Safe System Assessment

Nicholson Street

Image credit: Streets Alive Yarra

Prepared by: Streets Alive Yarra Inc.

streets-alive-yarra.org

Foreword

Streets Alive Yarra is a non-profit, volunteer, resident and ratepayer action group with a vision for more trees, wider footpaths and vibrant businesses in thriving neighbourhoods. We see our streets being used by people from all ages, irrespective of whether they choose to walk, cycle, use public transport or drive. Residents and shoppers are able to move safely, comfortably, and conveniently around Yarra; and can easily find a park near shops.

Image credit: OCULUS Landscape Architecture and Urban Design

Streets Alive Yarra was founded in 2017 and now has over 2,600 likes on Facebook. A network of local champions develops concepts and proposals for how to improve their local street or precinct. Streets Alive Yarra is also Yarra's Walkability Action Group (WAG) representative for Victoria Walks.

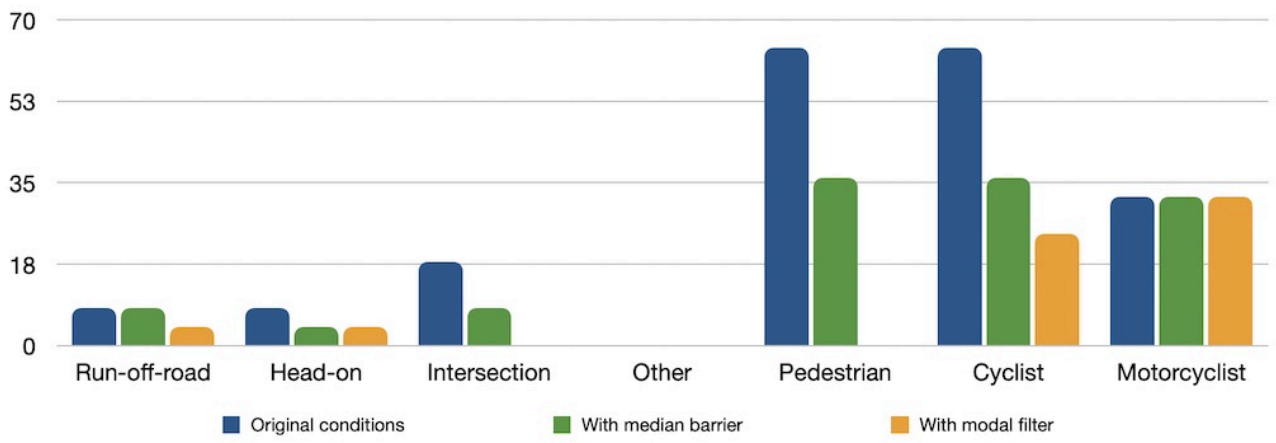
Further information is available at: streets-alive-yarra.org/about.

Summary

Safe System is the core of the *National Road Safety Strategy 2011–2020* and the *Victorian Road Safety Strategy 2021-2030*. The procedure for undertaking a Safe System Assessment is outlined in the Austroads publication *AP-R509-16 Safe System Assessment Framework* and the VicRoads publication *Safe System Assessment Guidelines V1.0 July 2018*. An assessment results in a score out of 448, with a lower score being better, aligning with Towards Zero.

This Safe System Assessment examines the original conditions at Langridge-Nicholson-Mollison, with the area of interest extending 20 metres to the north and south, past the side streets. Two treatment options were also assessed; a median barrier or a modal filter. Results are summarised in the table and chart below.

Treatment	Safe System Assessment Score
Original conditions - no median	194 / 448
With median barrier	124 / 448
With modal filter	64 / 448



The Safe System assessment shows that the ‘Original Conditions’ treatment is worst aligned with Safe System, while the ‘With Median Barrier’ offers improvements and the ‘With Modal Filter’ treatment offers the best outcome.

Based on these results, Streets Alive Yarra recommends that the median barrier be reinstated.

