RIGORE ENGINEERING SERVICES

Safe Systems Assessment

Junee Subdivision

RES2305.40.115-SSA

Date: 2/09/2023
Version: 1.0
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Document Quality Information

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Date	Version	Author	Approved	Change Reference
28/08/2023	0.1	Z. Walgers	J. Gorrie	Draft Safe System Assessment
02/09/2023	1.0	Z. Walgers	J. Gorrie	Final Safe System Assessment

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Executive Summary

Rigore Engineering Services (Rigore) has been engaged by TJHRR Pty Ltd, to undertake a Safe Systems Assessment on the proposed strategic access options from the proposed subdivision of land at 14 John Potts Drive Junee to the existing Junee Shire Council road network.

The Safe System is a road safety philosophy that requires roads to be designed and managed so that crash-related death and serious injury are avoidable.

A Safe System Assessment (SSA) is a safety examination of a road-related program, project, or initiative. The procedure for undertaking a Safe System Assessment is outlined in *AP-R509-16 Austroads Safe System Assessment Framework*.

A Safe System Assessment (SSA) has been conducted on a total of 2 scenarios as listed below with the Safe Systems Assessment Matrix scores provided in Table 1 – Options Summary.

- Option 1 – A single point of network access via Kitchener Street/Anzac Ave
- Option 2 – A single point of network access via John Potts Drive.

Table 1 – Options Summary

Option	Description	Score
Option 1	Access via Kitchener Street/Anzac Ave	6.25 / 448
Option 2	Access via John Potts Drive.	10.5 / 448

Each option has been assessed according to the framework set out in Austroads AP-R509-16. A Safe System matrix score is generated for each option. The Safe System matrix score is the sum of scores determined for seven major crash types for each of the options provided, summarised in Table 1. Lower scores are safer.

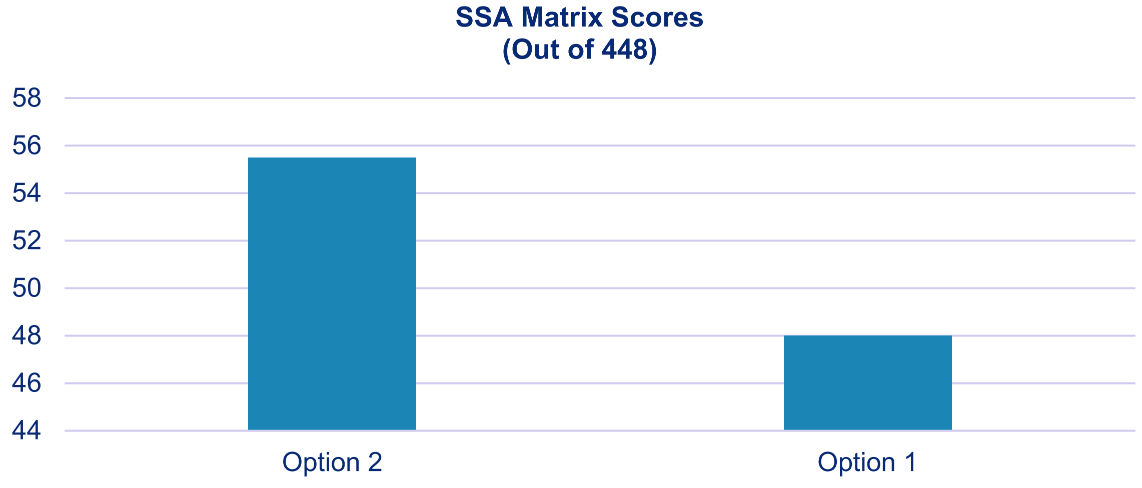

Figure 1 – Safe System Scores

The Safe Systems Assessment undertaking has demonstrated that not only is the proposed development typical of expected changes to the network behaviour but it has also demonstrated that there is a negligible foreseeable change to the road safety performance regardless of the adopted access option, although marginally in favour of Option 1 as detailed herein.

1. Introduction to the Safe System

1.1 Safe System Pillars

The Safe System approach seeks to ensure that no road user is subjected to kinetic energy exchange in a crash that will result in death or serious injury. There is a shared responsibility for safe travel outcomes between system designers (road authorities, vehicle manufactures, road designers etc.) and road users. There are four Safe System pillars: safer vehicles, safer speeds, safer roads, and safer road users. Post-crash response is another element that is often recognised as the fifth pillar. All parts of the system must be considered and strengthened so that road safety outcomes are maximised and to ensure that road users are adequately protected even if one part fails.

Safe System Assessment (SSA) is concerned mainly with the safer roads and safer speeds pillars. A SSA is used to examine road project proposals and aims to identify infrastructure and speed related factors that are likely to contribute to a higher risk of fatal and serious injury (FSI) crashes. It also seeks to identify design or scope changes that will improve the alignment of the project with Safe System principles.

