RoadPro CONSULTING

Road Safety Audit
Existing Stage

Western Arterial Road
(Toowong – Everton Park)
Chainage 1.40km – 2.00km

Prepared for Department of Transport and Main roads (Metropolitan Region)

1 April 2025

Document control

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Road Safety Audit (Existing Stage): Western Arterial Road U18B (Toowong – Everton Park), Chainage 1.40km – 2.00km

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1 Introduction

This report presents the findings of an existing stage road safety audit conducted along a short section of Western Arterial Road (U18B), Bardon. The audit site was approximately 600m in length, extending from the southern side of the intersection with Rainworth Road to the northern side of the intersection with Hebe Street (approximate chainage 1.40km to 2.00km).

The Department of Transport and Main Road – Metropolitan Region (TMR) commissioned the road safety audit.

The audit was conducted by:

Darren Shirley	Senior Road Safety Auditor Principal Consultant, RoadPro Consulting
Luke Kidd	Senior Road Safety Auditor Engineering Consultant, RoadPro Consulting

1.1 Examination of available materials

The following documentation was made available to the audit team:

- Plans detailing recent road safety improvement works within the audit site (refer to **Appendix B**)
- Traffic volume data (refer to **Appendix C**)
- Road Crash 2 - Crash Detail Report between 1 May 2019 – 7 February 2025 (refer to **Appendix D**).

1.2 Abbreviations and acronyms

AADT	Annual Average Daily Traffic Volume
AGRD	*Austroads Guide to Road Design*
ASD	approach sight distance
DCA	definitions for coding accidents
MUTCD	*Manual of Uniform Control Devices*
RRPM	raised reflective pavement marker
TMR	Department of Transport and Main Roads

2 Background

Western Arterial Road (U18B) is a state-controlled road managed by TMR. The road provides a vital traffic carrying function that links Centenary Motorway (U18A) / Milton Road at the southern end to East-West Arterial (U19) / Everton Park – Albany Creek Road (900) at the northern end. Western Arterial Road (U18B) is strategically classified as a "Regional Road" *(TMR Listing of Roads by classification – 30 June 2024)*.

The 600m section of Western Arterial Road that is the subject of this road safety audit was located between the southern side of the intersection with Rainworth Road and the northern side of the intersection with Hebe Street (approximate chainage 1.40km to 2.00km). At this location the road passes through two closely spaced (oval shaped) roundabouts (referred to hereafter as southern and northern roundabouts).

At the time of the audit, the subject section of Western Arterial Road operated under a 60km/h regulatory speed limit. Traffic count data from 2022 indicates the AADT within the audit site was 22,612 vehicles per day.

Figures 1 and 2 illustrate the location and extent of the audit site.

SOURCE – TMR DISTRICT MAP

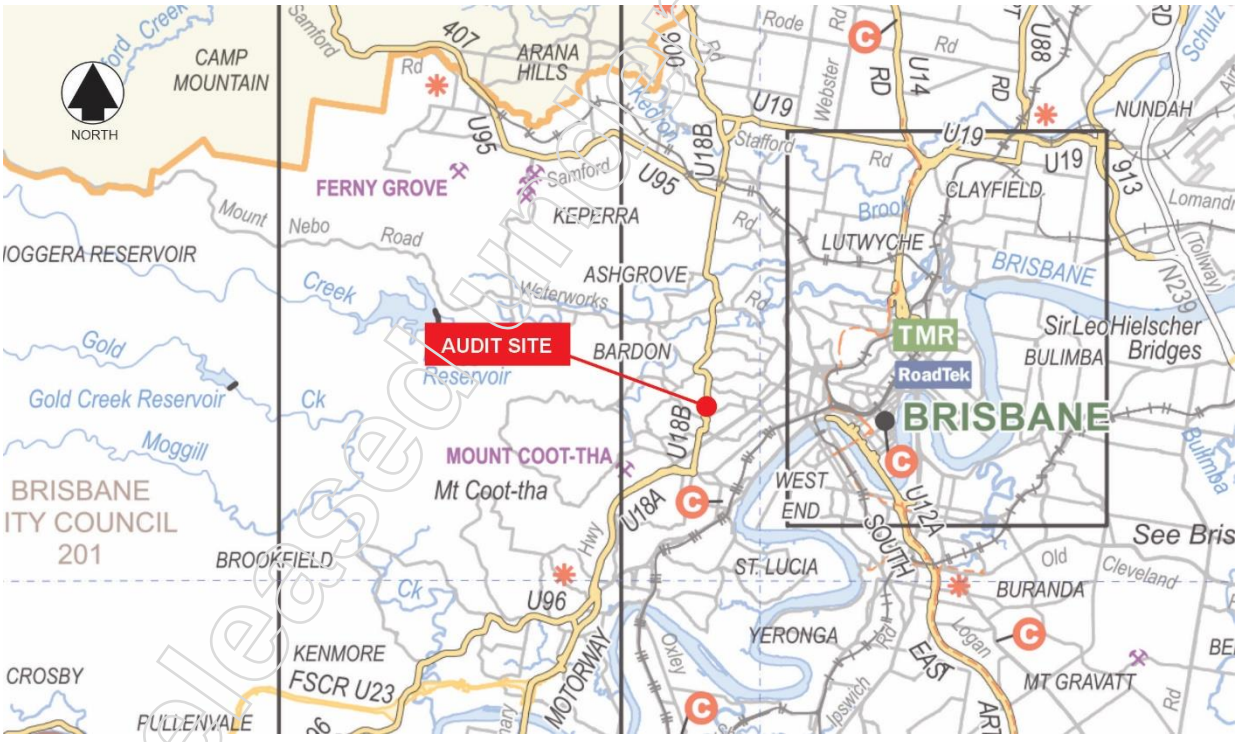


Figure 1: Location of audit site.

SOURCE – QUEENSLAND GLOBE

Figure 2: Extent of audit site.

3 Crash history

A search of the TMR's Road Crash 2 database indicates there have been 9 reported casualty crashes within the audit site within the period between 1 May 2019 to 7 February 2025.

A count of crashes by severity and DCA code is provided below in Table 1. The approximate location of crashes is illustrated in Figure 3.

Table 1: Number of crashes by Severity and DCA Code

DCA Code	DCA Description	Fatality	Hospitalisation	Medically Treated	Minor Injury	Total
001	Pedestrian: Near Side	0	0	0	1	**1**
104	Intersection: Thru-Right	0	1	0	0	**1**
301	Same direction: Rear End	0	0	4	1	**5**
302	Same direction: Left Rear	0	0	0	1	**1**
806	Off Path on Curve: Left Turn	0	0	1	0	**1**
	Totals:	**0**	**1**	**5**	**3**	**9**

SOURCE – QUEENSLAND GLOBE

Figure 3: Location of recorded crashes.

Key findings from of the crash report are:

- Seven of the nine crashes involved multiple vehicles at intersections
- Six of the nine crashes involved vehicles failing to slow or stop at intersections, resulting in 'rear-end' type incidents
- Five of the nine crashes resulted in vehicle occupants requiring medical treatment
- Seven of the nine crashes occurred during daylight hours
- Two of the nine crashes occurred when the pavement surface was wet
- One incident involved a pedestrian being struck at the only marked 'zebra' crossing located within the audit site (just prior to daylight at approximately 5am).

A copy of the crash reports is provided in **Appendix D**.

4 Entrance meeting

A formal entrance meeting was not held prior to commencing the audit. However, the audit team informally discussed the method of reviewing available data prior to undertaking the audit.

5 Site inspection

The audit team carried out a day and night inspection of the audit site on Tuesday 18th February 2025. The weather was fine and clear through the day and night inspections. Traffic

movements were driven in a Ford Ranger utility. Parts of the road were inspected on foot and digital photographs/video taken to capture site conditions. Details gathered during the site inspections, in conjunction with information supplied to the audit team, form the basis of the audit findings, which are detailed in subsequent sections of this report.

6 Audit findings

All issues identified during the road safety audit, along with suggested actions, are recorded in **Table 3**. The suggested actions are designed as a guide for the selection and implementation of remedial measures. They are not necessarily the only possible actions.

Based on the practice outlined in Section 10.5 from *AGRS Part 6: Road Safety Audit*, priority for remedial treatment has been allocated to each of the identified issues using a risk matrix of *Likelihood* versus *Severity* (refer to **Table 2** below). The priorities are categorised as follows:

- **Negligible** – no action required
- **Low** – should be corrected or the risk reduced if the treatment cost is low
- **Medium** – should be corrected or the risk significantly reduced, if the treatment cost is moderate, but not high
- **High** – should be corrected or the risk significantly reduced, even if the treatment cost is high
- **Extreme** – must be corrected regardless of cost.

Table 2: Priority (P) risk matrix (based on Figure 10.2 AGRS Part 6)

		Severity (S)*				
		Insignificant (Property damage)	**Minor** (Minor first aid)	**Moderate** (Major first aid, or presents to hospital)	**Serious**** (Admitted to hospital)	**Fatal**** (Death within 30 days of crash)
Likelihood (L)	**Almost Certain** (Once / quarter)	Medium	High	High	Extreme (FSI)	Extreme (FSI)
	Likely (Once / Quarter to 1 year)	Medium	Medium	High	Extreme (FSI)	Extreme (FSI)
	Possible (Once / 1 to 3 years)	Low	Medium	High	High (FSI)	Extreme (FSI)
	Unlikely (Once / 3 to 7 years)	Negligible	Low	Medium	High (FSI)	Extreme (FSI)
	Rare (Less than once / 7 years)	Negligible	Negligible	Low	Medium (FSI)	High (FSI)

* Severity is the likelihood of the outcome occurring

** Fatal / serious injury (FSI) severities exceed Safe System crash outcome threshold

For ease of reference, Western Arterial Road (U18B) is referenced to run north-south. The northbound direction is heading towards Ashgrove (Gazettal) and the southbound direction towards Toowong (Against Gazettal).

Road Safety Audit checklist

The following checklist, taken from Austroads' *Guide to Road Safety Part 6: Road Safety Audit*, provides an overview of potential safety issues identified during the audit.

Road alignment and cross section	☒
Visibility; sight distance	☒
Design speed	☐
Speed limit/speed zoning	☒
Overtaking	☐
Readability by driver	☐
Widths	☐
Shoulders	☐
Cross falls	☐
Batter slopes	☐
Drains	☒
Auxiliary lanes	☐
Tapers	☐
Shoulders	☐
Signs and markings	☐
Turning traffic	☐
Intersections	☒
Location	☐
Visibility; sight distance	☒
Controls and delineation	☒
Layout	☒
Miscellaneous	☐
Signs and lighting	☒
Lighting	☒
General sign issues	☒
Sign legibility	☒
Sign supports	☐
Markings and delineation	☒
General issues	☒
Centre lines, edge lines, lane lines	☒
Guide posts and reflectors	☐
Curve warning and delineation	☒
Crash barriers and clear zones	☒
Clear zones	☒
Crash barriers	☒
End treatments	☒
Fences	☐
Visibility of barriers and fences	☐

Traffic signals	☐
Operations	☐
Visibility	☐
Pedestrians and cyclists	☒
General issues	☒
Pedestrians	☒
Cyclists	☒
Public transport	☐
Bridge and culverts	☐
Design features	☐
Crash barriers	☐
Miscellaneous	☐
Pavement	☒
Pavement defects	☒
Skid resistance	☒
Ponding	☐
Loose stones/materials	☐
Parking	☐
General issues	☐
Provision for heavy vehicles	☒
Design issues	☒
Pavements/shoulder quality	☐
Floodways and causeways	☐
Ponding, flooding	☐
Safety of devices	☐
Miscellaneous	☐
Landscaping	☐
Temporary works	☐
Headlight glare	☐
Roadside activities	☐
Errant vehicles	☐
Other safety issues	☐
Rest areas	☐
Animals	☐

Table 3: Audit findings

Item no.	Audit findings	Suggested action	Priority
6.1 Road alignment and cross section			
6.1.1	There were 'crest' curves in the vertical alignment that diminished forward sight distance on Western Arterial Road on approaches to the southern and northern roundabouts. Refer 'Intersections' Item 6.3.1 and 6.3.2.	Refer Recommendations 6.3.1.1, 6.3.2.1 and 6.3.2.3.	
6.1.2	Although vehicle speeds were not measured during the site inspections, the audit team observed many vehicles entering/exiting and navigating the roundabouts within the audit site at what appeared to be excessive speed for the road geometry. Refer 'Intersections' Item 6.3.1 and 6.3.2.	Refer Recommendations 6.3.1.2 and 6.3.2.2.	

Item no.	Audit findings	Suggested action	Priority
6.1.3	There were a number of locations where a build-up of silt and grass/weeds in kerb and channel inverts was likely to prohibit unrestricted stormwater flow. It was also likely the build-up would cause stormwater to pond and potentially flow into the adjacent traffic lane, creating a safety hazard for cyclists and vehicular traffic. On the northbound approach to the southern roundabout (intersection with Rainworth Road), the issue was exacerbated by a series of steel plates and concrete ramps at property accesses – installed to minimise vehicles bottoming-out as they traversed the changing grade between the road surface and property driveways. In addition to impacting stormwater flow, the steel plates and concrete ramps could present a hazard to cyclists riding along the outer edge of the roadside.  **Photograph 1:** Example build-up of silt and grass/weeds in kerb and channel invert.	**Recommendation 6.1.3.1:** Arrange maintenance activities to clear all silt and grass/weed build-ups from drainage inverts throughout the audit site. Also, repair or remove damaged or dislodged pieces of concrete ramps. **Recommendation 6.1.3.2:** In conjunction with future upgrade works on Western Arterial Road, consider options to regrade surfaces that would allow the permanent removal of all steel plates and concrete ramps at property accesses. Prioritise action accordingly.	**L = Rare** **S = Serious** **P = Medium (FSI)**

Item no.	Audit findings	Suggested action	Priority
6.1.3 Cont'd.	 **Photograph 2:** Example of steel plate installed across kerb and channel invert at a property access. As well as the potential to block, the plates are a hazard for cyclists.  **Photograph 3:** Example of a damaged concrete ramp built across the drain invert at a property access. As well as the potential to block, the ramps are a hazard for cyclists.		