Background

VicRoads describes Safe System as:

> The Safe System is a road safety philosophy that is based on the principles that road users are fallible and will make mistakes but that no one should be killed or seriously injured when a crash occurs.
>
> To prevent this, the road system must be forgiving so that the forces of collisions do not exceed the limits that a human body can tolerate.

Source: https://www.vicroads.vic.gov.au/business-and-industry/technical-publications/safe-system-engineering

Safe System Assessment is a tool that has been developed to provide a measure of the extent to which a road infrastructure project aligns with Safe System principles and the ultimate objective of eliminating fatal and serious injuries from crashes on the road network.

This Safe System Assessment is a 'Rapid Assessment', conducted by a single person, Jeremy Lawrence, an engineer who has completed both Safe System Principles and Assessment Courses conducted by VicRoads and Safe System Solutions Pty Ltd. This aligns with a 'Level 1: Desktop' assessment, combined with a site visit.

Image credit: Jeremy Lawrence

Assessment framework

The Safe System Assessment was conducted for the original conditions of Nicholson Street in Abbotsford, at Langridge Street and Mollison Street. Nicholson Street is designated under the Smart Roads Road Use Hierarchy as a *Bicycle Priority Route,* but not a *Preferred Traffic Route (PTR)*. To provide context for the assessment, Austroads AP-R509-16 suggests the following prompts:

Austroads AP-R509-16 prompts	Comments
What road users are present? Consider the presence of elderly, school children and cyclists. Also note what facilities are available to vulnerable road users (e.g. signalised crossings, bicycle lanes, school zone speed limits, etc.).	• High volume of motor vehicles • High volume of cyclists and pedestrians
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)?	• Local street (not a Preferred Traffic Route) • Hosts residential and commercial properties • Speed limit of 40 km/h • On-street parking on both sides
What is the vehicle composition? Consider the presence of heavy vehicles (and what type), motorcyclists and other vehicles using the roadway.	• AADT is high, including approximately 5% heavy vehicle movements • Cycling expected • Walking expected • Standard composition of motorcyclists expected (1%)
What is the reason for the project? Is there a 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, etc.	• Consider right-hook collisions between motor vehicles and people walking or cycling • Consider dooring collisions, between people exiting parked cars and people cycling • Locals report an unwillingness to cycle or to allow their children to cycle along the street • Congestion is a problem during peak hours

The Austroads Safe System framework uses a risk assessment approach to assess different major crash types against the *exposure* to that crash risk, the *likelihood* of it occurring and the *severity* of the crash should it occur. These three attributes form the rows of the matrix.

When quantifying alignment with Safe System principles, reference is made to AP-R509-16 Table 4.4 which is reproduced below:

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.

Image credit: Austroads

Original conditions

Original conditions on Nicholson Street can be seen in the following photo.

Nicholson Street, looking south, near Mollison. Image credit: Google Maps

Notes:

- Speed limit is 40 km/h
- People exiting parked vehicles can fail to give way to people cycling (i.e. creating the hazard of dooring) with a risk of death or serious injury, e.g. if the person cycling is knocked off and is struck by an upcoming moving vehicle
- People driving can fail to leave sufficient clearance when overtaking people cycling (paint is not a barrier to driving in the bicycle lane), thus causing a collision (i.e. creating a hazard) with a risk of death or serious injury
- People driving and making a right turn from Nicholson into either Langridge or Mollison, can collide with people crossing the side street by walking or cycling, with a risk of death or serious injury
- People driving and entering Nicholson (from either Langridge or Mollison) can collide with people crossing Langridge or Mollison, with a risk of death or serious injury. The risk is greater for right turns, as drivers need to check in two directions.

Treatment option - with median barrier

One treatment option is to install a median barrier along Nicholson Street, between Langridge and Mollison.