Figure 2 – Safe System Pillars

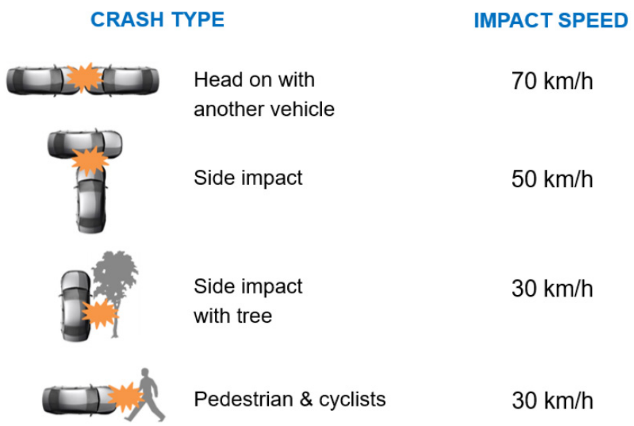

Figure 3 – Safe System Impact Speeds

1.2 Safe System Impact Speeds

The impact speed in a collision is a significant factor that affects the probability of a person being killed or seriously injured in a crash. Safe System impact speeds are speeds below which the chances of survival are high, and the likelihood of serious injury is low.

Figure 3 is a guide to Safe System impact speeds for common crash types. It should be noted that the angle of impact of a collision is also a factor that affects the severity of a crash. As far as is practically possible, infrastructure should be designed, and travel speeds managed so that the impact speeds when a crash occurs are below the thresholds show in Figure 3.

2. Safe System Assessment Process

2.1 Safe System Process

The Safe System Assessment process is based on Austroads Safe System Assessment Framework (Austroads 2016, Research Report AP-R509-16, Safe System Assessment Framework)

Steps in the process include:

- Deciding on the type of assessment
- Selecting an appropriate team to conduct the assessment.
- Understanding the project background, context, and objectives
- Collation of information and data for both existing and future conditions
- Inspection of the site
- Consideration of existing conditions and each project design option using the SSA Matrix
- Consideration of the additional Safe System components; road users, vehicles, post-cash care
- Review of the SSA Matrix scores and development of suggested changes to improve alignment with Safe System principles.
- Reporting
- Review of suggested design and scope changes
- Amendment of project scope and design to incorporate the accepted changes.

2.2 Safe System Matrix

To ensure that Safe System elements are considered, or to measure how well a given project (e.g., an intersection, road length, area, treatment type etc.) aligns with Safe System principles, a Safe System matrix has been produced. The purpose of the matrix is to assess different major crash types (those identified as the predominant contributors to fatal and serious crash outcomes) against the exposure to that crash risk, the likelihood of it occurring and the severity of the crash should it occur.

A risk assessment approach has been adopted that includes exposure, likelihood, and severity. Exposure, likelihood, and severity (the rows of the matrix) are defined as follows:

- Road user exposure: this refers to which road users, in what numbers and for how long are using the road and are thus exposed to a potential crash. The measures of exposure include: AADT, side-road traffic volumes, number of motorcycles, cyclists and pedestrians crossing or walking along the road, length of the road, area, and length of time.
- Crash likelihood: groups of factors affecting the probability of a crash occurring. They can be elements which moderate opportunity for conflict (e.g., number of conflict points, offset to roadside hazards, separation between opposing traffic). They can also include elements of road user behaviour and/or road environment. Typically, these are the elements which moderate road user error rates. This includes issues such as level of intersection control (e.g., priority/signals/movement ban), speed, sight distance, geometric alignment, driver guidance and warning. and maintenance (change in practice; implications of timing).
- Crash severity: groups of factors affecting the probability of severe injury outcomes should a crash occur. Typically, these factors are associated with the amount of kinetic energy and its transfer in the crash, e.g., impact speeds and angles, severity of roadside hazards.

Each cell in the matrix is to be manually assigned a score between zero and four. A score of zero indicates that the system is fully aligned with the Safe System vision for that component of a given crash type. The higher the score, the further the project is from a Safe System condition. When quantifying alignment with Safe System principles, reference is made to Austroads report APR509-16 Safe System Assessment Framework Table 4.2 (shown overleaf).

Table 2 – Safe System Matrix Scoring System

Road User Exposure	Crash Likelihood	Crash Severity
0 = there is no exposure to a certain crash type. This might mean there is no side flow or intersecting roads, no cyclists, no pedestrians, or motorcyclists).	0 = there is only minimal chance that a given crash type can occur for an individual road user given the infrastructure in place. Only extreme behaviour or substantial vehicle failure could lead to a crash. This may mean, for example, that two traffic streams do not cross at grade, or that pedestrians do not cross the road.	0 = should a crash occur, there is only minimal chance that it will result in a fatality or serious injury to the relevant road user involved. This might mean that kinetic energies transferred during the crash are low enough not to cause a fatal or serious injury (FSI), or that excessive kinetic energies are effectively redirected/dissipated before being transferred to the road user. Users may refer to Safe System-critical impact speeds for different crash types, while considering impact angles, and types of roadside hazards/barriers present.
1 = volumes of vehicles that may be involved in a particular crash type are particularly low, and therefore exposure is low. For run-of-road, head-on, intersection and 'other' crash types, AADT is < 1 000 per day. For cyclist, pedestrian and motorcycle crash types, volumes are < 10 units per day.	1 = it is highly unlikely that a given crash type will occur.	1 = should a crash occur, it is highly unlikely that it will result in a fatality or serious injury to any road user involved. Kinetic energies must be fairly low during a crash, or the majority is effectively dissipated before reaching the road user.
2 = volumes of vehicles that may be involved in a particular crash type are moderate, and therefore exposure is moderate. For run-of-road, head-on, intersection and 'other' crash types, AADT is between 1 000 and 5 000 per day. For cyclist, pedestrian and motorcycle crash types, volumes are 10–50 units per day.	2 = it is unlikely that a given crash type will occur.	2 = should a crash occur, it is unlikely that it will result in a fatality or serious injury to any road user involved. Kinetic energies are moderate, and the majority of the time they are effectively dissipated before reaching the road user.
3 = volumes of vehicles that may be involved in a particular crash type are high, and therefore exposure is high. For run-of-road, head-on, intersection and 'other' crash types, AADT is between 5 000 and 10 000 per day. For cyclist, pedestrian and motorcycle crash types, volumes are 50–100 units per day.	3 = it is likely that a given crash type will occur.	3 = should a crash occur, it is likely that it will result in a fatality or serious injury to any road user involved. Kinetic energies are moderate, but are not effectively dissipated and therefore may or may not result in an FSI.
4 = volumes of vehicles that may be involved in a particular crash type are very high, or the road is very long, and therefore exposure is very high. For run-of-road, head-on, intersection and 'other' crash types, AADT is > 10 000 per day. For cyclist, pedestrian and motorcycle crash types, volumes are > 100 units per day	4 = the likelihood of individual road user errors leading to a crash is high given the infrastructure in place (e.g. high approach speed to a sharp curve, priority movement control, filtering right turn across several opposing lanes, high speed).	4 = should a crash occur, it is highly likely that it will result in a fatality or serious injury to any road user involved. Kinetic energies are high enough to cause an FSI crash, and it is unlikely that the forces will be dissipated before reaching the road user.

