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Creativity in Transport Engineering

Goulburn Street School Crossing Existing Conditions Road Safety Audit



Prepared for Strathbogie Shire Council

10 September 2023

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1 INTRODUCTION

RedSquare Traffic has been engaged by Strathbogie Shire Council ('Client') to prepare an Existing Conditions Road Safety Audit pertaining to the school crossing near Nagambie Primary School in Nagambie, Victoria ('Subject Site', 'Site').

This report presents the finding of a Road Safety Audit conducted in accordance with Austroads Guide to Road Safety, Part 6: Road Safety Audit. A road safety audit is defined as a 'formal examination' of a future road or traffic project or an existing road or road related area, in which an independent, qualified team reports on the project's crash potential and actual safety performance respectively.

This Road Safety Audit is an Existing Conditions Road Safety Audit and has been undertaken by a team of independent Department of Transport & Planning (DTP) Accredited Road Safety Auditors.

In line with Austroads Guide to Road Safety, Part 6, the site and existing conditions are contextualised in the first half of this report. Then, the audit details and findings, including a corrective action schedule, is presented in the second half.



2 EXISTING SITE CONDITIONS

Subject Site of this Road Safety Audit includes a school crossing (*i.e.* children's crossing) located on Goulburn Street in Nagambie, Victoria. The crossing is found on Goulburn Street approximately 340m east of High Street and immediately west of Boyd Street and facilitates pedestrian movements to and from Nagambie Primary School.



FIGURE 1: SUBJECT SITE (SOURCE: NEARMAP)

The crossing was observed to be supervised during school times and children were escorted by *an adult* when using the crossing in accordance with VicRoads Traffic Engineering Manual – Section 8 – Pedestrian and Cyclist Crossings of Roads. A posted speed limit of 40km/h applies to both directions of Goulburn Street on the approach to the location in concern.

The crossing contained posts, flags, stop-lines, crosswalk lines as well as the use of hand held STOP sign (R6-7) by children crossing supervisors. A pedestrian containment fence was also noted on the southern side of the road.



Several images captured during the site inspection are provided below. Refer to the Appendices for additional images captured by the auditing team.



FIGURE 2: CROSSING AS OBSERVED FROM WEST



FIGURE 3: CROSSING AS OBSERVED FROM EAST





FIGURE 4: CROSSING AS OBSERVED FROM BOYD STREET

RedSquare Traffic's team of auditors noticed the following important observations related to the operation of this crossing.

- A notable number heavy vehicles were observed to be travelling on Goulburn Street through the site, some related to the construction site at the eastern end of Goulburn Street while some originating from industrial land uses. Figure 5 & 6 demonstrate such heavy vehicles observed on site.





FIGURE 5: HEAVY VEHICLES ON GOULBURN STREET (DUE TO INDUSTRIAL LAND USES)



FIGURE 6: HEAVY VEHICLES ON GOULBURN STREET (DUE TO CONSTRUCTION SITE)



- School buses were observed to be parking on the southern side of Goulburn Street. Thus, children *hopping on* these buses were not required to engage in any crossing movements.



FIGURE 7: SCHOOL BUSES PARKED NEAR THE PRIMARY SCHOOL

- School crossing was managed by *an adult* with appropriate hand-held sign controls (R3-3) and high visibility clothing. Vehicles were observed to be complying with the instructions provided by the crossing supervisor.





FIGURE 8: OPERATION OF THE CROSSING DURING SCHOOL TIMES

- Parents and guardians were seen to be standing both on north and south side of Goulburn Street waiting for their children to exit the school. Vehicles associated with school pick-ups & drop-offs were found to be utilising the street parking spaces on Goulburn Street and Boyd Street with a particularly high preference for the kerbside areas on Boyd Street. No vehicles were noted to be occupying any No Stopping areas.



3 EXISTING CONDITIONS

3.1 ROAD NETWORK

3.1.1 Goulburn Street

Goulburn Street is a Strathbogie Shire Council owned and managed municipal road oriented generally in an east-west alignment. The sealed road with a 12.5m wide trafficable width connects with High Street (an arterial road) on the west and provides access to a number of residential properties. Footpaths were found to be available on both sides of Goulburn Street and a posted limit of 40km/h was seen near the audit site. However no LATM treatments were observed to be in place to reduce vehicular speeds.