Image credit: Streets Alive Yarra

Notes:

- U-turns at either end of the median barrier are prohibited
- Median barrier can be crossed by an emergency vehicle
- North-south through traffic is unimpeded
- Risk of dooring is retained
- Risk of overtaking/colliding is retained
- Risk of right turn collisions (exiting or entering Nicholson) is eliminated
- If drivers choose to make an illegal U-turn, it can be expected that they will reduce their speed before doing so (because it is difficult to make a U-turn at 40 km/h), thus decreasing the severity of any collision

Treatment option - with modal filter

Another treatment option is to install a modal filter on Nicholson Street, between Langridge and Mollison. Asphalt can be converted to space for grass and trees.

Possible modal filter at Langridge/Nicholson/Mollison. Image credit: Nearmap and Streets Alive Yarra.

Notes:

- Motor traffic approaching from all four directions would turn around
- Traffic volumes on Langridge, Nicholson and Mollison would decrease significantly
- People walking and cycling would be unimpeded
- Risk of dooring is retained (away from the intersection)
- Risk of overtaking/colliding is eliminated (between Langridge and Mollison)
- Risk of right turn collisions (exiting or entering Nicholson) is eliminated
- Risk of U-turns is eliminated (compared with median barrier)
- New public open space is made available for grass and trees, and optionally to support increased outdoor dining at the ‘Three Bags Full’ cafe.

Safe System Assessment Matrix

Original conditions:

	Run-off-road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
Exposure (out of 4)	For run-off-road crash types, AADT is greater than 10,000 vehicles per day (Austroads trigger).	For head-on crash types, AADT is greater than 10,000 vehicles per day (Austroads trigger).	For intersection crash types, AADT is greater than 10,000 vehicles per day (Austroads trigger).	For other crash types, AADT is greater than 10,000 vehicles per day (Austroads trigger).	For pedestrian crash types, pedestrian volumes are greater than 100 units per day (Austroads trigger).	For cyclist crash types, cyclist volumes are expected to be > 100 units per day (Austroads trigger).	For motorcycle crash types, motorcycle volumes are expected to be greater than 100 units per day (Austroads trigger), based on 1% of total traffic).
	2	2	2	0	4	4	4
Likelihood (out of 4)	Factors that increase the likelihood include: - driver distraction (looking at mobile phone) Factors that decrease the likelihood include: - straight alignment	Factors that increase the likelihood include: - lack of median separation - driver distraction (looking at mobile phone) Factors that decrease the likelihood include: - straight alignment	Factors that increase the likelihood include: - lack of median separation - driver distraction (looking at mobile phone) Factors that decrease the likelihood include: - straight alignment	Not applicable	Factors that increase the likelihood include: - lack of footpath continuing at grade across Mollison (drivers fail to give way) - driver distraction (looking at mobile phone) Factors that decrease the likelihood include: - footpath continuing at grade across Langridge (drivers slow down)	Factors that increase the likelihood include: - lack of protected intersections - lack of protected bicycle lane - dooring via on-street parking - driver distraction (looking at mobile phone) Factors that decrease the likelihood include: - n/a	Factors that increase the likelihood include: - driver distraction (looking at mobile phone) Factors that decrease the likelihood include: - n/a
	2	2	3	0	4	4	2
Severity (out of 4)	Factors that increase the severity include: - road size hazards (poles) Factors that decrease the severity include: - painted bike lane - kerbs	Factors that increase the severity include: - n/a Factors that decrease the severity include: - n/a	Factors that increase the severity include: - right angle collisions are possible - speeding at night Factors that decrease the severity include: - n/a	Not applicable	Factors that increase the severity include: - bull-bars on vehicles - speed limit 40 km/h (i.e. > 30 km/h threshold) Factors that decrease the severity include: - good surface condition enabling emergency braking	Factors that increase the severity include: - bull-bars on vehicles - speed limit 40 km/h (i.e. > 30 km/h threshold) Factors that decrease the severity include: - good surface condition enabling emergency braking	Factors that increase the severity include: - road size hazards (poles) Factors that decrease the severity include: - n/a
	2	2	3	0	4	4	4
Product (out of 64)	8	8	18	0	64	64	32
Total (out of 448)	194						