3. Assessment Details

3.1 Type of Assessment

Rigore conducted a Safe System Assessment to assess the proposed strategic access options from the proposed subdivision of land at 14 John Potts Drive Junee to the existing Junee Shire Council road network.

3.2 Assessment Team

Table 3 – Assessment Team

James Gorrie		
	Position:	Managing Director | Project / Design Manager
	Experience:	20+ years
	Education:	Master of Engineering (Civil) Bachelor of Engineering Technology (Civil)
	Qualifications:	CPEng NER MIEAust APEC Engineer
	Accreditations:	Level 3 Lead/Snr Road Safety Auditor NSW | VIC | QLD | SA Treatment of Crash Location | Prepare Workzone TMP
Zach Walgers		
	Position:	Lead Civil Designer (Road) | Road Safety Auditor
	Experience:	7+ years
	Education:	Master of Engineering / Bachelor of Technology | Current Associate Degree of Engineering (Civil)
	Qualifications:	MIEAust
	Accreditations:	Level 2 Road Safety Auditor NSW

3.3 Assessment Methodology

A Safe System Assessment has been undertaken to examine the Junee Subdivision development. The procedure undertaking aligns with the that outlined in *AP-R509-16 Austroads Safe System Assessment Framework*.

4. Project Description

4.1 Project Background

The proposed subdivision includes 43 Torrens title residential lots, associated internal road and footpath infrastructure. The proposed site is located within the Junee township between John Potts Drive and Anzac Ave (refer to *Figure* 4 – *Site overview, Junee NSW*)

The proposed subdivision development access is yet to select a preferred ingress/egress arrangement. Two separate options for access are being considered with this assessment being one of several inputs put forward to determine the impact on the surrounding road network and roadside environment.

The options include:

- Option 1 – A single point of network access via Kitchener Street/Anzac Ave
- Option 2 – A single point of network access via John Potts Drive.