Item no.	Audit findings	Suggested action	Priority
6.2 Auxiliary lanes			
6.2.1	No issues with existing auxiliary lanes were identified during the audit.	No action.	
6.3 Intersections			
6.3.1	**Southern roundabout – Western Arterial Road / Rainworth Road / Runic Street / Boundary Road** There were a number of safety-related issues observed with the southern roundabout, including: • On the northbound approach to the intersection, there was a 'crest' curve in the vertical alignment on Western Arterial Road that limited forward sight distance to the roundabout. ASD to the holding line was approximately 65m from driver's eye height. Section 3 of AGRD Part 4B states that ASD *"should be provided to the holding line"*. Based on a reaction time of 2.0 seconds, Table 3.1 of AGRD Part 4A stipulates a minimum ASD of 92m for a design speed of 70km/h. Where ASD to the holding line is not possible, the absolute minimum requirement is ASD to the (approach) nose of the splitter island, as per Section 3.2.1 of AGRD Part 4B. • Due to the alignment of the circulating carriageway and shape of the central island, there was limited deflection of vehicle paths on several legs as vehicles entered the roundabout. The audit team observed many vehicles appearing to navigate at excessive speed relative to the existing geometry. Given the close spacing of some intersecting legs, and the high congestion observed during the PM peak, the higher speed of some vehicles could impact other driver's ability to select safe gaps to enter the circulating lanes or change lanes within to exit the multi-lane roundabout. Speed differentials could increase the risk of crashes between vehicles at the intersection.	**Recommendation 6.3.1.1:** In conjunction with future upgrade works on Western Arterial Road, consider reconstructing the median splitter island on the southern leg so that ASD is achieved to the nose of the island. Prioritise action accordingly. **Recommendation 6.3.1.2:** Instigate a project to identify suitable treatments to reduce the speed of traffic entering and exiting the roundabout. Options may include realigning the approach legs to achieve adequate deflection to limit speeds and/or installing raised platforms across traffic lanes. Consider in conjunction with other approved intersection upgrade works and prioritise approved action accordingly. **Recommendation 6.3.1.3:** Investigate options to improve lane line markings at the transition from single to dual circulating lanes at each end of the roundabout – such as the suitability of a 'spiral' line marking configuration (as outlined in Section 6.3 of AGRD Part 4B). Also, check compliance of lane line and pavements throughout the roundabout and intersecting legs against current departmental standards and guidelines. Develop a mass action project to	**L = Possible** **S = Serious** **P = High (FSI)**

Item no.	Audit findings	Suggested action	Priority
6.3.1 Cont'd	• The roundabout was an unusual, elongated oval-shape, with two circulating lanes running along the short straight sides and small radius curves forming a single lane at each end. There were two approach lanes on Western Arterial Road at the northern and southern entrances to the roundabout. Northbound traffic intending to turn right into Rainworth Road, and southbound traffic intending to turn right into Runic Street, were required to change lanes within the roundabout after negotiating the single lane at each end. As there was a lack of lane line markings to define the traffic lanes at each end (i.e. transition from single to dual circulating lanes), there appeared to be a conflict between circulating traffic (intending to change lanes and make a left-turn to exit) and traffic entering the roundabout from the left lane on Western Arterial Road. The conflict was particularly evident during peak traffic. Safety and efficiency could be improved by providing additional lane line markings at each end of the roundabout to assist with lane selection and reinforce priority for circulating traffic – such as a 'spiral' lane marking configuration • Some sight lines were obscured by thick vegetation located within the large central island. The diminished sight lines impacted driver decision times, particularly with regards to selecting safe gaps in traffic. Safety and efficiency could be improved by removing all the smaller hedges/bushes and the lower limbs of the large trees. Ideally, action to improve sight lines to achieve sight distance criteria outlined in Section 3.2 of AGRD Part 4B would be highly desirable. • Signing deficiencies -- refer Section 6.4 • Linemarking and delineation deficiencies – refer Section 6.5 • Pedestrian and cycling amenities – refer Item 6.8	upgrade line and pavement markings throughout. Consider in conjunction with other approved intersection upgrade works and prioritise action accordingly. **Recommendation 6.3.1.4:** To improve sight lines throughout, instigate a project to remove all the smaller hedges/bushes located within the large central roundabout island. Also, remove all lower-level limbs on the large trees up to 2.5m above ground level. Avoid re-instating low level plantings that could cause a similar issue in the future if unmaintained. Consider in conjunction with other approved intersection upgrade works and prioritise action accordingly.	

Item no.	Audit findings	Suggested action	Priority
6.3.1 Cont'd.			

Figure 4: Key safety-related issues observed at southern roundabout.

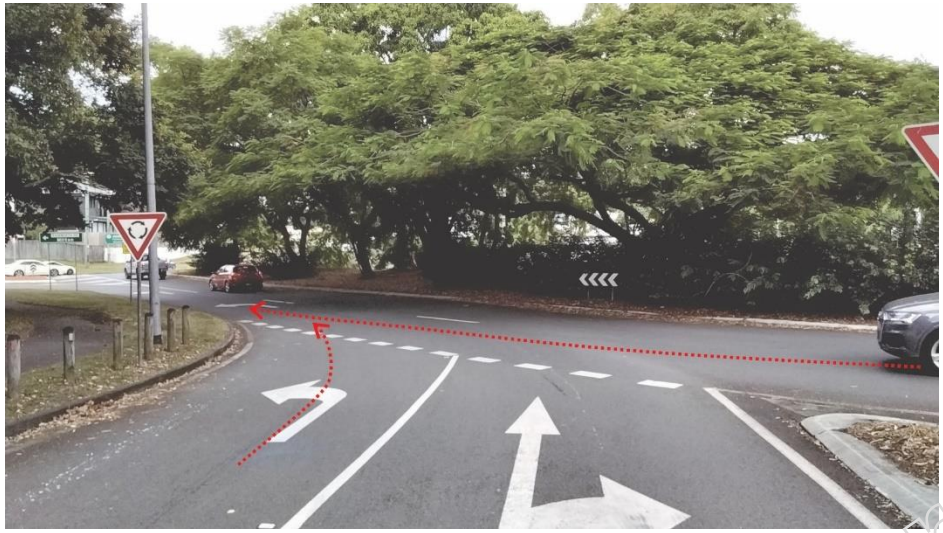
Item no.	Audit findings	Suggested action	Priority
6.3.1 Cont'd.	 **Photograph 4:** Northbound approach to the roundabout. The 'crest' curve in the vertical alignment on Western Arterial Road limited forward sight distance to the intersection, including the holding line at the roundabout.  **Photograph 5:** Northbound approach to southern roundabout on Western Arterial Road. The entry geometry encouraged high entry speeds.		

Item no.	Audit findings	Suggested action	Priority
6.3.1 Cont'd.	 **Photograph 6:** Northbound entry to southern roundabout from Western Arterial Road. The existing horizonal alignment allowed vehicles to entry the roundabout at high speed.  **Photograph 7:** Southbound approach to southern roundabout on Western Arterial Road. The reverse curved alignment assisted with limiting the approach speed.		

Item no.	Audit findings	Suggested action	Priority
6.3.1 Cont'd.	 **Photograph 8:** Southbound entry to southern roundabout from Western Arterial Road. The acute angle to the circulating lanes limited the entry speed of vehicles.  **Photograph 9:** Approach to southern roundabout on Rainworth Road. There was no deflection for the kerbside lane to limit excessive entry speed.		

Item no.	Audit findings	Suggested action	Priority
6.3.1 Cont'd.	 **Photograph 10:** Entry to southern roundabout from Rainworth Road. The existing horizonal alignment allowed left-turning traffic to pass through the roundabout at high speed.  **Photograph 11:** Approach to southern roundabout on Runic Street.		

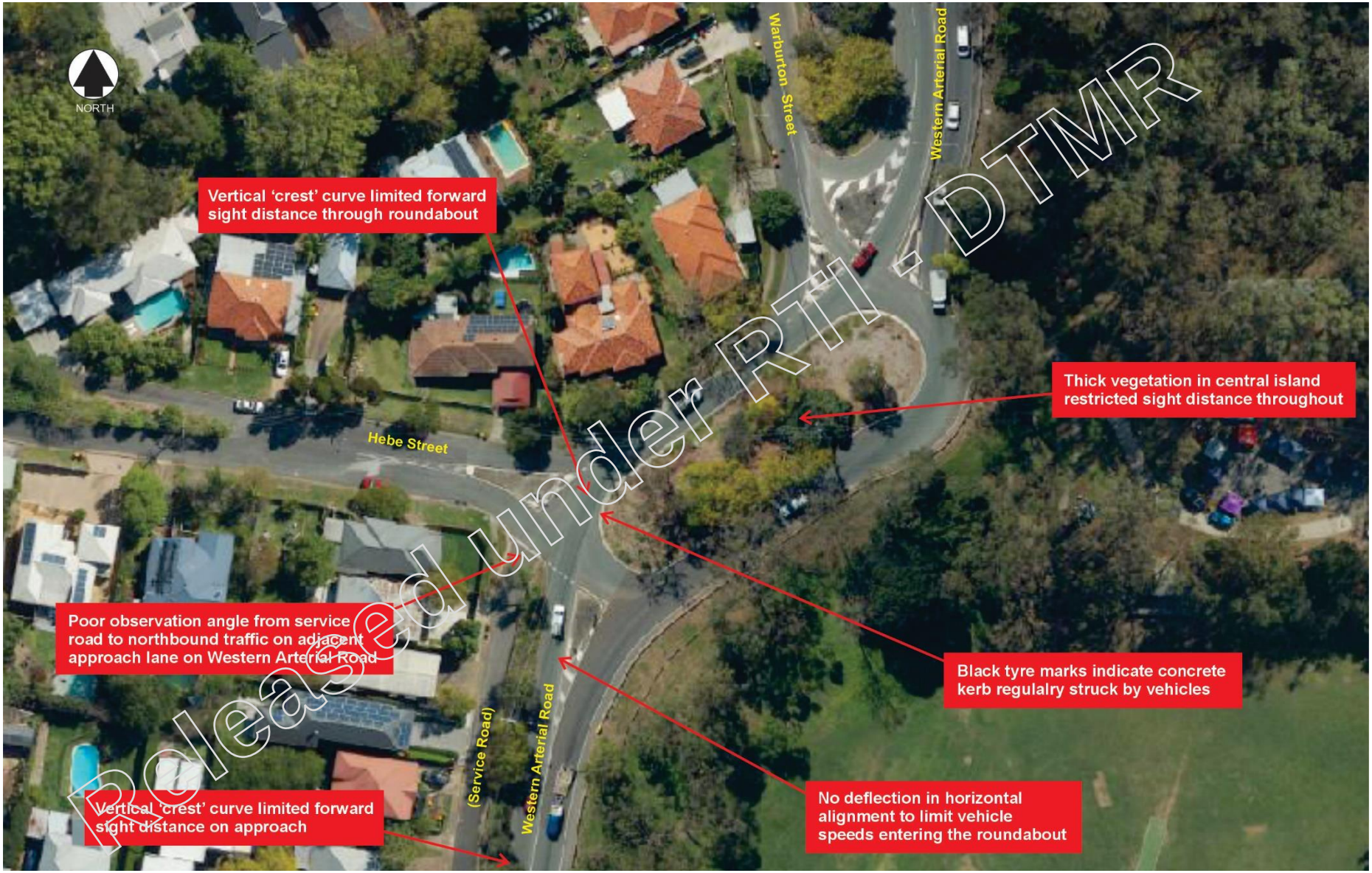
Item no.	Audit findings	Suggested action	Priority
6.3.1 Cont'd.	 **Photograph 12:** Approach to southern roundabout on Boundary Road.  **Photograph 13:** Southern roundabout, view looking north from Western Arterial Road. Due to a lack of lane line markings, circulating vehicles intending to change lanes and make a left-turn exit conflicted with vehicles entering the roundabout from the left lane.		

Item no.	Audit findings	Suggested action	Priority
6.3.1 Cont'd.	 **Photograph 14:** Southern roundabout - view looking south from Western Arterial Road. Due to a lack of lane line markings, circulating vehicles intending to change lanes and make a left-turn exit conflicted with vehicles entering the roundabout from the left lane.  **Photograph 15:** Northbound view from southern end of roundabout. Thick vegetation in the central island obstructed sight lines to circulating vehicles, impacting decision times for drivers to select safe gaps to enter the roundabout.		

Item no.	Audit findings	Suggested action	Priority
6.3.1 Cont'd.	 **Photograph 16:** Southbound view from northern end of roundabout. Thick vegetation in the central island obstructed sight lines to circulating vehicles, impacting decision times for drivers to select safe gaps to enter the roundabout**.**		

Item no.	Audit findings	Suggested action	Priority
6.3.2	**Northern roundabout – Western Arterial Road / Service Road / Hebe Street / Warburton Street** There were a number of safety-related issues observed with the northern roundabout, including: • On the northbound approach to the intersection, there was a 'crest' curve in the vertical alignment on Western Arterial Road that limited forward sight distance to the roundabout. ASD to the holding line was approximately 75m from driver's eye height. Section 3 of AGRD Part 4B states that ASD *"should be provided to the holding line"*. Based on a reaction time of 2.0 seconds, Table 3.1 of AGRD Part 4A stipulates a minimum ASD of 92m for a design speed of 70km/h. Where ASD to the holding line is not possible, the absolute minimum requirement is ASD to the (approach) nose of the splitter island, as per Section 3.2.1 of AGRD Part 4B. • The roundabout was an unusual, elongated oval-shape, with small radius curves at each end connecting to short straights along both sides. The straight sections were angled approximately at 45 degrees to the right of both approach legs on Western Arterial Road. Upon entering the roundabout from both Western Arterial Road approaches, drivers were required to navigate a low speed right curve around the end of the central island before entering the straight. On the northbound approach there was essentially no entry curve (straight alignment entry) to restrict the entry speed of vehicles. Furthermore, there was a 'crest' curve in the vertical alignment (opposite Hebe Street) that severely diminished forward sight distance to the tight right curve and subsequent straight alignment along the side of the roundabout. Black tyre marks on the central island kerb indicated it was regularly struck by northbound vehicles negotiating the curve. Where the kerb is struck at excessive speed, a vehicle could be re-directed and run-off the left side of the carriageway. On the southbound approach there was a right curve in the alignment that limited vehicle speeds. REDUCE SPEED signing was also	**Recommendation 6.3.2.1:** In conjunction with future upgrade works on Western Arterial Road, consider reconstructing the median splitter island on the southern leg so that ASD is achieved to the nose of the island. Prioritise action accordingly. **Recommendation 6.3.2.2:** Instigate a project to identify suitable treatments to reduce the speed of traffic entering the roundabout. Options may include realigning the approach legs with appropriate geometry to limit speeds and/or installing a raised platforms across the traffic lanes. Consider in conjunction with other approved intersection upgrade works and prioritise action accordingly. **Recommendation 6.3.2.3:** In conjunction with Recommendations 6.3.2.1 and 6.3.2.2, consider re-grading the vertical alignment on the northbound lane through the roundabout (passing Hebe Street intersection) to improve forward sight distance to the central island kerb and upcoming alignment. Prioritise action accordingly. **Recommendation 6.3.2.4:** In conjunction with future upgrade works on Western Arterial Road, investigation options for reconfiguring (to achieve safe sight lines) or prohibiting access to the roundabout from the service road. Prioritise action accordingly. **Recommendation 6.3.2.5:** To improve sight lines throughout, instigate a project to remove all of the smaller hedges/bushes located within	**L = Possible** **S = Serious** **P = High (FSI)**

Item no.	Audit findings	Suggested action	Priority
6.3.2 Cont'd	installed. As with the northbound leg, upon entering the roundabout drivers were required to navigate a low-speed right curve around the end of the central island. At both ends of the roundabout, the audit team observed many vehicles appearing to navigate at excessive speed relative to the existing geometry. Speed differentials could increase the risk of crashes between vehicles at the intersection. • Some sight lines were obscured by thick vegetation located within the large circulating island. The diminished sight lines impacted driver decision times, particularly with regards to selecting safe gaps in traffic. Operational safety and efficiency could be improved by removing all the smaller hedges/bushes and the lower limbs of the large trees. Ideally, action to improve sight lines to achieve minimum distances outlined in Section 3.2 of AGRD Part 4B would be highly desirable. • There was a service road running parallel to the western side of Western Arterial Road, on the southern side of the roundabout. The service road intersected with Hebe Street (and the edge of the roundabout), immediately adjacent to the southern leg of Western Arterial Road intersecting with the roundabout. The observation angle from the service road to northbound traffic on Western Arterial Road was poor, with drivers required to look almost 180 degrees back over their shoulder to identify approaching traffic and safe gaps to enter the roundabout. • Signing deficiencies -- refer Section 6.4 • Linemarking and delineation deficiencies – refer Section 6.5 • Pedestrian and cycling amenities – refer Item 6.8	the large central circulating island at the roundabout. Also, remove all lower-level limbs on the large trees up to 2.5m above ground level. Avoid re-instating low level plantings that could cause a similar issue in the future if unmaintained. Consider in conjunction with other approved intersection upgrade works and prioritise action accordingly.	