With median barrier:

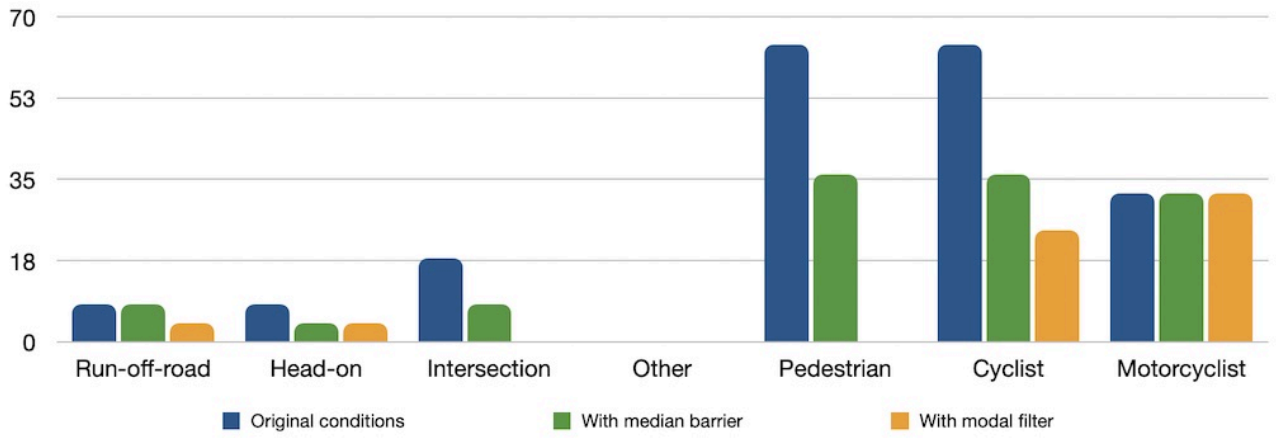
	Run-off-road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
Exposure	For run-off-road crash types, AADT is greater than 10,000 vehicles per day (Austroads trigger).	For head-on crash types, AADT is greater than 10,000 vehicles per day (Austroads trigger).	For intersection crash types, AADT is greater than 10,000 vehicles per day (Austroads trigger).	For other crash types, AADT is greater than 10,000 vehicles per day (Austroads trigger).	For pedestrian crash types, pedestrian volumes are greater than 100 units per day (Austroads trigger).	For cyclist crash types, cyclist volumes are expected to be > 100 units per day (Austroads trigger).	For motorcycle crash types, motorcycle volumes are expected to be greater than 100 units per day (Austroads trigger), based on 1% of total traffic).
	2	2	2	0	4	4	4
Likelihood	Factors that increase the likelihood include: - driver distraction (looking at mobile phone) Factors that decrease the likelihood include: - straight alignment	Factors that increase the likelihood include: - driver distraction (looking at mobile phone) Factors that decrease the likelihood include: - straight alignment - median barrier	Factors that increase the likelihood include: - driver distraction (looking at mobile phone) Factors that decrease the likelihood include: - straight alignment - median barrier prevents some collision types	Not applicable	Factors that increase the likelihood include: - lack of footpath continuing at grade across Mollison (drivers fail to give way) - driver distraction (looking at mobile phone) Factors that decrease the likelihood include: - footpath continuing at grade across Langridge (drivers slow down) - median barrier prevents some collision types	Factors that increase the likelihood include: - lack of protected intersections - lack of protected bicycle lane - dooring via on-street parking - driver distraction (looking at mobile phone) - drivers perform some illegal U-turns Factors that decrease the likelihood include: - median barrier prevents some collision types	Factors that increase the likelihood include: - driver distraction (looking at mobile phone) Factors that decrease the likelihood include: - n/a
	2	1	2	0	3	3	2
Severity	Factors that increase the severity include: - road size hazards (poles) Factors that decrease the severity include: - painted bike lane - kerbs	Factors that increase the severity include: - n/a Factors that decrease the severity include: - n/a	Factors that increase the severity include: - right angle collisions are possible - speeding at night Factors that decrease the severity include: - n/a	Not applicable	Factors that increase the severity include: - bull-bars on vehicles - speed limit 40 km/h (i.e. > 30 km/h threshold) Factors that decrease the severity include: - good surface condition enabling emergency braking	Factors that increase the severity include: - bull-bars on vehicles - speed limit 40 km/h (i.e. > 30 km/h threshold) Factors that decrease the severity include: - good surface condition enabling emergency braking	Factors that increase the severity include: - road size hazards (poles) Factors that decrease the severity include: - n/a
	2	2	2	3	3	3	4
Product	8	4	8	0	36	36	32
Total	124						