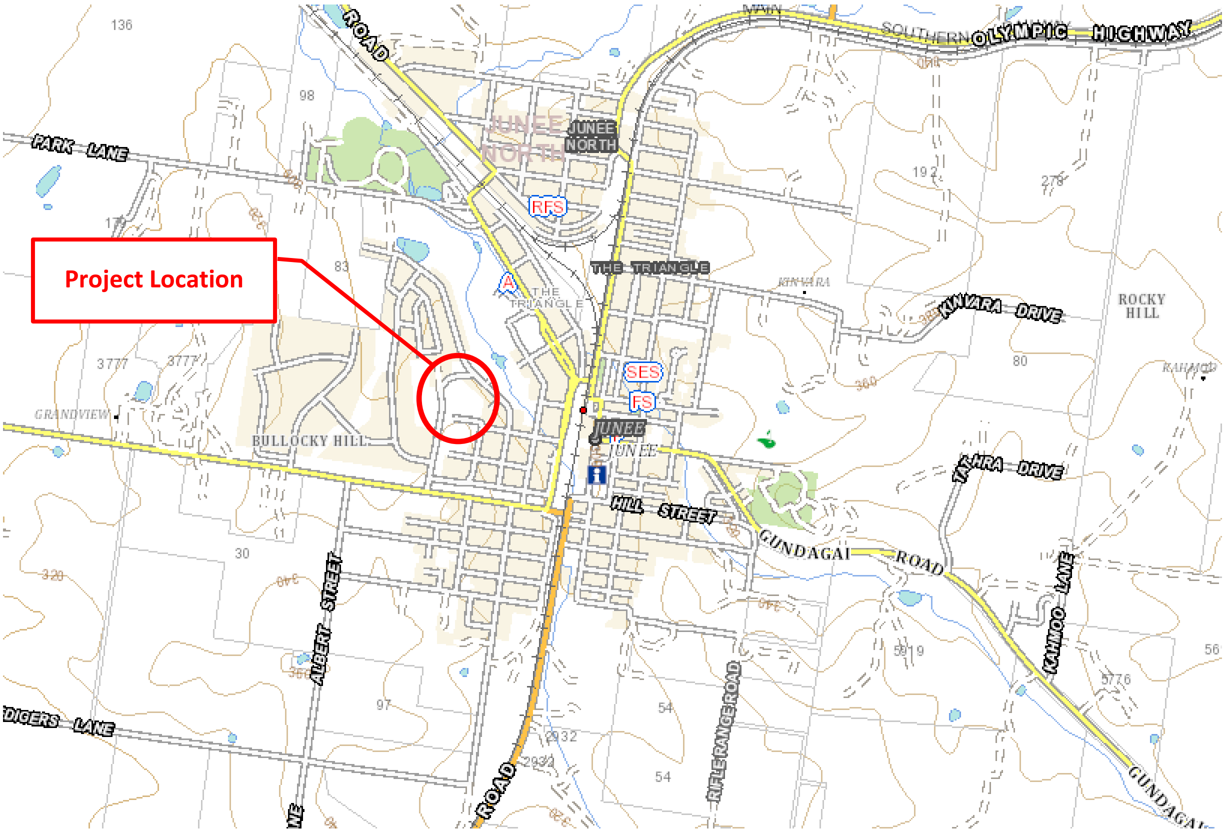

Figure 4 – Site Overview, Junee NSW

The proposed strategic access options include the below:

- Option 1 – A single point of network access via Kitchener Street/Anzac Ave

Figure 5 – Option 1 Access Locations

- Option 2 – A single point of network access via John Potts Drive.

Figure 6 – Option 2 Access Location

4.2 Project Context

Table 4 – Project Context

Prompts	Comments
What is the reason for the project? Is there specific crash type risk? Is it addressing specific issues such as poor speed limit compliance, road access, congestion, future traffic growth, freight movement, amenity concerns from the community, maintenance/asset renewal, etc.	- There is a proposed residential subdivision development creating 43 Torrens title lots - Provide safe integration, limiting impact to the existing network. - Maintain (or improve) general road user safety - Improve and better manage the increasing traffic volumes due to the subdivision - Improve pedestrian safety accommodating desire lines and increasing volumes. - There is no evident crash type existing in the current environment, however, vulnerable road users associated with the school zone and shared path network as well as intersection adjustments are a primary consideration.
What is the function of the road? Consider location, roadside land use, area type, speed limit, intersection type, presence of parking, public transport services and vehicle flows. What traffic features exist nearby (e.g., upstream and downstream)? What alternative routes exist?	- Either of the adopted access locations will connect to the development of the existing network, inherently introducing additional traffic movements. - The Saint Joseph's Catholic Church influences the operation of the network during morning and afternoon peak times. There is a notable risk but also significant opportunity associated with this factor.
What is the speed environment? What is the current speed limit? Has it changed recently? Is it similar to other roads of this type? How does it compare to Safe System speeds? What is the acceptability of lowering the speed limit at this location?	- The speed environment at the Option 1 access location is low, particularly in the Option 1 location where the existing through movement is a right-angled turn from/to Anzac Ave to Kitchener Street (operating speed estimated to be 20-30km/h) currently posted at 50km/h - The speed environment at the Option 2 access location is low-moderate where existing through movements are a continuous straight unimpeded flow along John Potts Drive currently posted at 50km/h.
What road users are present? Consider the presence of elderly pedestrians, school children and cyclists. What is the vehicle composition? Consider the presence of heavy vehicles (and what type), motorcyclists and other vehicles using the roadway. Also note what facilities are available to vulnerable road users (e.g. signalised crossings, bicycle lanes, school speed limits, etc.)	- The intersection has several road user types including, light rigid trucks, school buses, cars, motorcyclists, pedal cyclists, and pedestrians (most of which were observed or rightfully have access to this part of the network). - St Joseph’s Primary School bus zone is located 300m south of the Kitchener Street / Anzac Drive intersection.

4.3 Proposed Works

4.3.1 Existing Conditions Anzac Ave and Kitchener Street

Figure 7 – Existing Conditions – Kitchener Street/Anzac Drive proposed access.