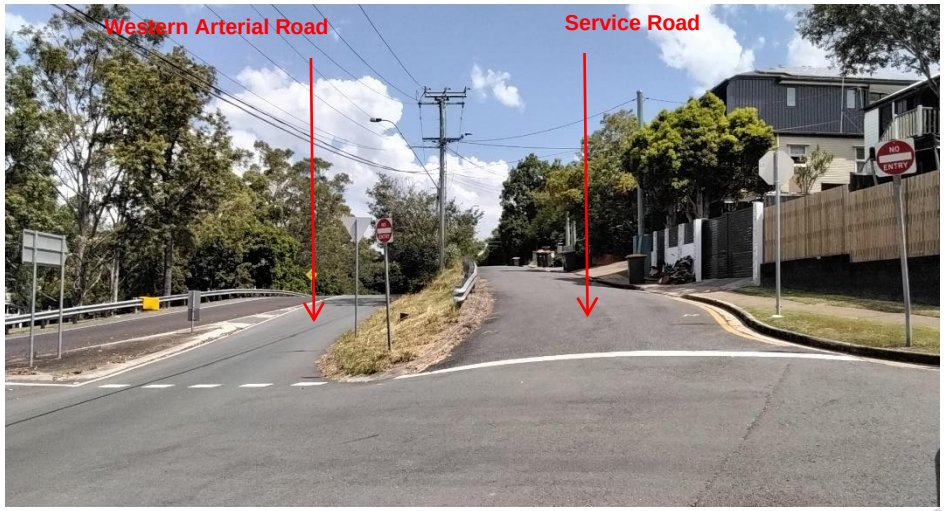
Item no.	Audit findings	Suggested action	Priority
6.3.2 Cont'd.	 **Figure 5:** Key safety-related issues observed at northern roundabout.		

Item no.	Audit findings	Suggested action	Priority
6.3.2 Cont'd.	 **Photograph 17:** Northbound approach to the intersection with Hebe Street. Sight distance to the painted give way line at the roundabout was approximately 75m.  **Photograph 18:** Northbound approach to northern roundabout on Western Arterial Road. There was no deflection in the alignment to limit excessive entry speed.		

Item no.	Audit findings	Suggested action	Priority
6.3.2 Cont'd.	 **Photograph 19:** Northbound entry to northern roundabout from Western Arterial Road. The existing horizonal alignment allowed vehicles to entry the roundabout at high speed before negotiating the small radius right curve around the end of the central island. Forward sight distance through the right curve and along the following alignment was restricted by a 'crest' in the vertical alignment (opposite Hebe Street).  **Photograph 20:** Northbound entry to northern roundabout, opposite Hebe Street. Black tyre marks on the concrete kerb indicated it is regularly struck by vehicles.		

Item no.	Audit findings	Suggested action	Priority
6.3.2 Cont'd.	 **Photograph 21:** There was a curve in the horizontal alignment that limited vehicle speeds on the southbound approach to the roundabout on Western Arterial Road.  **Photograph 22:** Southbound entry to northern roundabout from Western Arterial Road. Compared to the northbound entry, there was some deflection in the existing horizonal alignment that restricted vehicles speeds entering roundabout before negotiating the small radius right curve around the end of the central island.		

Item no.	Audit findings	Suggested action	Priority
6.3.2 Cont'd.	 **Photograph 23:** Hebe Street approach to intersection.  **Photograph 24:** Warburton Street approach to intersection.		

Item no.	Audit findings	Suggested action	Priority
6.3.2 Cont'd.	 **Photograph 25:** For traffic entering the intersection from the service road, there was a poor observation angle (looking back over right shoulder) to traffic approaching on the northbound lane on Western Arterial Road.  **Photograph 26:** Thick vegetation in the centre of the roundabout obstructed sight lines and prevented clear vision to the layout, alignment and other circulating vehicles.		

Item no.	Audit findings	Suggested action	Priority
6.3.2 Cont'd.	 **Photograph 27:** Thick vegetation in the centre of the roundabout obstructed sight lines and prevented clear vision to the layout, alignment and other circulating vehicles.		

Item no.	Audit findings	Suggested action	Priority
6.4 Signs and lighting			
6.4.1	The application of direction signs varied throughout the audit site. Issues observed included: • varying condition, some with minor damage • different design standards – such as roundabout diagrams and illustration of dual circulating lanes • inconsistencies with content – such as between advance and intersection signs on the same approach leg • no advance direction signs on northbound or southbound approaches to northern roundabout, nor northbound departure from northern roundabout • sign faces obscured by vegetation (refer Recommendation 6.4.7.1) Given the complexity of the alignment and number of intersecting legs throughout the audit site, upgrading signage would benefit both safety and efficiency.  **Photograph 28:** Direction sign facing northbound traffic on approach to the southern roundabout. The roundabout diagram illustrates dual circulating lanes.	**Recommendation 6.4.1.1:** Instigate a project to review and upgrade all advance and intersection direction signs (and structures as required) throughout the audit site. The scope of works should ensure: • an adequate provision of signage is provided at key decision points (including locations not currently signed) to effectively guide traffic through the complex site • signs are designed in accordance with current departmental design standards, including compliance of content with the local focal point plan. Sign content must be consistent throughout, particularly between advance and intersection signs on the same leg • a consistent approach is adopted for roundabout diagrams on advance signs – such as illustrating dual or single circulating lanes. The impact of any proposed changes to lane line markings should also be taken into consideration • sign structures are frangible where required to minimise the risk to occupants of errant vehicles. Consider in conjunction with other approved signing works and prioritise action accordingly.	**L = Unlikely** **S = Moderate** **P = Medium**

Item no.	Audit findings	Suggested action	Priority
6.4.1 Cont'd.	 **Photograph 29:** Direction sign facing southbound traffic existing the southern roundabout. The sign was in a deteriorated condition.  **Photograph 30:** Direction sign facing westbound traffic on Rainworth Road. The roundabout diagram illustrates a single circulating lane only.		

Item no.	Audit findings	Suggested action	Priority
6.4.1 Cont'd.	 **Photograph 31:** Direction sign facing westbound traffic on Rainworth Road. The design was non-standard, the content was inconsistent with the advanced sign, and it was in a deteriorated condition.  **Photograph 32:** Direction sign to Runic Street obscured by roadside vegetation.		

Item no.	Audit findings	Suggested action	Priority
6.4.1 Cont'd.	 **Photograph 33:** Direction sign facing northbound traffic on the southern roundabout. The sign face was in a deteriorated condition.  **Photograph 34:** Direction sign facing eastbound traffic on Boundary Road. The sign face was in a deteriorated condition. The roundabout diagram illustrates a single circulating lane only.		

Item no.	Audit findings	Suggested action	Priority
6.4.1 Cont'd.	 **Photograph 35:** Direction sign facing northbound exit from the southern roundabout. The sign face was in a deteriorated condition.  **Photograph 36:** Direction sign facing southbound traffic on approach to the southern roundabout. The roundabout diagram illustrates dual circulating lanes. The sign face was in a deteriorated condition.		

Item no.	Audit findings	Suggested action	Priority
6.4.1 Cont'd.	 **Photograph 37:** Direction sign facing southbound traffic on the southern roundabout.  **Photograph 38:** Direction sign facing southbound exit from the northern roundabout. The sign face was in a deteriorated condition.		

Item no.	Audit findings	Suggested action	Priority
6.4.1 Cont'd.	 **Photograph 39:** The existing direction sign at Hebe Street was in a deteriorated condition.		

Item no.	Audit findings	Suggested action	Priority
6.4.2	SLIPPERY (W5-20) warning signs were installed facing southbound traffic on Western Arterial Road on the approach and departure from northern roundabout. As a high friction pavement surface treatment had been applied to sections of the road in the vicinity, it was unclear if the signs were still warranted. To maintain credibility, it is essential warning signs, such as SLIPPERY, are restricted to locations where there is a current safety issue.  **Photograph 40:** Existing signage on southbound approach to northern roundabout.  **Photograph 41:** Existing signage on southbound departure from northern roundabout.	**Recommendation 6.4.2.1:** Confirm the exact locations of the deficient pavement surface and determine whether the high friction pavement surface treatments have rectified the safety issue. Review the warrants for retaining the existing SLIPPERY (W5-20) warning signs. Where signage is not required arrange removal. Consider in conjunction with Recommendation 6.4.3.1 (with regards to the existing REDUCE SPEED sign) and other approved signing works. Prioritise action accordingly.	**L = Rare** **S = Moderate** **P = Low**

Item no.	Audit findings	Suggested action	Priority
6.4.3	As discussed in Section 6.3, the audit team observed many vehicles appearing to enter, circulate and exit the roundabouts at excessive speed. To reinforce the presence of the roundabouts and the need for drivers to navigate at a safe speed, safety could be improved by installing more conspicuous warning signs on approaches.  **Photograph 42:** Existing warning sign on northbound approach to southern roundabout.	**Recommendation 6.4.3.1:** Remove the three existing ROUNDABOUT warning signs and posts. Install four (one on each approach to the northern and southern roundabouts) Target Board (TC1308) with a ROUNDABOUT (W2-7) warning sign. Consider in conjunction with Recommendation 6.4.2.1 (with regards to the existing REDUCE SPEED sign) and other approved signing works. Prioritise action accordingly.  **Figure 6:** Recommended Target Board (TC1308) with a ROUNDABOUT (W2-7) warning sign.	**L = Unlikely** **S = Serious** **P = High (FSI)**

Item no.	Audit findings	Suggested action	Priority
6.4.3 Cont'd.	 **Photograph 43:** Existing warning sign on northbound approach to southern roundabout.  **Photograph 44:** Existing warning sign on northbound approach to southern roundabout.		

Item no.	Audit findings	Suggested action	Priority
6.4.4	As discussed in Item 6.3.2, there was inadequate ASD on the northbound approach to the northern roundabout. To make the conflict point more conspicuous to approach motorists, safety could be improved by duplicating the regulatory ROUNDABOUT (R1-3) sign on the right side of the carriageway in the existing splitter island.  **Photograph 45:** To make the location of the conflict point more conspicuous to approaching traffic, installed a duplicate regulatory ROUNDABOUT sign.	**Recommendation 6.4.4.1:** To make the location of the conflict point at the intersection more conspicuous to approaching traffic, installed a duplicate ROUNDABOUT (R1-3B) sign on the right side of the carriageway in the splitter island. Consider in conjunction with other approved signing works and prioritise action accordingly.	**L = Possible** **S = Serious** **P = High (FSI)**

Item no.	Audit findings	Suggested action	Priority
6.4.5	There was a UNIDIRECTIONAL HAZARD MARKER (D4-1-1) installed at the northern end of the southern roundabout central island (facing traffic entering from Boundary Road). The sign was in a deteriorated condition. Also, the sign was offset from an electricity pole that posed a safety hazard for occupants of errant vehicles. Safety could be improved by installing a new hazard marker in front of the electricity pole to maximise warning and guidance passed the roadside hazard.  **Photograph 46:** The existing hazard marker was in a deteriorated condition and offset from the electricity pole hazard.	**Recommendation 6.4.5.1:** Remove the existing hazard marker and posts. Install a new UNIDIRECTIONAL HAZARD MARKER (D4-1-1) in front of the electricity pole. Consider in conjunction with other approved signing works and prioritise action accordingly.	**L = Rare** **S = Serious** **P = Medium (FSI)**

Item no.	Audit findings	Suggested action	Priority
6.4.6	There was a PEDESTRIAN CROSSING warning sign installed facing eastbound traffic approaching the southern roundabout on Boundary Road. The sign referred to the crossing located on the northern departure leg, for left turning traffic. However given its orientation, it could be interpreted as another crossing located ahead for right turning traffic. The existing PEDESTRIAN CROSSING warning signs installed at the zebra crossing appeared to provide adequate warning for left turning traffic out of Boundary Road. To avoid any potential confusion, removal of the subject warning sign is recommended.  **Photograph 47**: The orientation of the PEDESTRIAN CROSSING warning sign (highlighted above) was potentially misleading.	**Recommendation 6.4.6.1:** Remove the existing PEDESTRIAN CROSSING (R3-1) warning sign and post.	**L = Rare** **S = Moderate** **P = Low**

Item no.	Audit findings	Suggested action	Priority
6.4.7	Overgrown roadside vegetation obscured several signs throughout the audit site. To maximise safety, particularly with regards to regulatory control and warning messages, it is essential roadside vegetation is regularly inspected and maintained to ensure clear sight lines to signs for approaching road users.  **Photograph 48:** Westbound approach to southern roundabout on Rainworth Road  **Photograph 49:** Northbound at Runic Street intersection.	**Recommendation 6.4.7.1:** Arrange vegetation trimming as required to ensure all road traffic signs are clearly visible to approaching traffic. **Recommendation 6.4.7.2:** Review the current maintenance program with a view to ensuring routine inspection and undertaking of vegetation trimming surrounding road traffic signs.	**L = Rare** **S = Serious** **P = Medium (FSI)**

Item no.	Audit findings	Suggested action	Priority
6.4.7 Cont'd.	 **Photograph 50:** Northbound approach to northern roundabout.  **Photograph 51:** Southbound entrance to northern roundabout.		

Item no.	Audit findings	Suggested action	Priority
6.4.7 Cont'd.	 **Photograph 52:** Southbound approach to northern roundabout.		

Item no.	Audit findings	Suggested action	Priority
6.4.8	There were a number of signs in poor or a deteriorated condition throughout the audit site. To maximise safe and efficient traffic movement it is essential signs are maintained to a high standard.  **Photograph 53**: Example warning sign in poor condition. Also, the sign was installed on a flat top post that is no longer approved for use.	**Recommendation 6.4.8.1:** Instigate a project to replace all damaged and deteriorated signs throughout the audit site. Before replacement, check: • the warrants for retaining sign against relevant guidelines and standards • suitability of current location • compliance of current sign face content and design against relevant guidelines and standards • compliance of existing sign structure if re-used Where funding permits, consider a mass action project to incorporate all approved signing recommendations from this report. Prioritise action accordingly.	**L = Rare** **S = Serious** **P = Medium (FSI)**

Item no.	Audit findings	Suggested action	Priority
6.4.9	There were a number of locations throughout the audit site where tree foliage impacted the spread of street lighting. To maximise safety, it is essential vegetation is regularly inspected and maintained to provide the ultimate spread of lighting.  **Photograph 54**: Boundary Road exit from southern roundabout. Tree foliage cast a shadow over the exit lane.	**Recommendation 6.4.9.1:** Arrange vegetation trimming as permissible to maximise the spread of existing street lighting. **Recommendation 6.4.9.2:** Review the current maintenance program with a view to ensuring routine inspection and undertaking of vegetation trimming street lighting.	**L = Rare** **S = Serious** **P = Medium (FSI)**

Item no.	Audit findings	Suggested action	Priority
6.4.9 Cont'd.	 **Photograph 55:** Southern end of northern roundabout. Tree foliage adjacent to the streetlights severely impact the spread of lighting.  **Photograph 56:** Northern end of northern roundabout. Tree foliage adjacent to the streetlights severely impact the spread of lighting.		