With modal filter:

	Run-off-road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
Exposure	For run-off-road crash types, AADT is greater than 10,000 vehicles per day (Austroads trigger).	For head-on crash types, AADT is greater than 10,000 vehicles per day (Austroads trigger).	For intersection crash types, AADT is greater than 10,000 vehicles per day (Austroads trigger).	For other crash types, AADT is greater than 10,000 vehicles per day (Austroads trigger).	For pedestrian crash types, pedestrian volumes are greater than 100 units per day (Austroads trigger).	For cyclist crash types, cyclist volumes are expected to be > 100 units per day (Austroads trigger).	For motorcycle crash types, motorcycle volumes are expected to be greater than 100 units per day (Austroads trigger), based on 1% of total traffic).
	2	2	2	0	4	4	4
Likelihood	Factors that increase the likelihood include: - n/a Factors that decrease the likelihood include: - modal filter prevents motor vehicle traffic between Langridge and Mollison	Factors that increase the likelihood include: - n/a Factors that decrease the likelihood include: - modal filter prevents motor vehicle traffic between Langridge and Mollison	Factors that increase the likelihood include: - n/a Factors that decrease the likelihood include: - modal filter prevents motor vehicle traffic through intersections	Not applicable	Factors that increase the likelihood include: - n/a Factors that decrease the likelihood include: - modal filter prevents motor vehicle traffic through intersections	Factors that increase the likelihood include: - lack of protected bicycle lane - dooring via on-street parking (away from modal filter) - driver distraction (looking at mobile phone) Factors that decrease the likelihood include: - modal filter prevents collisions at intersections	Factors that increase the likelihood include: - driver distraction (looking at mobile phone) Factors that decrease the likelihood include: - n/a
	1	1	0	0	0	2	2
Severity	Factors that increase the severity include: - road size hazards (poles) Factors that decrease the severity include: - painted bike lane - kerbs	Factors that increase the severity include: - n/a Factors that decrease the severity include: - n/a	Factors that increase the severity include: - right angle collisions are possible - speeding at night Factors that decrease the severity include: - n/a	Not applicable	Factors that increase the severity include: - bull-bars on vehicles - speed limit 40 km/h (i.e. > 30 km/h threshold) Factors that decrease the severity include: - good surface condition enabling emergency braking	Factors that increase the severity include: - bull-bars on vehicles - speed limit 40 km/h (i.e. > 30 km/h threshold) Factors that decrease the severity include: - good surface condition enabling emergency braking	Factors that increase the severity include: - road size hazards (poles) Factors that decrease the severity include: - n/a
	2	2	2	3	3	3	4
Product	4	4	0	0	0	24	32
Total	64						

The table & chart below summarise the assessments:

Treatment	Safe System Assessment Score
Original conditions - no median	194 / 448
With median barrier	124 / 448
With modal filter	64 / 448



The assessment shows that:

- ‘Original conditions’ delivers the worst outcome
- ‘With median barrier’ delivers a better outcome
- ‘With modal filter’ delivers the best outcome, aligned with Safe System