4.3.2 Design Option 1 – (access via Kitchener Street/Anzac Drive)

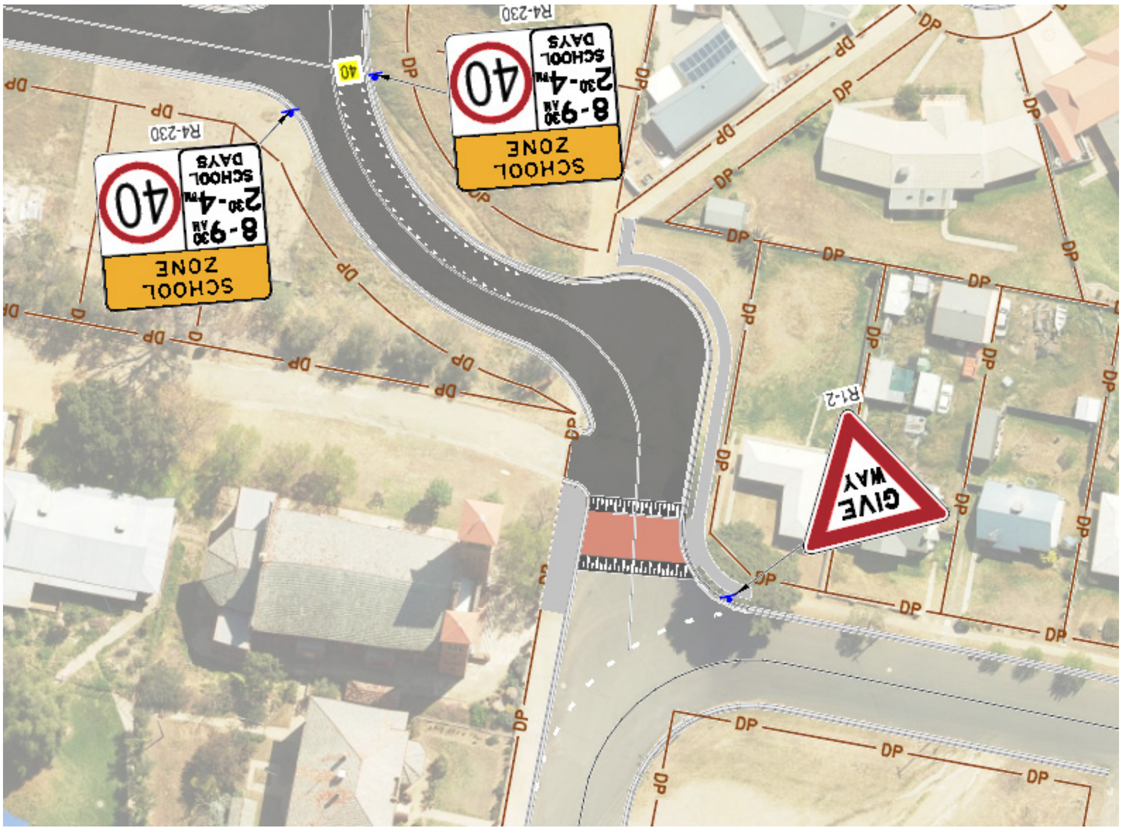

Figure 8 – Option 1 (access via Kitchener Street/Anzac Drive)

4.3.3 Existing Conditions John Potts Drive

Figure 9 – Existing Conditions – John Potts Dr and Vacant Block (Road No.1) proposed access.

4.3.4 Design Option 2 – (access via John Potts Dr)

Figure 10 – Option 2 (access via John Potts Dr)

4.4 Primary Considerations

Complimentary to the Safe Systems Approach, the following primary factors are evident for consideration concerning this project.

4.4.1 Road Safety Audit (and recommendations)

A Road Safety Audit was previously undertaken by Rigore, *RES2305.40.115 Junee Subdivision - Road Safety Audit and Recommendations Report.* This report has provided insight into the following items, which have been considered in the preparation of this Safe Systems Assessment:

- **Introduction and Project Description** – an overview of the project context and the engagement, client details and purpose of the engagement;
- **Primary Considerations** – including the relationship between vehicle speed and the likelihood of severe injury, influence of impact angle and travel speed on transferable kinetic energy, sight distance requirements (SISD, ASD, SSD, CSD);
- **Risk Assessment** – including the adopted methodology and risk assessment framework;
- **Audit Results** – including the general observations and identified risk;
- **Recommendations** – including the recommended treatments/countermeasures to improve road safety outcomes and the associated residual risk rating.

4.4.2 Traffic Impact Statement

A Traffic Impact Statement has been provided by Ason Group, *Traffic Impact Statement – Residential Subdivision Application John Potts Drive, Junee, dated 21/07/2023.* This report has provided insight into the following items, which have been considered in the preparation of this Safe Systems Assessment:

- **Consultation –** including discussions with Council representatives on site;
- **Scope of Assessment –** including report limitations: assessment of construction traffic, road design, road safety audit (this document) and safe system assessment;
- **Existing Conditions –** including land use, public transport, active transport, road network, crash history and network traffic volumes;
- **Operational Traffic Assessment –** including assessment scenarios (options), trip generation and distribution and network performance;
- **Parking Considerations –** resident parking and visitor parking;
- **Summary and Recommendations –** key findings and conclusion; and
- **Appendices –** road safety assessment (this document and safe systems and separately prepare safe systems assessment).

5. Assessment of Project Design Options

5.1 Assessment Summary

The Safe System Assessment Matrix scores for the existing conditions and the proposed design options are shown in Table 5. The scores for each crash type are shown in Figure 11 and Figure 12. The detailed assessments are presented in Section 5.2.

Table 5 – SSA Matrix Scores for the Project

Option	Description	Score
Option 1	Access via Kitchener Street/Anzac Ave	6.25 / 448
Option 2	Access via John Potts Drive.	10.5 / 448