Item no.	Audit findings	Suggested action	Priority
6.5 Markings and delineation			
6.5.1	As a general comment, there appeared to be an adequate provision of line and pavement markings throughout the audit – except on the southern roundabout circulating lanes as discussed in Item 6.3.1. While the overall condition of line and pavement markings was good and visible during daylight and night conditions, there were a few locations where reapplication was required due to dull or worn markings. Also, an edge line was not installed along the northbound lane on Western Arterial Road between the northern and southern roundabouts.  **Photograph 57:** Worn and dull edge line adjacent to the northbound entrance to the southern roundabout.	**Recommendation 6.5.1.1:** Undertake a detailed inspection throughout the audit site to identify all locations where dull or worn of line and pavement markings require reapplication. Consider in conjunction with Recommendation 6.3.1.3 and prioritise action accordingly. **Recommendation 6.5.1.2:** Install an edge line along the northbound lane on Western Arterial Road between the northern and southern roundabouts. Consider in conjunction with Recommendation 6.5.1.1 and prioritise action accordingly.	**L = Rare** **S = Serious** **P = Medium (FSI)**

Item no.	Audit findings	Suggested action	Priority
6.5.1 Cont'd.	 **Photograph 58:** An edge line was not installed along the northbound lane between the southern and northern roundabouts.  **Photograph 59:** Line and pavement markings surrounding the splitter island on Hebe Street were in poor condition.		

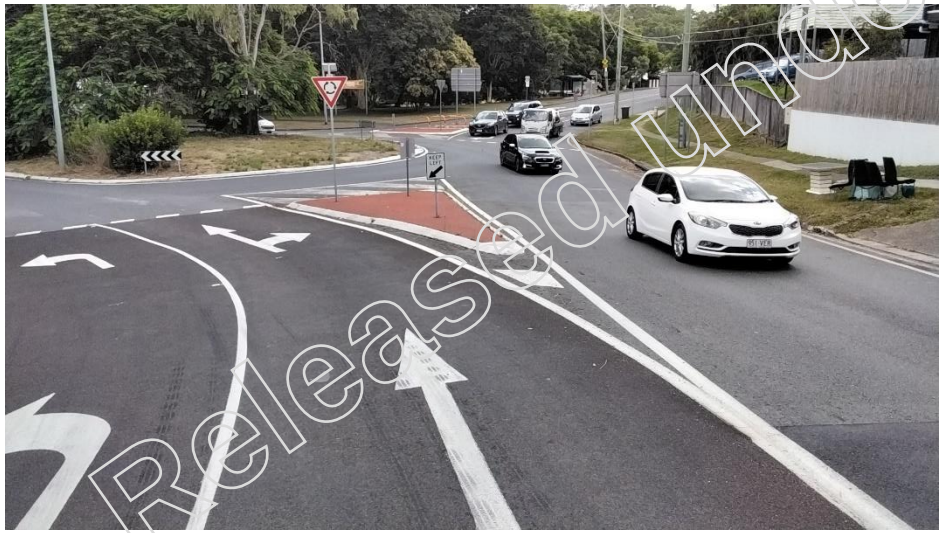
Item no.	Audit findings	Suggested action	Priority
6.5.1 Cont'd.	 **Photograph 60:** Southbound approach to the northern roundabout. The edge lines and chevron markings were in poor condition.		

Item no.	Audit findings	Suggested action	Priority
6.5.2	There was an inconsistent application of RRPMs throughout the audit site. While devices were installed along the centre of the road on approaches and between the two roundabouts, their application around intersection splitter islands and roundabout circulating lanes was varied and limited. As RRPMs provide important visual cues, particularly when the road pavement is wet or during foggy/misty weather conditions, it is essential the markings are installed and maintained to a high standard.  **Photograph 61:** RRPMs installed along the centre of the road on the northbound approach to the southern roundabout.	**Recommendation 6.5.2.1:** Instigate a project to upgrade RRPMs throughout the audit site to comply with minimum department standards and guidelines. Consider in conjunction with other approved safety works and prioritise action accordingly.	**L = Unlikely** **S = Serious** **P = High (FSI)**

Item no.	Audit findings	Suggested action	Priority
6.5.2 Cont'd.	 **Photograph 62:** RRPMs not installed surrounding the splitter island at the southern end of the southern roundabout.  **Photograph 63:** RRPMs not installed at the painted island at the Runic Street intersection.		

Item no.	Audit findings	Suggested action	Priority
6.5.2 Cont'd.	 **Photograph 64:** Limited application of RRPMs surrounding the splitter island at Boundary Road intersection.  **Photograph 65:** RRPMs were installed along the centre of the road between the two roundabouts.		

Item no.	Audit findings	Suggested action	Priority
6.5.2 Cont'd.	 **Photograph 66:** Limited application of RRPMs surrounding the splitter island at Hebe Street intersection.		

Item no.	Audit findings	Suggested action	Priority
6.5.3	There were a significant number of raised traffic islands located at the two roundabouts within the audit site. Their conspicuousness during daylight and at night varied and was dependant on the condition of their surfaces and the extent and condition of painted concrete kerbing along the perimeters. At the southern roundabout. The surfaces of the traffic islands were painted terracotta colour, and the surrounding kerbs painted white. Some of the white painted on the kerbs was cracked and peeling. At the northern roundabout, surfaces were unpainted, and the nose of islands painted white. The unpainted concrete surfaces were typically dull and dirty, and there was poor contrast between the traffic island and the adjacent road surface. Some of the white painted on the kerbs was cracked and peeling. Safety could be improved by cleaning and repainting surfaces to provide a high and consistent level of delineation to traffic islands throughout the audit site.  **Photograph 67:** Northbound entry to southern roundabout. The coloured surface and white painted kerbs on the splitter island provided a high level of contrast to the adjacent road surface.	**Recommendation 6.5.3.1:** Instigate a mass action project to improve the delineation of traffic islands throughout the audit site. The scope of works could include: • paint the surfaces of all traffic islands at the 'zebra crossing' kerbs and the northern roundabout the same terracotta colour as all islands at the southern roundabout • where surface painting is not supported, (water) pressure clean the exposed concrete surfaces to improve contrast to the adjacent pavement • repaint all the concrete kerbs surrounding the splitter islands and large central circulating islands with white reflectorised paint (to ensure a consistent standard and condition) Consider in conjunction with other approved safety works and prioritise action accordingly.	**L = Rare** **S = Serious** **P = Medium (FSI)**

Item no.	Audit findings	Suggested action	Priority
6.5.3 Cont'd.	 **Photograph 68:** Boundary Road approach to southern roundabout. The coloured surface and white painted kerbs on the splitter island provided a high level of contrast to the adjacent road surface.  **Photograph 69:** Hebe Street approach to northern roundabout. There was limited contrast between the traffic island surface and the adjacent road pavement.		

Item no.	Audit findings	Suggested action	Priority
6.5.3 Cont'd.	 **Photograph 70:** Northbound approach to northern roundabout. There was limited contrast between the traffic island surface and the adjacent road pavement.  **Photograph 71:** Southbound approach to northern roundabout. The painted kerb on the central island did not extend far enough around the perimeter to delineate the hazard.		

Item no.	Audit findings	Suggested action	Priority
6.5.4	As discussed in Item 6.3.2, there was poor vertical and horizontal alignment at the northbound entrance to the northern roundabout (opposite Hebe Street intersection). A 'crest' curve in the vertical alignment severely diminished forward sight distance to the tight right curve and subsequent straight alignment along the side of the large central island. Safety could be improved by installing additional delineation along the top of the concrete kerb (on the central island) to improve visual cues and emphasise the alignment.  **Photograph 72:** Northbound approach to the northern roundabout. The severity of the right curve passing the end of the central island, and the subsequent alignment further to the north, was not evident.	**Recommendation 6.5.4.1** At the south-west corner of the central island, remove the small bush and grass surface to maximise forward sight distance across the roundabout for northbound traffic entering the intersection. Seal the surface with concrete or fake turf to prevent re-growth and maintain the sight line. Prioritise action accordingly. **Recommendation 6.5.4.2** Commencing adjacent to the right end of the existing UNIDIRECTIONAL HAZARD MARKER in the central island, install short flexible bollards (or similar) along the top of the concrete kerb at regular intervals (for approximately 25m) to delineate the severity of the curve and subsequent alignment. Where supported, ensure the proposed delineation device is approved for use on the state-controlled rod network. Prioritise action accordingly.  **Photograph 73:** Example of 450mm high flexible bollard.	**L = Possible** **S = Serious** **P = High (FSI)**

Item no.	Audit findings	Suggested action	Priority
6.5.4 Cont'd.	 **Photograph 74:** Example of northbound vehicle navigating the roundabout at high speed.		

Item no.	Audit findings	Suggested action	Priority
6.6 Crash barriers and clear zones			
6.6.1	There were a significant number of non-frangible hazards located close to the edge of the traffic lanes throughout the audit site, including: • electricity and street light poles • trees with large diameter trunks • safety barriers • tree lined embankments • retaining walls. A noticeable reduction in roadside hazards would require the undertaking of significant works to relocate electricity and street light poles and remove trees. In addition to extensive costs, it is highly likely environmental constraints and community expectation would prevent (or severely limit) tree removal. Installation of additional safety barriers may be an alternative solution to hazard removal where further investigation identifies an economic benefit. Safety could be improved, at the very least, by implementing better guidance, clearer delineation, and enhanced visual cues as outlined in the signing, linemarking, and delineation recommendations.	**Recommendation 6.6.1.1** Instigate a project to identify and evaluate treatment options for high-risk hazards located within the audit site in accordance with the process detailed in Section 3 of AGRD, Part 6. If the evaluation finds that roadside risk intervention thresholds are met or exceeded, determine the relative priority of identified remedial works and, if appropriate, develop a hazard mitigation project. **Recommendation 6.6.1.2** Where the evaluation suggested in Recommendation 6.6.1.1 determines that safety treatments cannot be justified, ensure a high standard of signing, linemarking, and delineation is implemented.	**L = Possible** **S = Serious** **P = High (FSI)**

Item no.	Audit findings	Suggested action	Priority
6.6.1 Cont'd.	 **Photograph 75:** Retaining wall adjacent to southbound lane at southern end of audit site.  **Photograph 76:** Large diameter tree trunks and electricity poles on both sides of the road on approach to the southern roundabout.		

Item no.	Audit findings	Suggested action	Priority
6.6.1 Cont'd.	 **Photograph 77:** Electricity and street light poles beside the northbound exit from the southern roundabout.  **Photograph 78:** Tree and electricity pole lined embankment on the section of road between the two roundabouts.		

Item no.	Audit findings	Suggested action	Priority
6.6.1 Cont'd.	 **Photograph 79:** Large trees in the splitter island at the southbound exit to the southern roundabout.  **Photograph 80:** Safety barrier located on the outside of the southbound lane at the northern roundabout.		

Item no.	Audit findings	Suggested action	Priority
6.6.2	Long lengths of safety barrier were installed throughout the audit site. Safety related issues identified with the barriers during the site inspections included: • insufficient offset (working width) to a non-frangible hazard behind a w-beam barrier. To ensure hazards behind flexible barriers are not struck by errant vehicles, the expected maximum deflection of a barrier should not exceed the available room to deflect (as outlined in Section 5.5 of AGRD Part 6). • damage from numerous minor strikes, including minor pocketing that could affect safe operation and performance during future strikes • excessive w-beam offset behind concrete kerb (maximum 200mm as stipulated in Section 6.8.4 of AGRD Part 6) • dislodgement of w-beam rail from blockout. • absence of end terminal on central concrete barrier (northern end of audit site) • absence of delineators on central concrete barrier (northern end of audit site) • excessive spacing of delineators along some sections of w-beam barrier (where installed along small radius curves). Given safety barriers are installed to shield hazardous roadside environments, it is essential they are designed and maintained to a very high standard to maximise safety for road users.	**Recommendation 6.6.2.1** Instigate a project to upgrade the condition and standard (compliance) of safety barriers throughout the audit site. Undertake a detailed inspection to assess existing damage and design and installation compliance against current departmental standards and guidelines. Consider in conjunction with other approved safety works (including Recommendation 6.6.1.1) and prioritise action accordingly.	**L = Possible** **S = Serious** **P = High (FSI)**

Item no.	Audit findings	Suggested action	Priority
6.6.2 Cont'd.	 **Photograph 81:** Example of a large non-frangible tree hazard located too close to the w-beam barrier adjacent to the northern roundabout. There was insufficient offset between the barrier and the hazard to accommodate deflection caused by vehicle impact.  **Photograph 82:** Example of damage to existing w-beam barrier adjacent to the northern roundabout.		

Item no.	Audit findings	Suggested action	Priority
6.6.2 Cont'd.	 **Photograph 83:** Example of damage to existing w-beam barrier adjacent to the northern roundabout.  **Photograph 84:** Northern side of northern roundabout. A crash cushion was not installed at the southern end on the concrete barrier (similar to that installed at the northern end – refer next photograph).		

Item no.	Audit findings	Suggested action	Priority
6.6.2 Cont'd.	 **Photograph 85:** A crash cushion was installed at the northern end of the concrete barrier.  **Photograph 86:** Southbound approach to southern roundabout. The w-beam barrier was offset greater than 200mm behind the concrete kerb.		

Item no.	Audit findings	Suggested action	Priority
6.6.2 Cont'd.	 **Photograph 87:** Adjacent to the intersection with Warburton Street, the w-beam rail had dislodged from the blockout fixture.		
6.7 Traffic signals			
6.7.1	No traffic signal issues were identified during the audit.	No action.	

