Auditor
Date: 16 December 2020

Damian Landrigan

Road Safety Auditor
Date: 16 December 2020

6 APPENDIX A - Decision Tracking Form

Road Safety Audit Report Recommendations

DECISION TRACKING FORM

Project Title:	Armstrong Road between Greenhills Road and Henderson Road	**Road Safety Audit Stage:**	Road Safety Audit – Existing Road Conditions
Road Authority	City of Victor Harbor	**Designer:**	N/A

Road Safety Audit Team: Stephen Chan (Senior Road Safety Auditor), Damian Landrigan (Road Safety Auditor)

Item No.	Recommendation	Risk Rating	Road Authority Response/Comments	Road Authority Decision
1	Install continuity line and prune vegetation to improve sightline and allowing traffic to position closer at the junction. Refer details in section 4.2.1.	B	Works request lodged with depot to prune vegetation and linemarking sought from contractor.	Actioned
2	Prune vegetation to ensure visibility of these signs increasing the awareness of Greenhills Road. Refer details in section 4.2.2.	B	Works request lodged with depot to prune vegetation to improve visibility of signage.	Actioned
3	Relocate the GIVE WAY to the light pole and remove the 100km/h speed limit sign. Refer details in section 4.2.2.	C	Works request lodged with depot to relocate giveway sign to light pole and removal of 100km/h sign.	Actioned
4	Repair damaged unsealed shoulder and seal shoulder in proximity of junction to increase trafficable area for left turning vehicles. Refer details in section 4.2.3.	B	Works request lodged with depot to repair damages unsealed shoulder and seal shoulder in proximity of junction.	Actioned

Project Title:	Armstrong Road between Greenhills Road and Henderson Road	**Road Safety Audit Stage:**	Road Safety Audit – Existing Road Conditions
Road Authority	City of Victor Harbor	**Designer:**	N/A

Road Safety Audit Team: Stephen Chan (Senior Road Safety Auditor), Damian Landrigan (Road Safety Auditor)

Item No.	Recommendation	Risk Rating	Road Authority Response/Comments	Road Authority Decision
5	Stabilised the fill embankment to reduce further erosion and reinstall the unstable supports. Refer details in section 4.2.4.	B	Works request lodged with depot to stabilise the embankment, fill and compact.	Actioned
6	Replace the street light with a frangible slip base pole. Refer details in section 4.2.5.	B	Street lighting will be addressed in new financial year budget bid required to secure funding.	Deferred till next financial year
7	Repair potholes. Refer details in section 4.3.2.	C	Works request lodged with depot to repair potholes.	Actioned
8	Reinstate pavement marking at Henderson Road junction. Refer detailed in section 4.3.3.	C	Linemarking to be undertaken and sought from contractor	Actioned
9	Sweep the road junction on a regular basis to reduce risk of loose gravels present at both Greenhills Road and Henderson Road junctions. Refer to details in section 4.4.1.	B	Works request lodged with depot to complete the road sweeping and put on a cyclical occurrence.	Actioned
10	Replace existing hazard broad at intersections with bi-directional hazard board marker at both Greenhills Road and Henderson Road junctions. Refer to details in section 4.4.2.	C	New bi-directional hazard board ordered and to be installed by depot staff in existing location.	Actioned