FIGURE 9: GOULBURN STREET

3.2 PUBLIC TRANSPORT

No public transport services are available in the vicinity of the Subject Site.



3.3 ACTIVE TRANSPORT

Footpaths are available on both sides of Goulburn Street near the Subject Site in addition to the school crossing associated with Nagambie Primary School.

3.4 CRASH HISTORY

A review of crash statistics for the roads and intersections surrounding the Subject Site was sourced from the VicRoads Crash Statistics database. This database records fatal and injury (serious/other) crashes on Victorian roads during the latest five-year reporting period and categorises these crashes as follows;

- Fatal injury: At least one person was killed in the crash or died within 30 days as a result of the crash.
- Serious injury: At least one person was sent to hospital as a result of the crash.
- Other injury: At least one person required medical treatment as a result of the crash.

According to the review, there have been no incidents reported in the vicinity of the Subject Site for the past 5 years.



4 ROAD SAFETY AUDIT DETAILS

4.1 ROAD SAFETY AUDIT PROCEDURE

This Road Safety Audit has been conducted in accordance with the [Austroads Guide to Road Safety, Part 6: Road Safety Audit](#). Road Safety Audit is a formalised procedure, which can be applied to all phases of a road project or to an existing road system. The auditor and audit team must be independent of the designer.

In reviewing the safety aspects of a road, the reporting procedure is not intended as a redesign process. It is instead intended to outline potential or existing road safety issues and establish a basis upon which ongoing designs may produce an acceptable solution to the design intent.

In accordance with the Austroads guide, this audit seeks to identify potential safety hazards, however, auditors cannot guarantee that every deficiency has been identified and if all the recommendations in this report were to be followed, this would not guarantee that this section of road is “safe”. Rather, adoption of the recommendations should improve the level of safety for this road.

4.2 THE SAFE SYSTEM

[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:

1. Undertake a Safe System Assessment in the early stages of the project.
2. Integrate Safe System principles into the Road Safety Audit process.

[VicRoads Safe System Assessment Guidelines \(2018\)](#) states that a Safe System Assessment must be undertaken for any Victorian Government project greater than \$5M in value, is desirable for where the project value is greater than \$2M and optional for projects under \$2M. Where A Safe System Assessment is not undertaken, the project team should document how the project has considered Safe System alignment. Safe System Assessments are most valuable when conducted during the early stages of a project.

This Road Safety Audit has been undertaken to conform with [AGR Part 6: Managing Road Safety Audits \(2019\)](#). As such, an assessment has been undertaken for each Road Safety Audit finding to determine if the kinetic energy associated with the possible crash is above the tolerable levels set out in [Table 1](#).



TABLE 1: SAFE SYSTEM KINETIC ENERGY

CRASH TYPE	TOLERABLE (10%) SPEED – PASSENGER VEHICLE
HEAD-ON	70km/h
SIDE IMPACT (90-DEGREES)	50km/h
SIDE IMPACT (45-DEGREES)	60km/h
SIDE IMPACT INTO POINT SOURCE HAZARD	30-40km/h
PEDESTRIAN, CYCLIST, MOTORCYCLIST	30km/h

Each recommendation is also categorised into one of the Austroads Safe System treatment categories described in Table 2.

TABLE 2: SAFE SYSTEM TREATMENT CATEGORIES

TREATMENT TYPE	DESCRIPTION
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	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

4.3 ROAD SAFETY AUDIT TEAM

It is a requirement in Victoria that road safety audits are undertaken in teams of two or more, with at least one Senior Road Safety Auditor. Each auditor must be accredited and registered on VicRoads Register of Road Safety Auditors (www.vrsa.com.au).

The independent audit team for this audit was Dinith (Dane) Wanninayake and Sachini Hewawasam. Dinith is a DTP Accredited Senior Road Safety Auditor and a DTP Recommended Safe System Assessor. Sachini is a DTP



accredited Road Safety Auditor. All auditors have been independent of the design process, as stipulated by Austroads Guidelines.

A Corrective Action Schedule summarising the findings of this Road Safety Audit is provided in Section 5 of this report. The Project Manager/Designer shall indicate in this schedule whether the finding is accepted, and if not accepted, shall provide a reason for non-acceptance.