Item no.	Audit findings	Suggested action	Priority
6.8 Pedestrians and cyclists			
6.8.1	There were a number of safety-related issues identified with pedestrian paths throughout the audit site, including: • varying path widths ranging from 1.0m to 2.0m. Section 5.1.2 of AGRD Part 6A stipulates a desirable minimum width of 1.2m, with an absolute minimum width of 1.0m • sections of the narrow paths overgrown with grass and tree foliage that obstructed clear passage • sections of poor surface condition, including cracks and lips causing trip hazards • path edge drop-offs • steep grades along paths that could impact access and safety for people in wheelchairs and mobility scooter/walking frame devices. Along steeper grades, AS1428.1:2021 makes provision for the use of landing pads at regular intervals to give path users relief from the gradient. Given the topography in the general area, it is highly unlikely design standards could be achieved. At minimum, maintenance activities are required to address the key safety issues. Ideally, a mass action project to improve the overall standard and condition of paths throughout the audit site would provide the greatest level of safety and benefit for users.	**Recommendation 6.8.1.1** Arrange maintenance activities to improve the condition of paths throughout the audit site by removing hazards that impact safety and accessibility. The scope of works should include: • repairing surfaces where there is major cracking • grinding off lips that pose a trip hazard • removing overgrown grass and vegetation that obstructs access – particularly along narrower sections of path • backfilling path edges to remove drop-off hazards. Consider in conjunction with other approved works or projects and prioritise action accordingly. **Recommendation 6.8.1.2** Review current maintenance arrangements with a view to ensuring regular inspections and undertaking of upkeep or repair works as required. Consider in conjunction with other approved maintenance activities and prioritise action accordingly. **Recommendation 6.8.1.3** Instigate a mass action project to upgrade the standard and condition of paths throughout the audit site, including increased minimum widths. Incorporate Recommendation 6.8.1.1 (where applicable) and consider in conjunction with other approved safety works. Prioritise action accordingly.	**L = Possible** **S = Serious** **P = High (FSI)**

Item no.	Audit findings	Suggested action	Priority
6.8.1 Cont'd.	 **Photograph 88:** Southern end of audit site adjacent to northbound lane. Narrow 1m wide path width obstructed by overgrown vegetation.  **Photograph 89:** Southern end of audit site adjacent to northbound lane. Lips in path causing trip hazards, as well as 90mm drop-off from edge of path.		

Item no.	Audit findings	Suggested action	Priority
6.8.1 Cont'd.	 **Photograph 90:** Southern end of audit site adjacent to northbound lane. Overgrown vegetation obstructing clear passage.  **Photograph 91:** Steep grade (greater than 1 in 14) adjacent to northbound approach to southern roundabout.		

Item no.	Audit findings	Suggested action	Priority
6.8.1 Cont'd.	 **Photograph 92:** Southern end of audit site. Steep grade (greater than 1 in 14) adjacent to southbound lane.  **Photograph 93:** Southern end of audit site adjacent to southbound lane. Steep grade (greater than 1 in 14) and poor path condition.		

Item no.	Audit findings	Suggested action	Priority
6.8.1 Cont'd.	 **Photograph 94:** Southern end of audit site adjacent to southbound lane. Excessive crossfall, overgrown grass along narrow path and lips causing trip hazards.  **Photograph 95:** Along the western side of the southern roundabout, the path width widened to 1.8m.		

Item no.	Audit findings	Suggested action	Priority
6.8.1 Cont'd.	 **Photograph 96:** Narrow and path and trip hazards between Runic Street and Boundary Road intersections.  **Photograph 97:** Narrow path with access obstructed by vegetation on the western roadside of the 'zebra crossing'.		

Item no.	Audit findings	Suggested action	Priority
6.8.1 Cont'd.	 **Photograph 98:** Poor surface condition and trip hazard in the path on the eastern roadside of the 'zebra crossing'.  **Photograph 99: B**uild-up of silt and surface cracking in the 2m wide concrete path located between the 'zebra crossing' and the pedestrian refuge on Rainworth Road.		

Item no.	Audit findings	Suggested action	Priority
6.8.1 Cont'd.	 **Photograph 100:** The narrow 1m wide path adjacent to the southern side of Rainworth Road was in poor condition and partially overgrown with grass.  **Photograph 101:** Narrow 1m wide path along the western side of Western Arterial Road between the southern and northern roundabouts.		

Item no.	Audit findings	Suggested action	Priority
6.8.1 Cont'd.	 **Photograph 102:** Steep grade (greater than 1 in 14) of path along the north-west corner of Hebe Street and Western Arterial Road (northern roundabout).  **Photograph 103:** Narrow 1m wide path along the western side of the northern roundabout, between Hebe Street and Warburton Street. Partially overgrown with grass.		

Item no.	Audit findings	Suggested action	Priority
6.8.1 Cont'd.	 **Photograph 104:** Narrow 1m path along southern side of Warburton Street. Partially overgrown with grass.		

Item no.	Audit findings	Suggested action	Priority
6.8.2	There was an inconsistent provision, standard and condition of pedestrian crossings throughout the audit site. Safety-related issues identified during the site inspections included: • absence of a pedestrian crossing facility on Western Arterial Road on the southern side of the southern roundabout • the deteriorated condition and non-compliance of kerb ramps and intersecting paths, along with the absence of landing pads at path/kerb ramp junctions, at the existing pedestrian refuge crossing on Rainworth Road. • absence of a pedestrian crossing facility at the intersection with Runic Street to facilitate safe pedestrian passage across the wide intersection • poor alignment of the pedestrian refuge crossing at Boundary Road, that led pedestrians to/from a property access driveway on northern side of the road. Also, on the southern side of the road, the kerb ramp was non-compliant, and a landing pad was not installed at the path/kerb ramp junction • deteriorated condition of the existing 'zebra crossing' on the northern leg of the southern roundabout, and the non-compliant of kerb ramps • At Hebe Street a cut-out was not provided through the splitter island (as recommended in Section 8.2.2 of AGRD Part 4), and the existing kerb ramps were non-compliant. Additionally, holding rails were not installed, as was provided at other formal crossing points within the audit site. Given the high volume of traffic passing through the audit site, safety could be improved by providing a consistent and high standard of road crossings.	**Recommendation 6.8.2.1** Instigate a project to investigate pedestrian activity and desire lines thorough the audit site. Develop a project to upgrade existing crossing deficiencies and install additional crossing points as determined by the investigation. Ensure all new facilities are constructed, and existing facilities upgraded, to comply with current departmental standards and guidelines. Given the anticipated high cost associated with overall construction works, adopt a staged implementation where funding is limited. Consider in conjunction with other approved works and prioritise action accordingly.	**L = Possible** **S = Serious** **P = High (FSI)**

Item no.	Audit findings	Suggested action	Priority
6.8.2 Cont'd.	 **Photograph 105:** At the southern roundabout, pedestrian access was not provided across the southern leg on Western Arterial Road.  **Photograph 106:** Eastbound view across the southern leg. There were existing paths on both sides of the road.		

Item no.	Audit findings	Suggested action	Priority
6.8.2 Cont'd.	 **Photograph 107:** Southbound view of departure from southern roundabout. Pedestrian access was not provided across the southern leg on Western Arterial Road.  **Photograph 108:** Westbound approach to existing pedestrian refuge on Rainworth Road.		

Item no.	Audit findings	Suggested action	Priority
6.8.2 Cont'd.	 **Photograph 109:** Approach to existing pedestrian refuge on Rainworth Road from the circulating lane on the southern roundabout.  **Photograph 110:** Southbound view across Rainworth Road at existing pedestrian refuge.		

Item no.	Audit findings	Suggested action	Priority
6.8.2 Cont'd.	 **Photograph 111:** Northbound view across Rainworth Road at existing pedestrian refuge.  **Photograph 112:** Narrow path and non-compliant kerb ramp on southern side of Rainworth Road. Also, a landing pad was not provided at the junction of the path and kerb ramp.		

Item no.	Audit findings	Suggested action	Priority
6.8.2 Cont'd.	 **Photograph 113:** Runic Street eastbound approach to roundabout. A raised island was not installed in the painted island to shield pedestrian movement and provide refuge.  **Photograph 114:** Northbound view across Runic Street. A landing pad was not provided at the junction of the path and non-compliant kerb ramp.		

Item no.	Audit findings	Suggested action	Priority
6.8.2 Cont'd.	 **Photograph 115:** Southbound view across Runic Street. There was poor alignment of paths, and a landing pad was not provided at the junction of the kerb ramp.  **Photograph 116:** Southern corner of intersection with Boundary Road. A landing pad was not provided at the junction of the paths and non-compliant kerb ramp.		

Item no.	Audit findings	Suggested action	Priority
6.8.2 Cont'd.	 **Photograph 117:** Northern corner of intersection with Boundary Road. Pedestrian access on the northern side of the road was via a property access and not a dedicated kerb ramp.  **Photograph 118:** Property access on the northern side of Boundary Road that provide access to the pedestrian refuge.		

Item no.	Audit findings	Suggested action	Priority
6.8.2 Cont'd.	 **Photograph 119:** Northbound approach to 'zebra crossing' located on the northern leg of the southern roundabout.  **Photograph 120:** Southbound approach to 'zebra crossing' located on the northern leg of the southern roundabout.		

Item no.	Audit findings	Suggested action	Priority
6.8.2 Cont'd.	 **Photograph 121:** Narrow path, absence of landing pad, non-compliant kerb ramp on the western roadside of the 'zebra crossing'.  **Photograph 122:** Southbound approach to 'zebra crossing' on path on western side of Western Arterial Road.		

Item no.	Audit findings	Suggested action	Priority
6.8.2 Cont'd.	 **Photograph 123:** Poor surface condition, including potential trip hazards within the refuge island at the 'zebra crossing'.  **Photograph 124:** Looking west across 'zebra crossing'.		

Item no.	Audit findings	Suggested action	Priority
6.8.2 Cont'd.	 **Photograph 125:** Southern side of intersection with Hebe Street. Non-compliant kerb ramp design, also orientation of the approaching path and kerb ramp does not direct and align with the central crossing point and ramp on the northern side of the road.  **Photograph 126:** A cut-out was not provided through the central island (as recommended in Section 8.2.2 of AGRD Part 4A), and the existing kerb ramps were non-compliant. Furthermore, holding bars were not installed like other refuge islands located within the audit site.		

Item no.	Audit findings	Suggested action	Priority
6.8.2 Cont'd.	 **Photograph 127:** Northern side of Hebe Street. A landing pad was not provided at the junction of the path and non-compliant kerb ramp.  **Photograph 128:** Steep grade (greater than 1 in 14) of path along the north-west corner of Hebe Street and Western Arterial Road (northern roundabout).		

Item no.	Audit findings	Suggested action	Priority
6.8.3	Dedicated bicycle lanes or formal shared bicycle/pedestrian paths were not provided throughout the audit site. TMR's *Principal Cycle Network Plan (2016)* indicate Western Arterial Road and Boundary Road (western leg off southern roundabout) are both principal cycling routes. During the day inspections a small number of on-road cyclists were observed navigating the southern roundabout. A number of cyclists were also observed to use off-road paths to cross Western Arterial Road at the 'zebra crossing' located on the northern leg of the southern roundabout. The layout of both roundabouts presented safety risks for on-road cyclists. Enhancing safety for cyclists would be highly beneficial and could be achieved using one or more toolbox treatments provided in TMR's guideline *Providing for people walking and riding bikes at roundabouts (2022).*	**Recommendation 6.8.3.1** Review and verify the status of principal cycling routes in relation to the audit site. Where there is a need for enhanced cycling infrastructure within the audit site, incorporating appropriate toolbox treatments outlined in TMR guidelines as part of upcoming upgrade projects or future planning initiatives. Where funding is limited, consider a staged implementation and prioritise actions accordingly.	**L = Unlikely** **S = Serious** **P = High (FSI)**

Item no.	Audit findings	Suggested action	Priority
6.8.3 Cont'd.			

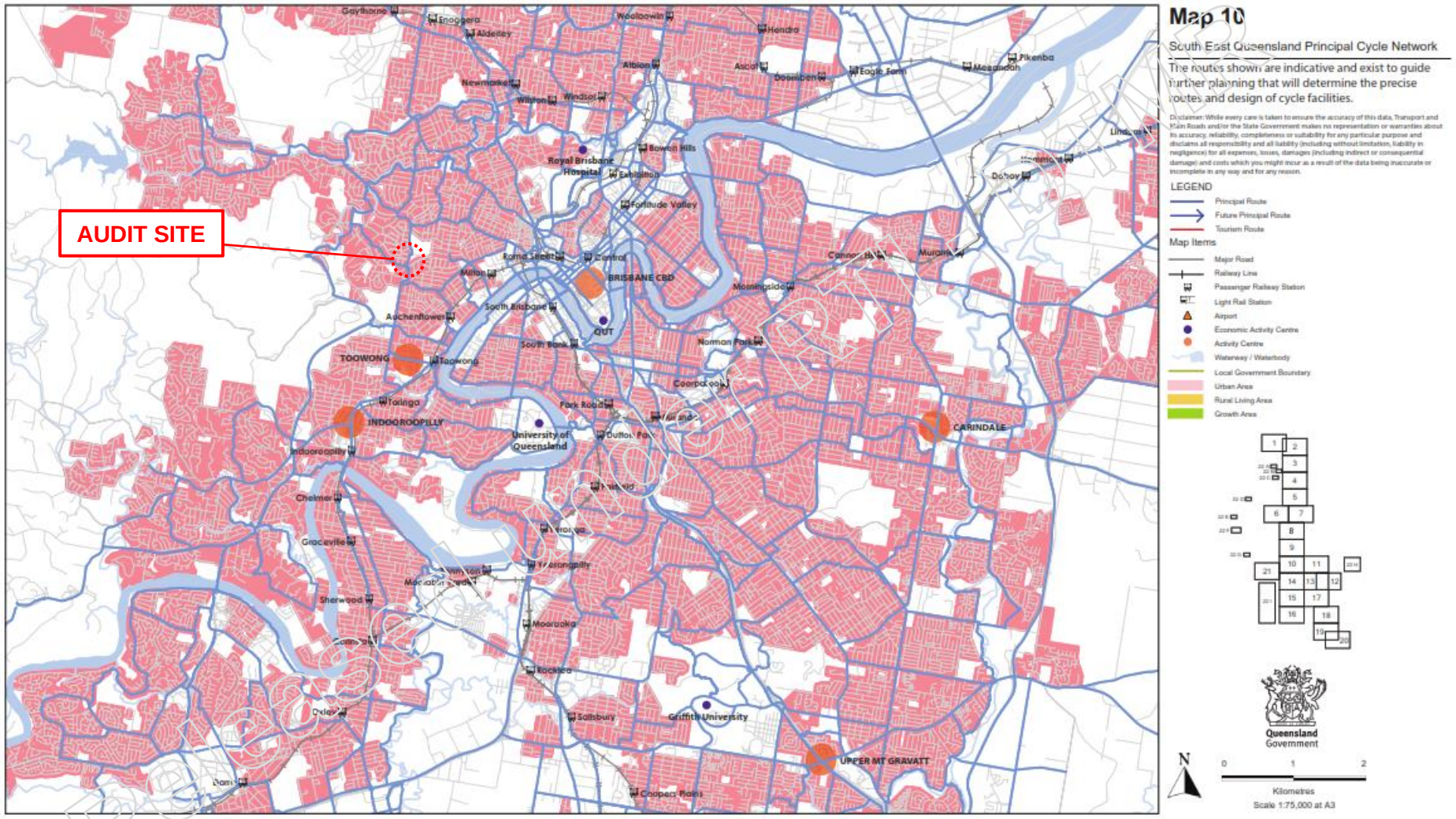


Figure 7: Extract from *TMR's Principal Cycle Network Plan (SEQ) 2016*. As indicated on the map, Western Arterial Road and Boundary Road are identified as principal cycling routes.