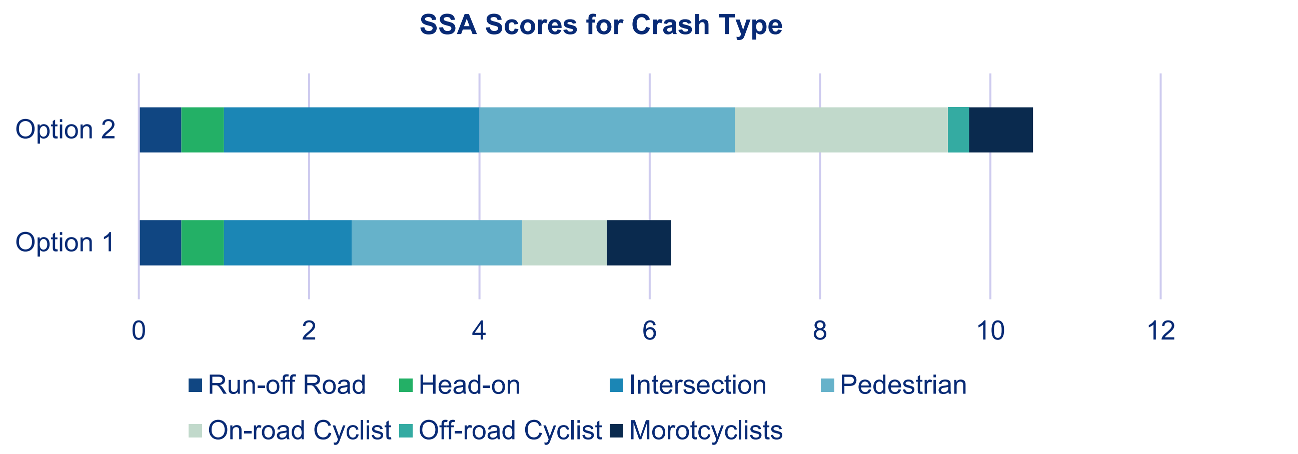

Figure 11 – SSA Scores for Crash Types

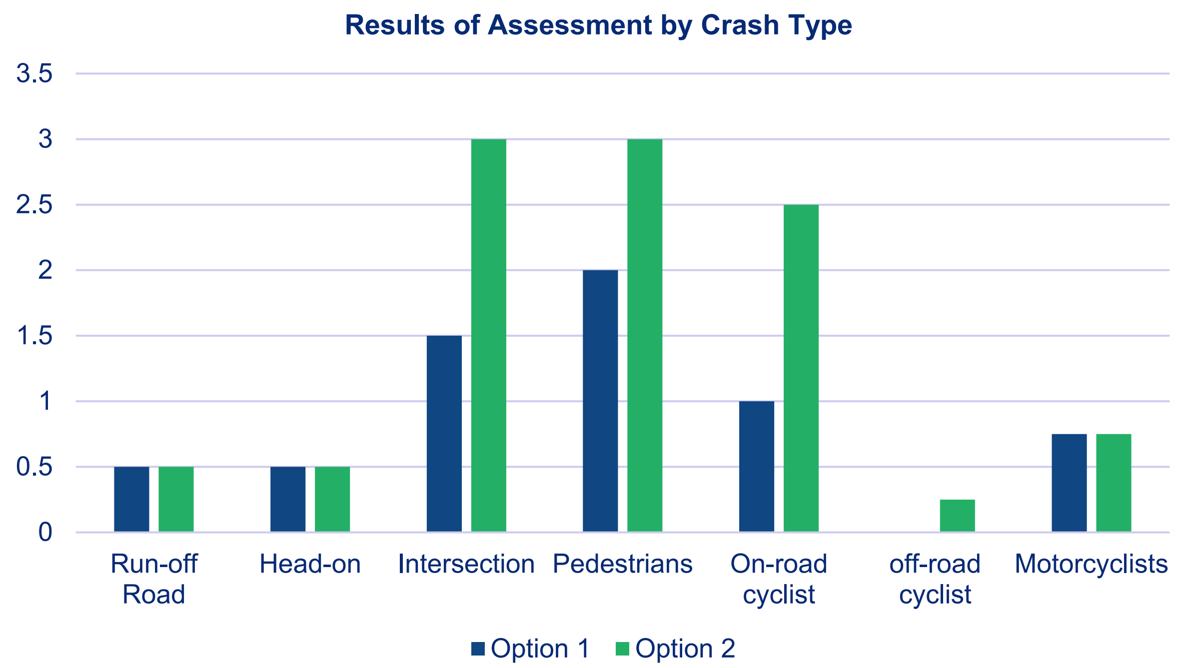

Figure 12 – Results of Assessment by Crash Types

5.2 Safe System Assessment Matrices

5.2.1 Design Option 1 – Single point access

LEGEND:

Normal Text: Factors between the existing conditions (baseline) and this option.

Red Text: New or significantly altered in this option when compared to the existing conditions.