4.4 SITE INSPECTIONS & MEETINGS

Pre-audit discussions were held with Jason McConkey of Strathbogie Shire Council (Manager Community Safety) via email/phone conversations, during which Jason explained the details associated with the project.

RedSquare Traffic's Road Safety Audit undertook a site inspection on 02 October 2023 during which matters relating to the existing conditions of the site was noted down.



4.6 RISK ASSESSMENT

The potential road safety issues identified have been assigned a risk rating based on the likelihood of a crash occurring as a result of the deficiency together with the potential consequence of that crash.

The risk rating adopted are:

- Almost Certain
- Likely
- Possible
- Unlikely
- Rare

TABLE 3: LIKELIHOOD OF A CRASH (AUSTRoadS, 2019)

Likelihood	Description
ALMOST CERTAIN	One per quarter
LIKELY	Quarter to 1-year
POSSIBLE	1 to 3 years
UNLIKELY	3 to 7 years
RARE	7 years +



TABLE 4: LIKELY SEVERITY OF THE RESULTING CRASH TYPE

SEVERITY	DESCRIPTION
FATAL	Death within 30 days of the crash
SERIOUS	Admitted to hospital
MODERATE	Major first aid and/or presents to hospital (not admitted)
MINOR	Minor first aid



TABLE 5: RESULTING LEVEL OF RISK

Likelihood/ Severity	INSIGNIFICANT	MINOR	MODERATE	SERIOUS	FATAL
ALMOST CERTAIN	Medium	High	High	Extreme (FSI)	Extreme (FSI)
LIKELY	Medium	Medium	High	Extreme (FSI)	Extreme (FSI)
POSSIBLE	Low	Medium	High	High (FSI)	Extreme (FSI)
UNLIKELY	Negligible	Low	Medium	High (FSI)	Extreme (FSI)
RARE	Negligible	Negligible	Low	Medium (FSI)	High (FSI)



5 AUDIT FINDINGS & RECOMMENDATIONS

TABLE 6: AUDIT FINDINGS

NO	FINDINGS	LEVEL OF RISK (INC. FSI)	SAFE SYSTEM ENERGY	Recommendations <ul style="list-style-type: none"> • Primary (P) • Supporting (S) 	Responsible Officer	
					Accept - Yes/No	Comments
1	<p>Several signs near the Subject Site were observed to be faded and are required to be replaced by new signs.</p> 	Noted.	N/A	Sign replacement to be considered (S).		
2	Tactile Ground Surface Indicator (TGSI) treatment currently installed at the crossing were found to be inconsistent and in poor shape.	<p>Likelihood: Unlikely Severity: Serious HIGH (FSI)</p>	Above Tolerable Limits	Consider reviewing the TGSI treatment and making appropriate modifications to achieve compliance (S).		





It is recommended that the TGSIs are installed covering the “full width of the path of travel - perpendicular to the direction of travel”. Incorrectly installed TGSIs could lead to vehicle/pedestrian crashes.

3 A pedestrian containment fence is found on the southern side of Goulburn Street at the crossing which assists in funnelling children (& other pedestrians) towards the appropriate crossing point. Those who were about to cross *from the school* were seen to be gathering at the opening of this containment fence (which only as wide as the crossing itself) and is noted as a positive outcome.

As the users step on to the crossing, they are not encouraged to walk in a straight line as the *desire lines* were often found to be towards the parked cars on Boyd Street & Goulburn Street. The auditors have not captured photos of this behaviour; yet the users were observed to be crossing in the angles indicated by the red arrows in the image below.

Likelihood: Unlikely
Severity: Serious
HIGH (FSI)

Above Tolerable Limits

Consider installing a similar containment fence on the northern side of the road to improving user compliance (S).





As a result, they were required to step over the level differences created by the kerb extensions found at the intersection of Goulburn Street and Boyd Street. This could potentially give rise to a tripping incident.

This is particularly important in the morning as the pedestrian desire line (shown via dashed red arrow) of those using the crossing are between the northern side of Goulburn (and Boyd Street) towards the main gate of the school.



It is important to have pedestrians use the appropriate area allocated for the crossing movement.