Item no.	Audit findings	Suggested action	Priority
6.9 Bridges and culverts			
6.9.1	No bridge and culvert issues were identified during the audit.	No action.	
6.10 Pavement			
6.10.1	The road pavement was generally in good condition throughout the audit site, with only a couple of identified isolated failures. The condition of the pavement was improved by high-friction surface treatments that appeared to have been recently applied along sections of the pavement road.  **Photograph 129:** Failure in the northbound lane of the northern roundabout, adjacent to the intersection with Hebe Street.	**Recommendation 6.10.1.1** Conduct a detailed inspection of the road pavement throughout the audit site to locate and assess pavement failures, and to determine an appropriate course of action to rectify. Prioritise accordingly. Consider in conjunction with other planned maintenance activities and prioritise action accordingly.	**L = Unlikely** **S = Minor** **P = Low**

Item no.	Audit findings	Suggested action	Priority
6.11 Parking			
6.11.1	No parking issues were identified during the audit.	No action.	
6.12 Provision for heavy vehicles			
6.12.1	Observations during the site inspections identified a noticeable proportion of heavy vehicle truck and bus movement through the audit site. Given the traffic carrying function of the road, it is important proposed safety treatment works (such as lane realignment or installation of raised platforms) does not impede access.	**Recommendation 6.12.1.1** Ensure design of safety treatments carefully considers safe and unimpeded access for heavy vehicles.	**L = Possible** **S = Serious** **P = High (FSI)**
6.13 Floodways and causeways			
6.13.1	No floodway and causeway issues were identified during the audit.	No action.	
6.14 Miscellaneous			
6.14.1	No additional issues were identified during the audit.	No action.	

7 Recommendations

The existing stage road safety audit conducted along the subject section of Western Arterial Road U18B has identified a number of safety matters for consideration. These matters have been discussed in Section 6, Table 3 and suggested actions have been identified.

These suggested actions are not intended to be the only possible actions, rather, they have been provided as a guide for remedial action. The responsibility for the selection and implementation of the recommendations rests with Department of Transport and Main Roads, and the department should decide the appropriate actions for the identified issues and select the appropriate remedial measures. Table 4: Summary of Audit Findings is attached in **Appendix A** for the recording of comments and/or further actions in response to the suggested actions listed in Table 3.

8 Audit team statement

The audit team carried out this road safety audit using site inspections and information made available to it. Every effort was made to ensure that all the safety issues were considered.

The above safety audit findings and suggested actions are the opinion and the judgement of the audit team.

Irrelevant

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Darren Shirley
Senior Road Safety Auditor
RoadPro Consulting, Principal Consultant

Irrelevant

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Luke Kidd
Senior Road Safety Auditor
RoadPro Consulting, Engineering Consultant

Appendix A
Summary of audit findings

Table 4: Summary of audit findings

Item no.	Audit findings	Suggested action	Priority	Agreed action	Action officer
6.1 Road alignment and cross section					
6.1.1	There were 'crest' curves in the vertical alignment that diminished forward sight distance on Western Arterial Road on approaches to the southern and northern roundabouts. Refer 'Intersections' Item 6.3.1 and 6.3.2.	Refer Recommendations 6.3.1.1, 6.3.2.1 and 6.3.2.3.			
6.1.2	Although vehicle speeds were not measured during the site inspections, the audit team observed many vehicles entering/exiting and navigating the roundabouts within the audit site at what appeared to be excessive speed for the road geometry. Refer 'Intersections' Item 6.3.1 and 6.3.2.	Refer Recommendations 6.3.1.2 and 6.3.2.2.			
6.1.3	There were a number of locations where a build-up of silt and grass/weeds in kerb and channel inverts was likely to prohibit unrestricted stormwater flow. It was also likely the build-up would cause stormwater to pond and potentially flow into the adjacent traffic lane, creating a safety hazard for cyclists and vehicular traffic. On the northbound approach to the southern roundabout (intersection with Rainworth Road), the issue was exacerbated by a series of steel plates and concrete ramps at property accesses – installed to minimise vehicles bottoming-out as they traversed the changing grade between the road surface and property driveways. In addition to impacting stormwater flow, the steel plates and concrete ramps could present a hazard to cyclists riding along the outer edge of the roadside.	**Recommendation 6.1.3.1:** Arrange maintenance activities to clear all silt and grass/weed build-ups from drainage inverts throughout the audit site. Also, repair or remove damaged or dislodged pieces of concrete ramps. **Recommendation 6.1.3.2:** In conjunction with future upgrade works on Western Arterial Road, consider options to regrade surfaces that would allow the permanent removal of all steel plates and concrete ramps at property accesses. Prioritise action accordingly.	**L = Rare** **S = Serious** **P = Medium (FSI)**		
6.2 Auxiliary lanes					
6.2.1	No issues with existing auxiliary lanes were identified during the audit.	No action.			

Item no.	Audit findings	Suggested action	Priority	Agreed action	Action officer
6.3 Intersections / Property accesses					
6.3.1	**Southern roundabout – Western Arterial Road / Rainworth Road / Runic Street / Boundary Road** There were a number of safety-related issues observed with the southern roundabout, including: • On the northbound approach to the intersection, there was a 'crest' curve in the vertical alignment on Western Arterial Road that limited forward sight distance to the roundabout. ASD to the holding line was approximately 65m from driver's eye height. Section 3 of AGRD Part 4B states that ASD *"should be provided to the holding line"*. Based on a reaction time of 2.0 seconds, Table 3.1 of AGRD Part 4A stipulates a minimum ASD of 92m for a design speed of 70km/h. Where ASD to the holding line is not possible, the absolute minimum requirement is ASD to the (approach) nose of the splitter island, as per Section 3.2.1 of AGRD Part 4B. • Due to the alignment of the circulating carriageway and shape of the central island, there was limited deflection of vehicle paths on several legs as vehicles entered the roundabout. The audit team observed many vehicles appearing to navigate at excessive speed relative to the existing geometry. Given the close spacing of some intersecting legs, and the high congestion observed during the PM peak, the higher speed of some vehicles could impact other driver's ability to select safe gaps to enter the circulating lanes or change lanes within to exit the multi-lane roundabout. Speed differentials could increase the risk of crashes between vehicles at the intersection. • The roundabout was an unusual, elongated oval-shape, with two circulating lanes running along the short straight sides and small radius	**Recommendation 6.3.1.1:** In conjunction with future upgrade works on Western Arterial Road, consider reconstructing the median splitter island on the southern leg so that ASD is achieved to the nose of the island. Prioritise action accordingly. **Recommendation 6.3.1.2:** Instigate a project to identify suitable treatments to reduce the speed of traffic entering and exiting the roundabout. Options may include realigning the approach legs to achieve adequate deflection to limit speeds and/or installing raised platforms across traffic lanes. Consider in conjunction with other approved intersection upgrade works and prioritise approved action accordingly. **Recommendation 6.3.1.3:** Investigate options to improve lane line markings at the transition from single to dual circulating lanes at each end of the roundabout – such as the suitability of a 'spiral' line marking configuration (as outlined in Section 6.3 of AGRD Part 4B). Also, check compliance of lane line and pavements throughout the roundabout and intersecting legs against current departmental standards and guidelines. Develop a mass action project to upgrade	**L = Possible** **S = Serious** **P = High (FSI)**		

Item no.	Audit findings	Suggested action	Priority	Agreed action	Action officer
6.3.1 Cont'd	curves forming a single lane at each end. There were two approach lanes on Western Arterial Road at the northern and southern entrances to the roundabout. Northbound traffic intending to turn right into Rainworth Road, and southbound traffic intending to turn right into Runic Street, were required to change lanes within the roundabout after negotiating the single lane at each end. As there was a lack of lane line markings to define the traffic lanes at each end (i.e. transition from single to dual circulating lanes), there appeared to be a conflict between circulating traffic (intending to change lanes and make a left-turn to exit) and traffic entering the roundabout from the left lane on Western Arterial Road. The conflict was particularly evident during peak traffic. Safety and efficiency could be improved by providing additional lane line markings at each end of the roundabout to assist with lane selection and reinforce priority for circulating traffic – such as a 'spiral' lane marking configuration • Some sight lines were obscured by thick vegetation located within the large central island. The diminished sight lines impacted driver decision times, particularly with regards to selecting safe gaps in traffic. Safety and efficiency could be improved by removing all the smaller hedges/bushes and the lower limbs of the large trees. Ideally, action to improve sight lines to achieve sight distance criteria outlined in Section 3.2 of AGRD Part 4B would be highly desirable. • Signing deficiencies – refer Section 6.4 • Linemarking and delineation deficiencies – refer Section 6.5 • Pedestrian and cycling amenities – refer Item 6.8	line and pavement markings throughout. Consider in conjunction with other approved intersection upgrade works and prioritise action accordingly. **Recommendation 6.3.1.4:** To improve sight lines throughout, instigate a project to remove all the smaller hedges/bushes located within the large central roundabout island. Also, remove all lower-level limbs on the large trees up to 2.5m above ground level. Avoid re-instating low level plantings that could cause a similar issue in the future if unmaintained. Consider in conjunction with other approved intersection upgrade works and prioritise action accordingly.			

Item no.	Audit findings	Suggested action	Priority	Agreed action	Action officer
6.3.2	**Northern roundabout – Western Arterial Road / Service Road / Hebe Street / Warburton Street** There were a number of safety-related issues observed with the northern roundabout, including: • On the northbound approach to the intersection, there was a 'crest' curve in the vertical alignment on Western Arterial Road that limited forward sight distance to the roundabout. ASD to the holding line was approximately 75m from driver's eye height. Section 3 of AGRD Part 4B states that ASD *"should be provided to the holding line"*. Based on a reaction time of 2.0 seconds, Table 3.1 of AGRD Part 4A stipulates a minimum ASD of 92m for a design speed of 70km/h. Where ASD to the holding line is not possible, the absolute minimum requirement is ASD to the (approach) nose of the splitter island, as per Section 3.2.1 of AGRD Part 4B. • The roundabout was an unusual, elongated oval-shape, with small radius curves at each end connecting to short straights along both sides. The straight sections were angled approximately at 45 degrees to the right of both approach legs on Western Arterial Road. Upon entering the roundabout from both Western Arterial Road approaches, drivers were required to navigate a low-speed right curve around the end of the central island before entering the straight. On the northbound approach there was essentially no entry curve (straight alignment entry) to restrict the entry speed of vehicles. Furthermore, there was a 'crest' curve in the vertical alignment (opposite Hebe Street) that severely diminished forward sight distance to the tight right curve and subsequent straight alignment along the side of the roundabout. Black tyre marks on the central island kerb	**Recommendation 6.3.2.1:** In conjunction with future upgrade works on Western Arterial Road, consider reconstructing the median splitter island on the southern leg so that ASD is achieved to the nose of the island. Prioritise action accordingly. **Recommendation 6.3.2.2:** Instigate a project to identify suitable treatments to reduce the speed of traffic entering the roundabout. Options may include realigning the approach legs with appropriate geometry to limit speeds and/or installing a raised platforms across the traffic lanes. Consider in conjunction with other approved intersection upgrade works and prioritise action accordingly. **Recommendation 6.3.2.3:** In conjunction with Recommendations 6.3.2.1 and 6.3.2.2, consider re-grading the vertical alignment on the northbound lane through the roundabout (passing Hebe Street intersection) to improve forward sight distance to the central island kerb and upcoming alignment. Prioritise action accordingly. **Recommendation 6.3.2.4:** In conjunction with future upgrade works on Western Arterial Road, investigation options for	**L = Possible** **S = Serious** **P = High (FSI)**		

Item no.	Audit findings	Suggested action	Priority	Agreed action	Action officer
6.3.2 Cont'd	indicated it was regularly struck by northbound vehicles negotiating the curve. Where the kerb is struck at excessive speed, a vehicle could be re-directed and run-off the left side of the carriageway. On the southbound approach there was a right curve in the alignment that limited vehicle speeds. REDUCE SPEED signing was also installed. As with the northbound leg, upon entering the roundabout drivers were required to navigate a low-speed right curve around the end of the central island. At both ends of the roundabout, the audit team observed many vehicles appearing to navigate at excessive speed relative to the existing geometry. Speed differentials could increase the risk of crashes between vehicles at the intersection. • Some sight lines were obscured by thick vegetation located within the large circulating island. The diminished sight lines impacted driver decision times, particularly with regards to selecting safe gaps in traffic. Operational safety and efficiency could be improved by removing all the smaller hedges/bushes and the lower limbs of the large trees. Ideally, action to improve sight lines to achieve minimum distances outlined in Section 3.2 of AGRD Part 4B would be highly desirable. • There was a service road running parallel to the western side of Western Arterial Road, on the southern side of the roundabout. The service road intersected with Hebe Street (and the edge of the roundabout), immediately adjacent to the southern leg of Western Arterial Road intersecting with the roundabout. The observation angle from the service road to northbound traffic on Western Arterial Road was poor, with drivers required to look almost 180	reconfiguring (to achieve safe sight lines) or prohibiting access to the roundabout from the service road. Prioritise action accordingly. **Recommendation 6.3.2.5:** To improve sight lines throughout, instigate a project to remove all of the smaller hedges/bushes located within the large central circulating island at the roundabout. Also, remove all lower-level limbs on the large trees up to 2.5m above ground level. Avoid re-instating low level plantings that could cause a similar issue in the future if unmaintained. Consider in conjunction with other approved intersection upgrade works and prioritise action accordingly.			