Table 6 – SSA Matrix Option 1

	Run-off road	Head-on	Intersection	Pedestrian	On-road Cyclist	Off-road Cyclist	Motorcyclists
Exposure Comments	AADT <1000 (based of Ason TIS)	AADT <1000 (based of Ason TIS)	<40 veh/hr in AM and PM peaks (based of Ason TIS)	10-50 units a day (assumed)	<10 units a day (assumed)	<10units a day (assumed)	<10 units a day (assumed)
Exposure Score	**0.5/4**	**0.5 /4**	**1/4**	**2/4**	**0.5/4**	**0/4**	**0.5/4**
Likelihood Comments	**Factors that increase the likelihood include:** - Negligible change to existing. **Factors that decrease the likelihood include:** - Increased urbanisation of environment of access intersection - Increased signage and delineation of access intersection (control of priority) - Threshold treatment (speed calming and visual queues)	**Factors that increase the likelihood include:** - Negligible change to existing. **Factors that decrease the likelihood include:** - Increased urbanisation of environment of access intersection - Increased signage and delineation of access intersection (control of priority) - Threshold treatment (speed calming and visual queues)	**Factors that increase the likelihood include:** - Increase trip generation/additional movements within the access intersection (inherent of urban development). **Factors that decrease the likelihood include:** - Increased urbanisation of environment of access intersection - Increased signage and delineation of access intersection (control of priority) - Threshold treatment (speed calming and visual queues)	**Factors that increase the likelihood include:** - Existing pedestrian crossing locations will be exposed to Increase trip generation/additional movements within the access intersection (inherent of urban development). **Factors that decrease the likelihood include:** - Increased urbanisation of environment of access intersection - Increased signage and delineation of access intersection (control of priority) - Threshold treatment (speed calming and visual queues)	**Factors that increase the likelihood include:** - Increase trip generation/additional movements within the access intersection (inherent of urban development). **Factors that decrease the likelihood include:** - Increased urbanisation of environment of access intersection - Increased signage and delineation of access intersection (control of priority) - Threshold treatment (speed calming and visual queues)	**Factors that increase the likelihood include:** - None (no off road facilities available). **Factors that decrease the likelihood include:** - None	**Factors that increase the likelihood include:** - Increase trip generation/additional movements within the access intersection (inherent of urban development). **Factors that decrease the likelihood include:** - Increased urbanisation of environment of access intersection - Increased signage and delineation of access intersection (control of priority) - Threshold treatment (speed calming and visual queues)
Likelihood Score	**0.5/4**	**0.5/4**	**1/4**	**1/4**	**0.5/4**	**0/4**	**0.5/4**
Severity Comments	**Factors that increase the Severity include:** - None **Factors that decrease the severity include:** - Threshold treatment (speed calming and visual queues), reduces kinetic energy transfer and likely trauma.	**Factors that increase the Severity include:** - None **Factors that decrease the severity include:** - Threshold treatment (speed calming and visual queues), reduces kinetic energy transfer and likely trauma.	**Factors that increase the Severity include:** - None **Factors that decrease the severity include:** - Threshold treatment (speed calming and visual queues), reduces kinetic energy transfer and likely trauma.	**Factors that increase the Severity include:** - None **Factors that decrease the severity include:** - Threshold treatment (speed calming and visual queues), reduces kinetic energy transfer and likely trauma.	**Factors that increase the Severity include:** - None **Factors that decrease the severity include:** - Threshold treatment (speed calming and visual queues), reduces kinetic energy transfer and likely trauma.	**Factors that increase the Severity include:** - None (no off road facilities available). **Factors that decrease the severity include:** - None	**Factors that increase the Severity include:** - None **Factors that decrease the severity include:** - Threshold treatment (speed calming and visual queues), reduces kinetic energy transfer and likely trauma.
Severity Score	**1/4**	**1/4**	**1.5/4**	**2/4**	**2/4**	**0/4**	**1.5/4**
Product	**0.5/64**	**0.5/64**	**1.5/64**	**2/64**	**1/64**	**0/64**	**0.75/64**
						TOTAL	**6.25/448**

5.2.2 Design Option 2 – Two separate accesses

LEGEND:
Normal Text: Factors between the existing conditions (baseline) and this option.
Red Text: New or significantly altered in this option when compared to the existing conditions.

Table 7 – SSA Matrix Option 2

	Run-off road	Head-on	Intersection	Pedestrian	On-road Cyclist	Off-road Cyclist	Motorcyclists
Exposure Comments	AADT <1000 (based of Ason TIS)	AADT <1000 (based of Ason TIS)	<40 veh/hr in AM and PM peaks (based of Ason TIS)	10-50 units a day (assumed)	<10 units a day (assumed)	<10units a day (assumed)	<10 units a day (assumed)
Exposure Score	**1/4**	**1/4**	**2/4**	**1/4**	**0.5/4**	**0/4**	**0.5/4**
Likelihood Comments	**Factors that increase the likelihood include:** - Introduction of a fourth leg to the intersection increase conflict points. **Factors that decrease the likelihood include:** - Increased signage and delineation of access intersection (control of priority) - Threshold treatment (speed calming and visual queues)	**Factors that increase the likelihood include:** - Introduction of a fourth leg to the intersection increase conflict points. **Factors that decrease the likelihood include:** - Increased signage and delineation of access intersection (control of priority) - Threshold treatment (speed calming and visual queues)	**Factors that increase the likelihood include:** - Introduction of a fourth leg to the intersection increase conflict points. - The steep downgrade may introduce brake failure or loss of control. **Factors that decrease the likelihood include:** - Increased signage and delineation of access intersection (control of priority) - Threshold treatment (speed calming and visual queues)	**Factors that increase the likelihood include:** - Increased pedestrian movements across John Potts drive to (inherent of urban development). **Factors that decrease the likelihood include:** - Increased signage and delineation of access intersection (control of priority) - Threshold treatment (speed calming and visual queues)	**Factors that increase the likelihood include:** - The steep downgrade may introduce loss of control. **Factors that decrease the likelihood include:** - Increased signage and delineation of access intersection (control of priority) - Threshold treatment (speed calming and visual queues)	**Factors that increase the likelihood include:** - Increased generation of movements trying to access the shared path/off-road network near wetlands. **Factors that decrease the likelihood include:** - The proximity/awareness of the shared path/off-road network may increase awareness.	**Factors that increase the likelihood include:** - Increase trip generation/additional movements within the access intersection (inherent of urban development). **Factors that decrease the likelihood include:** - Increased signage and delineation of access intersection (control of priority) - Threshold treatment (speed calming and visual queues)
Likelihood Score	**0.5/4**	**0.5/4**	**1.5/4**	**1.5/4**	**1/4**	**0.5/4**	**0.5/4**
Severity Comments	**Factors that increase the Severity include:** - None **Factors that decrease the severity include:** - Threshold treatment (speed calming and visual queues), reduces kinetic energy transfer and likely trauma.	**Factors that increase the Severity include:** - None **Factors that decrease the severity include:** - Threshold treatment (speed calming and visual queues), reduces kinetic energy transfer and likely trauma.	**Factors that increase the Severity include:** - None **Factors that decrease the severity include:** - Threshold treatment (speed calming and visual queues), reduces kinetic energy transfer and likely trauma.	**Factors that increase the Severity include:** - None **Factors that decrease the severity include:** - Threshold treatment (speed calming and visual queues), reduces kinetic energy transfer and likely trauma.	**Factors that increase the Severity include:** - Speed grade may increase speed of impact/ kinetic energy transfer. **Factors that decrease the severity include:** - Threshold treatment (speed calming and visual queues), reduces kinetic energy transfer and likely trauma.	**Factors that increase the Severity include:** - Speed grade may increase speed of impact/ kinetic energy transfer. **Factors that decrease the severity include:** - None	**Factors that increase the Severity include:** - None **Factors that decrease the severity include:** - Threshold treatment (speed calming and visual queues), reduces kinetic energy transfer and likely trauma.
Severity Score	**1/4**	**1/4**	**2.0/4**	**2/4**	**2.5/4**	**0.5/4**	**1.5/4**
Product	**0.5/64**	**0.5/64**	**3/64**	**3/64**	**2.5/64**	**0.25/64**	**0.75/64**
						TOTAL	**10.5/448**