4 The 40km/h speed limit sign installed on the eastern approach of the crossing was observed to be obscured by a large tree as shown by the following three images.

Likelihood: Unlikely
Severity: Serious

Above Tolerable Limits

The speed limit sign under discussion should be moved to





HIGH (FSI)

a location with better visibility
as a matter of urgency (P).





The second 40km/h speed limit sign is also found right at the crossing which does not allow sufficient time for drivers to process the information and to reduce the speed. Achieving reduced vehicular speeds is essential to a safe operation of the school crossing as;

- Drivers known to be more alert at reduced vehicular speeds; and
- Should a crash occur, the severity of the crash is lesser at the reduced vehicular speeds due to a reduced energy transfer.

5 It is acknowledged that most vehicles exiting Boyd Street are vehicles associated with residencies in this street and tend to familiar with local conditions. Nonetheless, at any T-intersection drivers are required to process a large amount information and make quick decisions. The placement of the crossing with respect to the stop-line on Boyd Street adds to the complexity. This is because vehicles are required to not give-way to vehicles on Goulburn Street but also to follow the instructions of the crossing supervisor and come to a complete stop having just turned out of Boyd Street.

Sightlines were observed to be adequate, yet the crossing being located on the departure end of this operation means that vehicles exiting Boyd Street are “accelerating” as they approach the crossing. If a misjudgement is to occur, coming to a sudden stop is a challenging task with minimal braking distance between the point of conflict and the stop-line of Boyd Street.

Likelihood: Unlikely Severity: Moderate Medium	Above Tolerable Limits	Consider installing warning signs or similar on the southern side of Goulburn Street to indicate the presence of the children’s crossing (S).
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Tyre marks observed on the road pavement further indicates that the typical movement undertaken from Boyd Street does not allow for a vehicle to store fully within the traffic lane (behind the stop line) at the crossing which further exacerbates the conditions explained above.





6 Presence of heavy vehicles is a vital consideration when analysing the potential of crashes and their corresponding severity. A higher mass will generate a higher kinetic energy resulting in more severe crashes than when crashing with a passenger vehicle travelling at the same speed. Presence of multiple heavy vehicle movements is generally not encouraged in locations with high pedestrian activity due to this reason and various similar reasons.

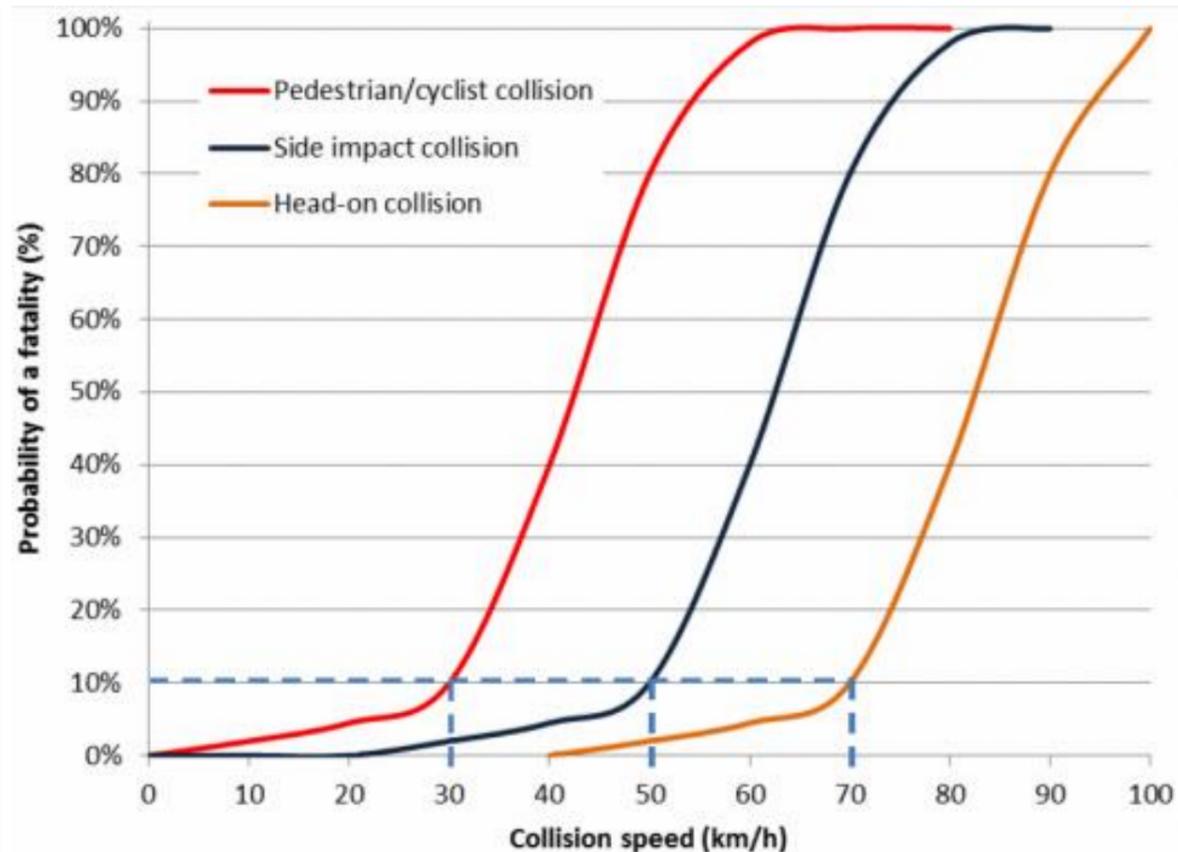
Under the Safe System Principles, it is vital to understand the risk of being killed increases steeply as the speed reaches 30km/h or more when it comes to a collision with a pedestrian. A diagram extracted from The Safe System Approach (Austroads) is provided below for reference.