Item no.	Audit findings	Suggested action	Priority	Agreed action	Action officer
6.3.2 Cont'd	degrees back over their shoulder to identify approaching traffic and safe gaps to enter the roundabout. • Signing deficiencies – refer Section 6.4 • Linemarking and delineation deficiencies – refer Section 6.5 • Pedestrian and cycling amenities – refer Item 6.8				
6.4 Signs and lighting					
6.4.1	The application of direction signs varied throughout the audit site. Issues observed included: • varying condition, some with minor damage • different design standards – such as roundabout diagrams and illustration of dual circulating lanes • inconsistencies with content – such as between advance and intersection signs on the same approach leg • no advance direction signs on northbound or southbound approaches to northern roundabout, nor northbound departure from northern roundabout • sign faces obscured by vegetation (refer Recommendation 6.4.7.1) Given the complexity of the alignment and number of intersecting legs throughout the audit site, upgrading signage would benefit both safety and efficiency.	**Recommendation 6.4.1.1:** Instigate a project to review and upgrade all advance and intersection direction signs (and structures as required) throughout the audit site. The scope of works should ensure: • an adequate provision of signage is provided at key decision points (including locations not currently signed) to effectively guide traffic through the complex site • signs are designed in accordance with current departmental design standards, including compliance of content with the local focal point plan. Sign content must be consistent throughout, particularly between advance and intersection signs on the same leg • a consistent approach is adopted for roundabout	**L = Unlikely** **S = Moderate** **P = Medium**		

Item no.	Audit findings	Suggested action	Priority	Agreed action	Action officer
6.4.1 Cont'd		diagrams on advance signs – such as illustrating dual or single circulating lanes. The impact of any proposed changes to lane line markings should also be taken into consideration • sign structures are frangible where required to minimise the risk to occupants of errant vehicles. Consider in conjunction with other approved signing works and prioritise action accordingly.			
6.4.2	SLIPPERY (W5-20) warning signs were installed facing southbound traffic on Western Arterial Road on the approach and departure from northern roundabout. As a high friction pavement surface treatment had been applied to sections of the road in the vicinity, it was unclear if the signs were still warranted. To maintain credibility, it is essential warning signs, such as SLIPPERY, are restricted to locations where there is a current safety issue.	**Recommendation 6.4.2.1:** Confirm the exact locations of the deficient pavement surface and determine whether the high friction pavement surface treatments have rectified the safety issue. Review the warrants for retaining the existing SLIPPERY (W5-20) warning signs. Where signage is not required arrange removal. Consider in conjunction with Recommendation 6.4.3.1 (with regards to the existing REDUCE SPEED sign) and other approved signing works. Prioritise action accordingly.	**L = Rare** **S = Moderate** **P = Low**		

Item no.	Audit findings	Suggested action	Priority	Agreed action	Action officer
6.4.3	As discussed in Section 6.3, the audit team observed many vehicles appearing to enter, circulate and exit the roundabouts at excessive speed. To reinforce the presence of the roundabouts and the need for drivers to navigate at a safe speed, safety could be improved by installing more conspicuous warning signs on approaches.	**Recommendation 6.4.3.1:** Remove the three existing ROUNDABOUT warning signs and posts. Install four (one on each approach to the northern and southern roundabouts) Target Board (TC1308) with a ROUNDABOUT (W2-7) warning sign. Consider in conjunction with Recommendation 6.4.2.1 (with regards to the existing REDUCE SPEED sign) and other approved signing works. Prioritise action accordingly.	**L = Unlikely** **S = Serious** **P = High (FSI)**		
6.4.4	As discussed in Item 6.3.2, there was inadequate ASD on the northbound approach to the northern roundabout. To make the conflict point more conspicuous to approach motorists, safety could be improved by duplicating the regulatory ROUNDABOUT (R1-3) sign on the right side of the carriageway in the existing splitter island.	**Recommendation 6.4.4.1:** To make the location of the conflict point at the intersection more conspicuous to approaching traffic, installed a duplicate ROUNDABOUT (R1-3B) sign on the right side of the carriageway in the splitter island. Consider in conjunction with other approved signing works and prioritise action accordingly.	**L = Possible** **S = Serious** **P = High (FSI)**		

Item no.	Audit findings	Suggested action	Priority	Agreed action	Action officer
6.4.5	There was a UNIDIRECTIONAL HAZARD MARKER (D4-1-1) installed at the northern end of the southern roundabout central island (facing traffic entering from Boundary Road). The sign was in a deteriorated condition. Also, the sign was offset from an electricity pole that posed a safety hazard for occupants of errant vehicles. Safety could be improved by installing a new hazard marker in front of the electricity pole to maximise warning and guidance passed the roadside hazard.	**Recommendation 6.4.5.1:** Remove the existing hazard marker and posts. Install a new UNIDIRECTIONAL HAZARD MARKER (D4-1-1) in front of the electricity pole. Consider in conjunction with other approved signing works and prioritise action accordingly.	**L = Rare** **S = Serious** **P = Medium (FSI)**		
6.4.6	There was a PEDESTRIAN CROSSING warning sign installed facing eastbound traffic approaching the southern roundabout on Boundary Road. The sign referred to the crossing located on the northern departure leg, for left turning traffic. However given its orientation, it could be interpreted as another crossing located ahead for right turning traffic. The existing PEDESTRIAN CROSSING warning signs installed at the zebra crossing appeared to provide adequate warning for left turning traffic out of Boundary Road. To avoid any potential confusion, removal of the subject warning sign is recommended.	**Recommendation 6.4.6.1:** Remove the existing PEDESTRIAN CROSSING (R3-1) warning sign and post.	**L = Rare** **S = Moderate** **P = Low**		

Item no.	Audit findings	Suggested action	Priority	Agreed action	Action officer
6.4.7	Overgrown roadside vegetation obscured several signs throughout the audit site. To maximise safety, particularly with regards to regulatory control and warning messages, it is essential roadside vegetation is regularly inspected and maintained to ensure clear sight lines to signs for approaching road users.	**Recommendation 6.4.7.1:** Arrange vegetation trimming as required to ensure all road traffic signs are clearly visible to approaching traffic. **Recommendation 6.4.7.2:** Review the current maintenance program with a view to ensuring routine inspection and undertaking of vegetation trimming surrounding road traffic signs.	**L = Rare** **S = Serious** **P = Medium (FSI)**		
6.4.8	There were a number of signs in poor or a deteriorated condition throughout the audit site. To maximise safe and efficient traffic movement it is essential signs are maintained to a high standard.	**Recommendation 6.4.8.1:** Instigate a project to replace all damaged and deteriorated signs throughout the audit site. Before replacement, check: • the warrants for retaining sign against relevant guidelines and standards • suitability of current location • compliance of current sign face content and design against relevant guidelines and standards • compliance of existing sign structure if re-used Where funding permits, consider a mass action project to incorporate all approved signing recommendations from this report. Prioritise action accordingly.	**L = Rare** **S = Serious** **P = Medium (FSI)**		

Item no.	Audit findings	Suggested action	Priority	Agreed action	Action officer
6.4.9	There were a number of locations throughout the audit site where tree foliage impacted the spread of street lighting. To maximise safety, it is essential vegetation is regularly inspected and maintained to provide the ultimate spread of lighting.	**Recommendation 6.4.9.1:** Arrange vegetation trimming as permissible to maximise the spread of existing street lighting. **Recommendation 6.4.9.2:** Review the current maintenance program with a view to ensuring routine inspection and undertaking of vegetation trimming street lighting.	**L = Rare** **S = Serious** **P = Medium (FSI)**		
6.5 Markings and delineation					
6.5.1	As a general comment, there appeared to be an adequate provision of line and pavement markings throughout the audit – except on the southern roundabout circulating lanes as discussed in Item 6.3.1. While the overall condition of line and pavement markings was good and visible during daylight and night conditions, there were a few locations where reapplication was required due to dull or worn markings. Also, an edge line was not installed along the northbound lane on Western Arterial Road between the northern and southern roundabouts.	**Recommendation 6.5.1.1:** Undertake a detailed inspection throughout the audit site to identify all locations where dull or worn of line and pavement markings require reapplication. Consider in conjunction with Recommendation 6.3.1.3 and prioritise action accordingly. **Recommendation 6.5.1.2:** Install an edge line along the northbound lane on Western Arterial Road between the northern and southern roundabouts. Consider in conjunction with Recommendation 6.5.1.1 and prioritise action accordingly.	**L = Rare** **S = Serious** **P = Medium (FSI)**		

Item no.	Audit findings	Suggested action	Priority	Agreed action	Action officer
6.5.2	There was an inconsistent application of RRPMs throughout the audit site. While devices were installed along the centre of the road on approaches and between the two roundabouts, their application around intersection splitter islands and roundabout circulating lanes was varied and limited. As RRPMs provide important visual cues, particularly when the road pavement is wet or during foggy/misty weather conditions, it is essential the markings are installed and maintained to a high standard.	**Recommendation 6.5.2.1:** Instigate a project to upgrade RRPMs throughout the audit site to comply with minimum department standards and guidelines. Consider in conjunction with other approved safety works and prioritise action accordingly.	**L = Unlikely** **S = Serious** **P = High (FSI)**		
6.5.3	There were a significant number of raised traffic islands located at the two roundabouts within the audit site. Their conspicuousness during daylight and at night varied and was dependant on the condition of their surfaces and the extent and condition of painted concrete kerbing along the perimeters. At the southern roundabout. The surfaces of the traffic islands were painted terracotta colour, and the surrounding kerbs painted white. Some of the white painted on the kerbs was cracked and peeling. At the northern roundabout, surfaces were unpainted, and the nose of islands painted white. The unpainted concrete surfaces were typically dull and dirty, and there was poor contrast between the traffic island and the adjacent road surface. Some of the white painted on the kerbs was cracked and peeling. Safety could be improved by cleaning and repainting surfaces to provide a high and consistent level of delineation to traffic islands throughout the audit site.	**Recommendation 6.5.3.1:** Instigate a mass action project to improve the delineation of traffic islands throughout the audit site. The scope of works could include: • paint the surfaces of all traffic islands at the 'zebra crossing' kerbs and the northern roundabout the same terracotta colour as all islands at the southern roundabout • where surface painting is not supported, (water) pressure clean the exposed concrete surfaces to improve contrast to the adjacent pavement • repaint all the concrete kerbs surrounding the splitter islands and large central circulating islands with white reflectorised paint (to ensure a consistent standard and condition) Consider in conjunction with other approved safety works and prioritise action accordingly.	**L = Rare** **S = Serious** **P = Medium (FSI)**		

Item no.	Audit findings	Suggested action	Priority	Agreed action	Action officer
6.5.4	As discussed in Item 6.3.2, there was poor vertical and horizontal alignment at the northbound entrance to the northern roundabout (opposite Hebe Street intersection). A 'crest' curve in the vertical alignment severely diminished forward sight distance to the tight right curve and subsequent straight alignment along the side of the large central island. Safety could be improved by installing additional delineation along the top of the concrete kerb (on the central island) to improve visual cues and emphasise the alignment.	**Recommendation 6.5.4.1** At the south-west corner of the central island, remove the small bush and grass surface to maximise forward sight distance across the roundabout for northbound traffic entering the intersection. Seal the surface with concrete or fake turf to prevent re-growth and maintain the sight line. Prioritise action accordingly. **Recommendation 6.5.4.2** Commencing adjacent to the right end of the existing UNIDIRECTIONAL HAZARD MARKER in the central island, install short flexible bollards (or similar) along the top of the concrete kerb at regular intervals (for approximately 25m) to delineate the severity of the curve and subsequent alignment. Where supported, ensure the proposed delineation device is approved for use on the state-controlled rod network. Prioritise action accordingly.	**L = Possible** **S = Serious** **P = High (FSI)**		

Item no.	Audit findings	Suggested action	Priority	Agreed action	Action officer
6.6 Crash barriers and clear zones					
6.6.1	There were a significant number of non-frangible hazards located close to the edge of the traffic lanes throughout the audit site, including: • electricity and street light poles • trees with large diameter trunks • safety barriers • tree lined embankments • retaining walls. A noticeable reduction in roadside hazards would require the undertaking of significant works to relocate electricity and street light poles and remove trees. In addition to extensive costs, it is highly likely environmental constraints and community expectation would prevent (or severely limit) tree removal. Installation of additional safety barriers may be an alternative solution to hazard removal where further investigation identifies an economic benefit. Safety could be improved, at the very least, by implementing better guidance, clearer delineation, and enhanced visual cues as outlined in the signing, linemarking, and delineation recommendations.	**Recommendation 6.6.1.1** Instigate a project to identify and evaluate treatment options for high-risk hazards located within the audit site in accordance with the process detailed in Section 3 of AGRD, Part 6. If the evaluation finds that roadside risk intervention thresholds are met or exceeded, determine the relative priority of identified remedial works and, if appropriate, develop a hazard mitigation project. **Recommendation 6.6.1.2** Where the evaluation suggested in Recommendation 6.6.1.1 determines that safety treatments cannot be justified, ensure a high standard of signing, linemarking, and delineation is implemented.	**L = Possible** **S = Serious** **P = High (FSI)**		

Item no.	Audit findings	Suggested action	Priority	Agreed action	Action officer
6.6.2	Long lengths of safety barrier were installed throughout the audit site. Safety related issues identified with the barriers during the site inspections included: • insufficient offset (working width) to a non-frangible hazard behind a w-beam barrier. To ensure hazards behind flexible barriers are not struck by errant vehicles, the expected maximum deflection of a barrier should not exceed the available room to deflect (as outlined in Section 5.5 of AGRD Part 6). • damage from numerous minor strikes, including minor pocketing that could affect safe operation and performance during future strikes • excessive w-beam offset behind concrete kerb (maximum 200mm as stipulated in Section 6.8.4 of AGRD Part 6) • dislodgement of w-beam rail from blockout. • absence of end terminal on central concrete barrier (northern end of audit site) • absence of delineators on central concrete barrier (northern end of audit site) • excessive spacing of delineators along some sections of w-beam barrier (where installed along small radius curves). Given safety barriers are installed to shield hazardous roadside environments, it is essential they are designed and maintained to a very high standard to maximise safety for road users.	**Recommendation 6.6.2.1** Instigate a project to upgrade the condition and standard (compliance) of safety barriers throughout the audit site. Undertake a detailed inspection to assess existing damage and design and installation compliance against current departmental standards and guidelines. Consider in conjunction with other approved safety works (including Recommendation 6.6.1.1) and prioritise action accordingly.	**L = Possible** **S = Serious** **P = High (FSI)**		
6.7 Traffic signals					
6.7.1	No traffic signal issues were identified during the audit.	No action.			

Item no.	Audit findings	Suggested action	Priority	Agreed action	Action officer
6.8 Pedestrians and cyclists					
6.8.1	There were a number of safety-related issues identified with pedestrian paths throughout the audit site, including: • varying path widths ranging from 1.0m to 2.0m. Section 5.1.2 of AGRD Part 6A stipulates a desirable minimum width of 1.2m, with an absolute minimum width of 1.0m • sections of the narrow paths overgrown with grass and tree foliage that obstructed clear passage • sections of poor surface condition, including cracks and lips causing trip hazards • path edge drop-offs • steep grades along paths that could impact access and safety for people in wheelchairs and mobility scooter/walking frame devices. Along steeper grades, AS1428.1:2021 makes provision for the use of landing pads at regular intervals to give path users relief from the gradient. Given the topography in the general area, it is highly unlikely design standards could be achieved. At minimum, maintenance activities are required to address the key safety issues. Ideally, a mass action project to improve the overall standard and condition of paths throughout the audit site would provide the greatest level of safety and benefit for users.	**Recommendation 6.8.1.1** Arrange maintenance activities to improve the condition of paths throughout the audit site by removing hazards that impact safety and accessibility. The scope of works should include: • repairing surfaces where there is major cracking • grinding off lips that pose a trip hazard • removing overgrown grass and vegetation that obstructs access – particularly along narrower sections of path • backfilling path edges to remove drop-off hazards. Consider in conjunction with other approved works or projects and prioritise action accordingly. **Recommendation 6.8.1.2** Review current maintenance arrangements with a view to ensuring regular inspections and undertaking of upkeep or repair works as required. Consider in conjunction with other approved maintenance activities and prioritise action accordingly.	**L = Possible** **S = Serious** **P = High (FSI)**		

Item no.	Audit findings	Suggested action	Priority	Agreed action	Action officer
6.8.1 Cont'd		**Recommendation 6.8.1.3** Instigate a mass action project to upgrade the standard and condition of paths throughout the audit site, including increased minimum widths. Incorporate Recommendation 6.8.1.1 (where applicable) and consider in conjunction with other approved safety works. Prioritise action accordingly.			