6. Treatments to Improve Safe System Alignment

Table 8, Table 9 and Table 10 list treatments that will improve the Safe System alignment of the project.

Primary treatments are those measures that have the potential to eliminate or come close to eliminating the risk of fatal and serious injury (FSI) crashes.

Supporting treatments are effective in reducing the risk of FSI crashes but not to the extent of primary treatment (i.e., there is a residual moderate or significant FSI crash risk). Implementation of a primary treatment should be given priority over a supporting treatment that may be targeting a similar crash risk.

Table 8 – Primary Treatments

Treatments for Consideration	Option
Nil	N/A

Table 9 – Supporting Treatments

Treatments for Consideration	Option
Adequate artificial lighting should be provided at the adopted access location	ALL

Table 10 – Other Treatments (General)

Treatments for Consideration	Option
Consultation with the surrounding community and school	ALL

7. Additional Safe Systems Components

As part of this SSA, consideration has been given to other components that comprise the Safe System i.e., road users, vehicles, and post-crash care. Issues identified as relevant to this project are listed in Table.

Table 11 – Other Safe System Components

Pillar	Prompts	Comments
Road User	*Are road users likely to be alert and compliant? Are there factors that might influence this?* *What are the expected compliance and enforcement levels (alcohol/drugs, speed, road rules and driving hours)? What is the likelihood of driver fatigue? Can enforcement activities be conducted safely?* *Are there special road users (e.g., entertainment precincts, elderly, children, on-road activities, motorcyclist route), distractions by environmental factors (e.g., commerce, tourism) or risk-taking behaviours?*	The proposed access locations are within an urban environment where road users are reasonably expected to be alert. The presence of children in the AM and PM peaks within this part of the surrounding network is represented by the existing conditions. The St Joseph's Catholic operation may require specific consideration during events such as weddings and funerals where a greater than usual network demand may be present.
Vehicles	*What level of alignment is there with the ideal of safer vehicles?* *Are there factors that may attract large numbers of unsafe vehicles? Is the percentage of heavy vehicles too high for the proposed / existing road design? Is this route used by recreational motorcyclists?* *Are there resources in the area to detect non-roadworthy, overloaded, or unregistered vehicles and thus remove them from the network? Can enforcement activities be undertaken safely?* *Has vehicle breakdown been catered for?*	Both access locations proposed are restricted to moderate-light vehicles only. The roadside environment is built up with kerb and gutter and wide shoulders for vehicles to safely pull over and park.
Post-crash Care	*Are there issues that might influence safe and efficient post-crash care in the event of a severe injury (e.g., congestion, access, stopping space)?* *Do emergency and medical services operate as efficiently as possible?* *Are other road users and emergency response teams protected during a crash event? Are drivers provided the correct information to address travelling speeds on the approach and adjacent to the incident? Is there reliable information available via radio, VMS etc?* *Is there provision for e-safety (i.e., safety systems based on modern information and communication technologies, C-ITS)?*	The proposed development access is located in Junee. The closest medical centre is Junee District Hospital which is located 1.2km from the site. There are available detour routes if needed post-crash.

8. Conclusions

The project team have assessed the proposed options utilising the Safe System Assessment process outlined within Austroads Safe System Assessment Framework (Austroads 2016, Research Report AP-R509-16, Safe System Assessment Framework).

The Safe Systems Assessment undertaking has demonstrated that not only is the proposed development typical of expected changes to the network behaviour but it has also demonstrated that there is a negligible foreseeable change to the road safety performance regardless of the adopted access option, although marginally in favour of Option 1 as detailed herein.

There has been no notable risk identified that may result in a fatal or serious injury should Option 1 be implemented. Option 1 also presents the opportunity to address outlying issues related to the quality and adequacy of the infrastructure related to the St Josephs School Zone and operations.

In summary, we recommend that Option 1, access via Kitchener St and Anzac Ave be considered the preferred location for network integration.