Likelihood: Unlikely
 Severity: Serious
HIGH (FSI)

Above Tolerable Limits

Consider reducing the speed limit to 30km/h or lower (P).
 Consider implementing LATM devices to reduce vehicular speeds (P).





It is said “the human body is vulnerable not built to withstand impact forces greater than 30km/h – any impact greater than 30km/h greatly increases the risk of dying”.

Considering these factors, RedSquare Traffic recommends lowering the speed limit in accordance with the Safe System Framework, to 30km/h or less on the approach to the crossing to reduce the “severity of collisions”, should a collision is to take place. It is beneficial if such a posted speed limit is supplemented by Local Area Traffic Management (LATM) treatments that would reduce the driver speeds through speed limiting devices (e.g. road humps, rumble strips) rather than relying on drivers to comply with regulatory speed limits.

7 In accordance with VicRoads TEM Vol 2 Part 2.10 – AS1742.10 – Clause 7.2; the parallel crosswalk lines shall be converted to “broken line” pattern, should resurfacing be considered as part of future improvements to the Subject Site and surrounds.

“If the works involve the removal of both crosswalk lines entirely, then crosswalk lines in the new broken line pattern shall be installed” – VicRoads TEM

Noted

N/A

Consider transitioning to the broken line standard in accordance with VicRoads TEM (S).



8	<p>The following image was captured at around 2pm on the day of the audit, approximately 1.5hrs prior to the school ending time. Children’s crossing flags were observed to be installed at this time too, in contrary to the instructions provided by VicRoads TEM – “<i>Flags shall only be displayed when school children are likely to be proceeding to and from school</i>”.</p> <p>Extended use of the flags, particularly outside school times reduces its efficiency and is therefore not recommended.</p>	<p>Likelihood: Unlikely Severity: Moderate Medium</p>	<p>Above Tolerable Limits</p>	<p>Flags should only be used when school children are likely to be proceeding to and from school (S).</p>
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6 CONCLUSION

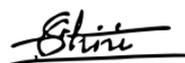
This Road Safety Audit has been conducted in accordance with the procedures set out in the *Austrroads Guide to Road Safety Part 6: Road Safety Audit (2022)*. The findings, recommendations and Safe System elements are provided for consideration to the client and any other interested parties.



Dinith Wanninayake – Principal Traffic Engineer

Senior Road Safety Auditor/Audit Team Leader

Date: 10 October 2023



Sachini Hewawasam – Senior Traffic Engineer

Road Safety Auditor

Date: 10 October 2023



7 APPENDICES

7.1 APPENDIX A – SITE PHOTOS







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