Recommendations

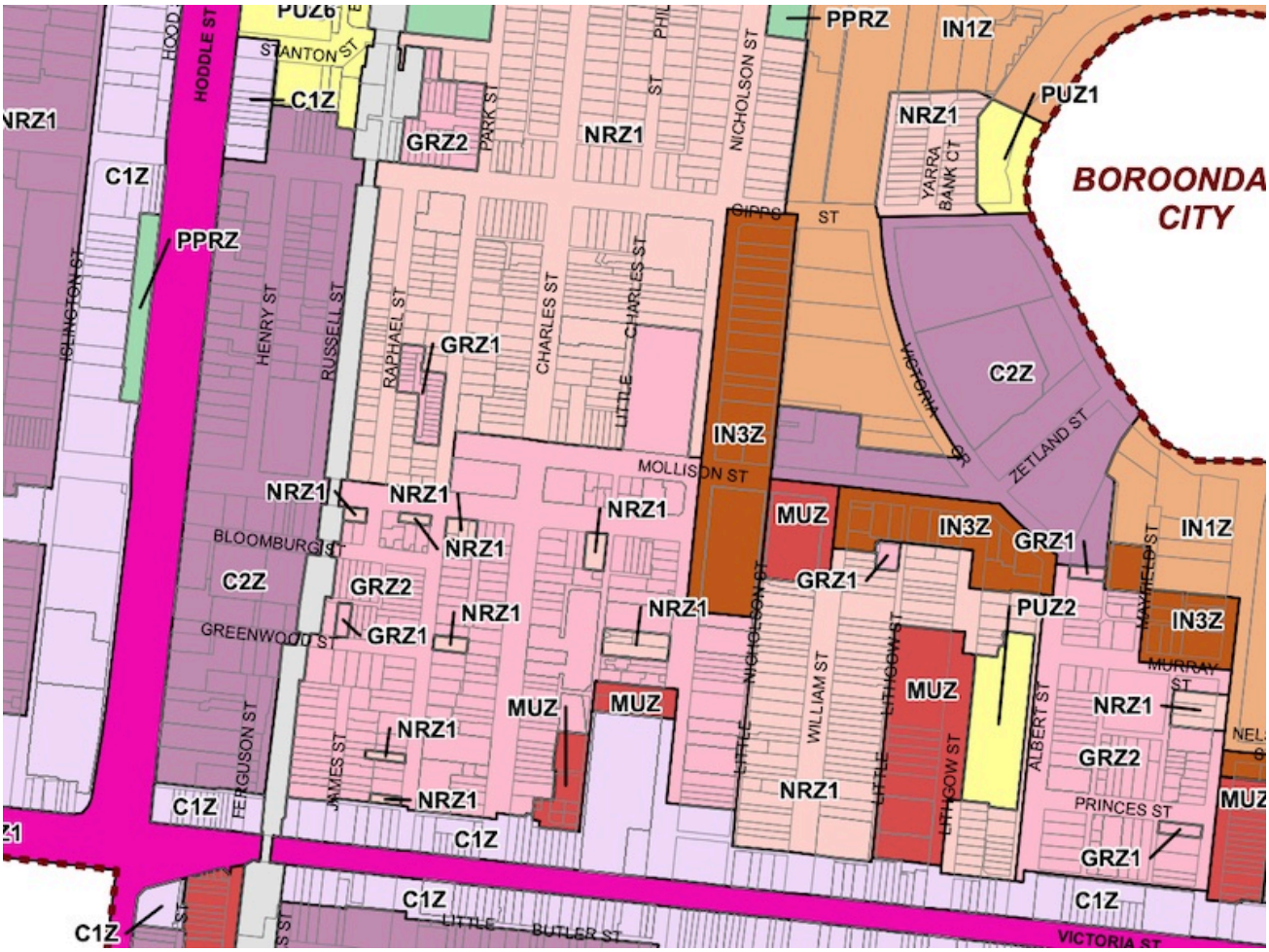
Streets Alive Yarra recommends that the City of Yarra:

- Re-instate the median barrier, or even better, install a modal filter
- Commit to using Safe System to assess overall risk of possible treatments

Median barrier on Nicholson Street. Image credit: Streets Alive Yarra.

Appendix A: Surrounding land use

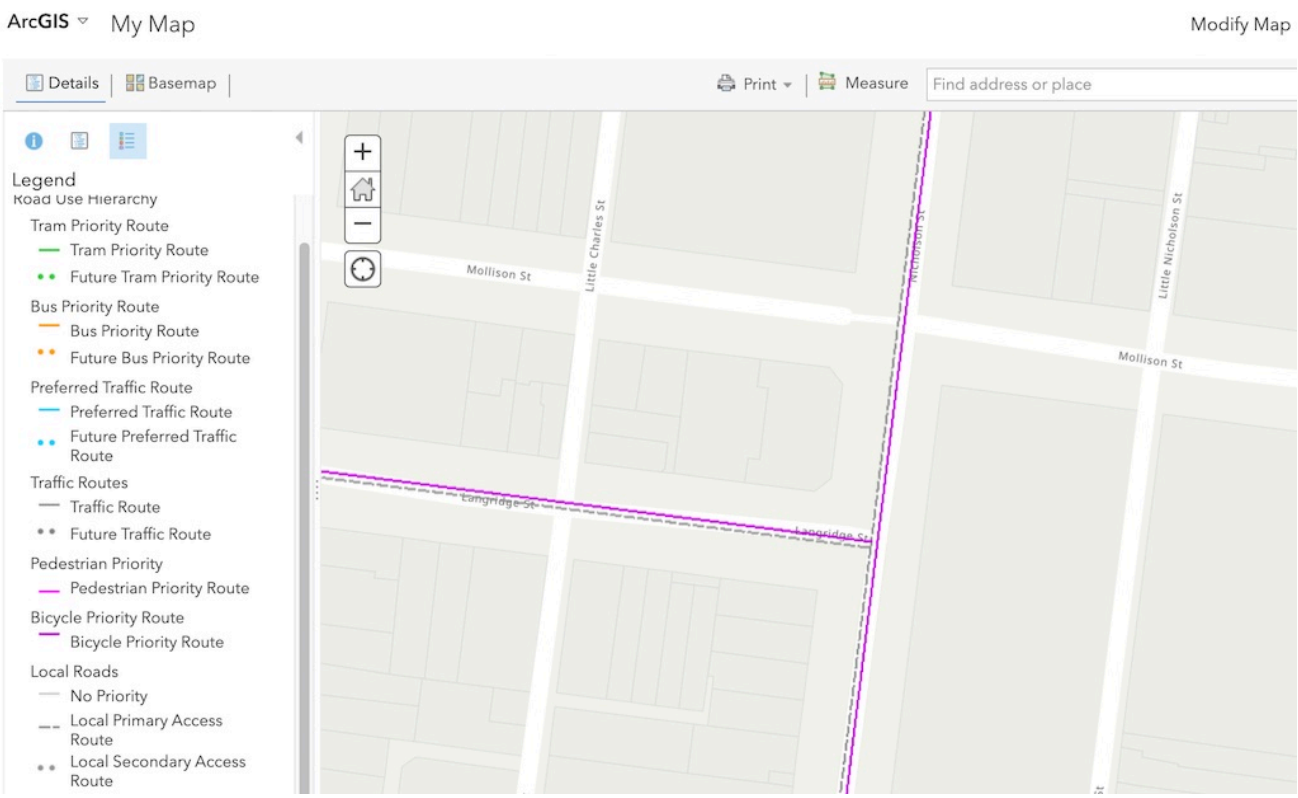
Nicholson Street, near Langridge and Mollison, is lined by residential (GRZ) and industrial (IN3Z) zones.



Source: https://planning-schemes.api.delwp.vic.gov.au/__data/assets/pdf_file/0008/484082/yarra06zn.pdf

Appendix B: Road hierarchy map

Nicholson Street is not a Preferred Traffic Route (PTR), but is a Bicycle Priority Route:



Source: VicRoads Map