Item no.	Audit findings	Suggested action	Priority	Agreed action	Action officer
6.8.2	There was an inconsistent provision, standard and condition of pedestrian crossings throughout the audit site. Safety-related issues identified during the site inspections included: • absence of a pedestrian crossing facility on Western Arterial Road on the southern side of the southern roundabout • the deteriorated condition and non-compliance of kerb ramps and intersecting paths, along with the absence of landing pads at path/kerb ramp junctions, at the existing pedestrian refuge crossing on Rainworth Road. • absence of a pedestrian crossing facility at the intersection with Runic Street to facilitate safe pedestrian passage across the wide intersection • poor alignment of the pedestrian refuge crossing at Boundary Road, that led pedestrians to/from a property access driveway on northern side of the road. Also, on the southern side of the road, the kerb ramp was non-compliant, and a landing pad was not installed at the path/kerb ramp junction • deteriorated condition of the existing 'zebra crossing' on the northern leg of the southern roundabout, and the non-compliant of kerb ramps • At Hebe Street a cut-out was not provided through the splitter island (as recommended in Section 8.2.2 of AGRD Part 4), and the existing kerb ramps were non-compliant. Additionally, holding rails were not installed, as was provided at other formal crossing points within the audit site Given the high volume of traffic passing through the audit site, safety could be improved by providing a consistent and high standard of road crossings.	**Recommendation 6.8.2.1** Instigate a project to investigate pedestrian activity and desire lines thorough the audit site. Develop a project to upgrade existing crossing deficiencies and install additional crossing points as determined by the investigation. Ensure all new facilities are constructed, and existing facilities upgraded, to comply with current departmental standards and guidelines. Given the anticipated high cost associated with overall construction works, adopt a staged implementation where funding is limited. Consider in conjunction with other approved works and prioritise action accordingly.	**L = Possible** **S = Serious** **P = High (FSI)**		

Item no.	Audit findings	Suggested action	Priority	Agreed action	Action officer
6.8.3	Dedicated bicycle lanes or formal shared bicycle/pedestrian paths were not provided throughout the audit site. TMR's *Principal Cycle Network Plan (2016)* indicate Western Arterial Road and Boundary Road (western leg off southern roundabout) are both principal cycling routes. During the day inspections a small number of on-road cyclists were observed navigating the southern roundabout. A number of cyclists were also observed to use off-road paths to cross Western Arterial Road at the 'zebra crossing' located on the northern leg of the southern roundabout. The layout of both roundabouts presented safety risks for on-road cyclists. Enhancing safety for cyclists would be highly beneficial and could be achieved using one or more toolbox treatments provided in TMR's guideline *Providing for people walking and riding bikes at roundabouts (2022).*	**Recommendation 6.8.3.1** Review and verify the status of principal cycling routes in relation to the audit site. Where there is a need for enhanced cycling infrastructure within the audit site, incorporating appropriate toolbox treatments outlined in TMR guidelines as part of upcoming upgrade projects or future planning initiatives. Where funding is limited, consider a staged implementation and prioritise actions accordingly.	**L = Unlikely** **S = Serious** **P = High (FSI)**		
6.9 Bridges and culverts					
6.9.1	No bridge and culvert issues were identified during the audit.	No action.			
6.10 Pavement					
6.10.1	The road pavement was generally in good condition throughout the audit site, with only a couple of identified isolated failures. The condition of the pavement was improved by high-friction surface treatments that appeared to have been recently applied along sections of the pavement road.	**Recommendation 6.10.1.1** Conduct a detailed inspection of the road pavement throughout the audit site to locate and assess pavement failures, and to determine an appropriate course of action to rectify. Prioritise accordingly. Consider in conjunction with other planned maintenance activities and prioritise action accordingly.	**L = Unlikely** **S = Minor** **P = Low**		

Item no.	Audit findings	Suggested action	Priority	Agreed action	Action officer
6.11 Parking					
6.11.1	No parking issues were identified during the audit.	No action.			
6.12 Provision for heavy vehicles					
6.12.1	Observations during the site inspections identified a noticeable proportion of heavy vehicle truck and bus movement through the audit site. Given the traffic carrying function of the road, it is important proposed safety treatment works (such as lane realignment or installation of raised platforms) does not impede access.	**Recommendation 6.12.1.1** Ensure design of safety treatments carefully considers safe and unimpeded access for heavy vehicles.	**L = Possible** **S = Serious** **P = High (FSI)**		
6.13 Floodways and causeways					
6.13.1	No floodway and causeway issues were identified during the audit.	No action.			
6.14 Miscellaneous					
6.1.14.1	No additional issues were identified during the audit.	No action.			

Appendix B
Recent safety improvement works

Queensland Government

Department of Transport and Main Roads
OPERATIONS
Floor 10 | 313 Adelaide Street | Brisbane Qld 4000
PO Box 70 | Spring Hill Qld 4004
PH: (07) 3066 1371

NOTES:

RPEQ Approved By: Faith Alazawi
Date: 16 May 23

Irrelevant

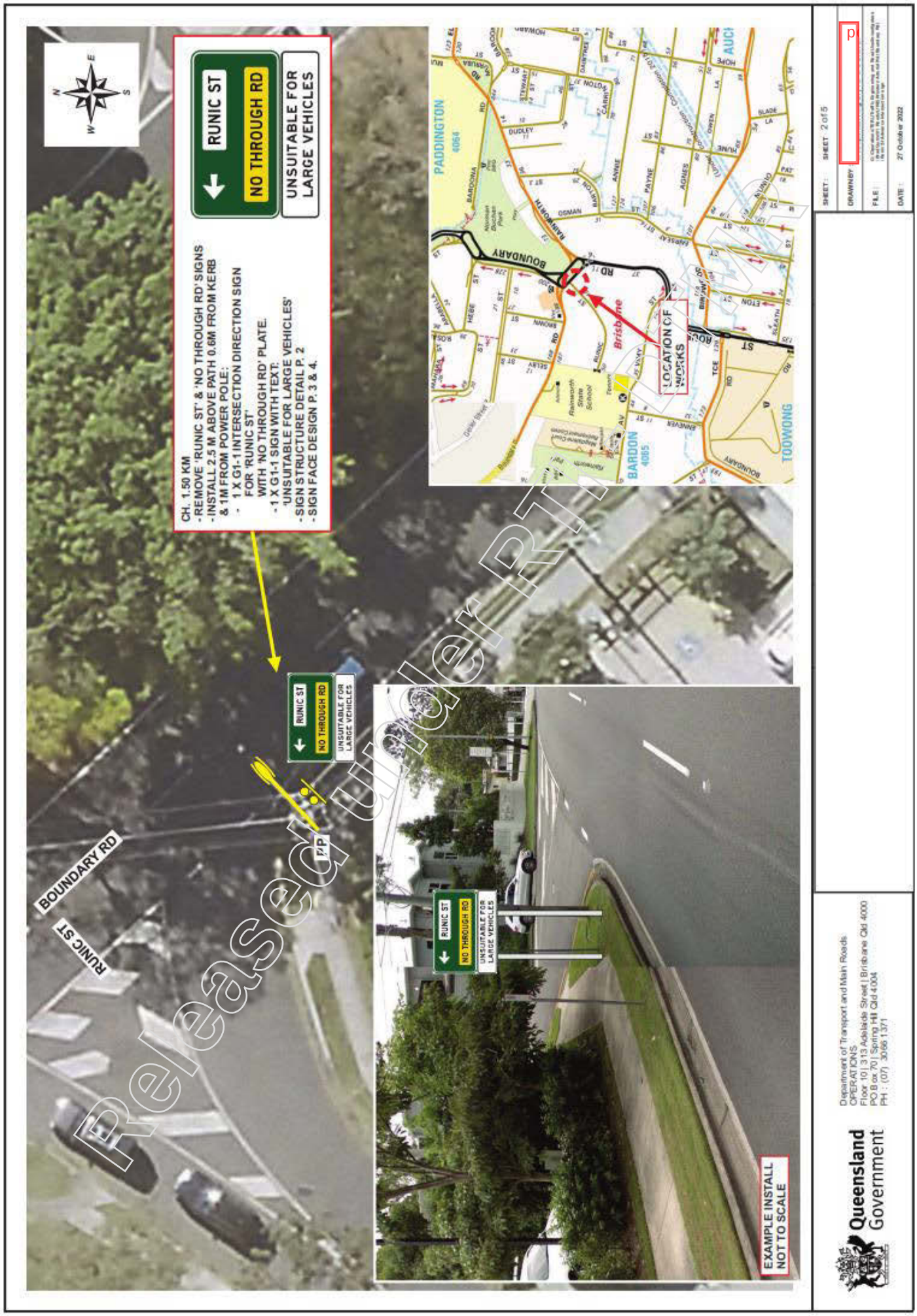
Road # U18B Location - Rouen Rd and Runic St, BARDON

DESCRIPTION : Update to signs and lines for entry into Runic Street

LOCALITY OF WORKS

NOT TO SCALE

SHEET: Cover sheet 1 of 7
DRAWN BY: per
CASE REF: Ministerial
DATE: 15/11/2022



Appendix C
Traffic data

AADT: Complete Report

Area
Region: 706 - Metropolitan
District: 406 - Metropolitan
Road: U18B - WESTERN ARTERIAL ROAD (TOOWONG - EVERTON PARK)

Site
ID: 133384
Type: C - Coverage
Description: North of Rouen Rd R'bout

Spatial
TDist: 1.69 km
Latitude: -27.466368
Longitude: 152.987933

1. Select - **Traffic Year**
2. Select - **Road**
3. Select individual **Traffic Sites** using map select

Traffic Year
2022

Region
All

District
All

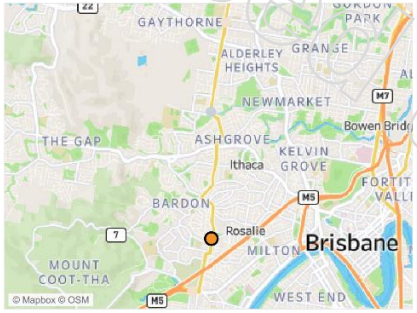
Road
U18B - WESTERN ARTERIAL ROAD (TOOWONG - E..

Site Type
- P - Permanent
- C - Coverage

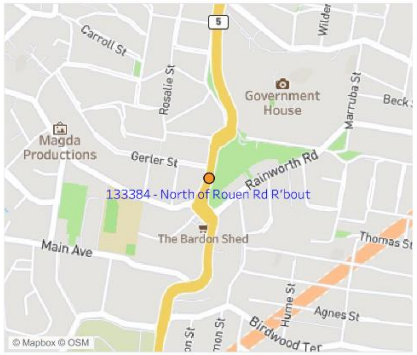
Direction of Travel
- With Gazettal
- Against Gazettal
- Both Directions

Site selection: 133384

Click anywhere on the map to DESELECT a site or click on a different site to CHANGE selection.



Local area zoom (visible once a single site is selected)



Quick Facts (Both Directions only)

AADT: 22,612

Collection year: 2022

Week day % of AADT: 101.48 %

Weekend day % of AADT: 96.31 %

total days in year: 365

days with data: 21

% of year with data 5.75%

Average daily traffic: 23,432

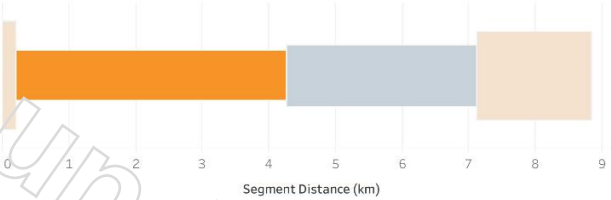
Growth % last year: 2.90 %

Growth % last 5 years: -0.29 %

Growth % last 10 years: 0.28 %

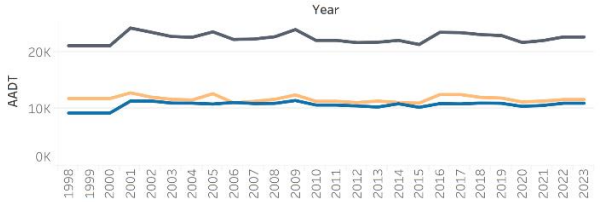
Segments overview for U18B - WESTERN ARTERIAL ROAD (TOOWONG - EVERTON PARK)

Selected road section with segment width and height proportional to length and AADT respectively.



AADT History: 133384

Historical Annual Average Daily Traffic (AADT) values for the Site by Year and Direction of Travel.



AADT and VKT totals by Vehicle Class and Direction of Travel: 133384

The below chart displays Annual Average Daily Traffic (AADT) and yearly Vehicle Kilometers Travelled (VKT 'millions') by Vehicle Class and Direction of Travel.

Vehicle Class Bins	Vehicle Class	With Gazettal AADT	With Gazettal % of AADT Total	With Gazettal VKT	Against Gazettal AADT	Against Gazettal % of AADT Total	Against Gazettal VKT	Both Directions AADT	Both Directions % of AADT Total	Both Directions VKT
1 Bin	00 - All Vehicles	10,980	100.00%	16.2713	11,632	100.00%	17.2375	22,612	100.00%	33.5087
2 Bins	0A - Light Vehicles	10,243	93.29%	15.1795	10,449	89.83%	15.4844	20,692	91.51%	30.6638
	0B - Heavy Vehicles	737	6.71%	1.0918	1,183	10.17%	1.7530	1,920	8.49%	2.8449
4 Bins	1A -Short Vehicles	10,243	93.29%	15.1795	10,449	89.83%	15.4844	20,692	91.51%	30.6638
	1B - Trucks and Buses	665	6.06%	0.9860	1,057	9.09%	1.5669	1,723	7.62%	2.5534
	1C - Articulated Vehicles	64	0.56%	0.0944	117	1.01%	0.1741	181	0.80%	0.2681
	1D - Road Trains	8	0.07%	0.0114	8	0.07%	0.0121	16	0.07%	0.0235
12 Bins	2A - Short 2-Axle Vehicles	10,063	91.65%	14.9126	10,319	88.71%	15.2914	20,380	90.13%	30.2014
	2B - Short Vehicles Towing	180	1.64%	0.2668	130	1.12%	0.1931	312	1.38%	0.4624
	2C - 2-Axle Trucks and Buses	580	5.28%	0.8591	942	8.10%	1.3962	1,522	6.73%	2.2551
	2D - 3-Axle Trucks and Buses	66	0.60%	0.0976	91	0.78%	0.1345	156	0.69%	0.2312
	2E - 4-Axle Trucks	20	0.18%	0.0293	24	0.21%	0.0362	45	0.20%	0.0670
	2F - 3-Axle Articulate	14	0.13%	0.0212	58	0.50%	0.0862	72	0.32%	0.1072
	2G - 4-Axle Articulate	10	0.09%	0.0146	21	0.18%	0.0310	32	0.14%	0.0469
	2H - 5-Axle Articulate	7	0.06%	0.0098	9	0.08%	0.0138	16	0.07%	0.0235
	2I - 6-Axle Articulate	33	0.30%	0.0488	29	0.25%	0.0431	61	0.27%	0.0905
	2J - B Double	8	0.07%	0.0114	8	0.07%	0.0121	16	0.07%	0.0235
	2K - Double Road Trains	0	0.00%	0.0000	0	0.00%	0.0000	0	0.00%	0.0000
	2L - Triple Road Trains	0	0.00%	0.0000	0	0.00%	0.0000	0	0.00%	0.0000

Appendix D
Crash report

Queensland Government

Road Crash 2
CRASH DETAIL REPORT

Crash Types

Crash Dates 01-MAY-2019 - 07-FEB-2025

Owner MR DEPARTMENT OF MAIN ROADS

DCA Code

Group

Fatalities =

Severity

Nature

Alignment: Vertical

Horizontal

Feature

Traffic Ctrl

Speed Limit

Contrib Circ.

Unit Type

Risk Factor

Area

LGA SLA Police Division

Road Sections

All Road Sections S Include Crashes on: Y Thru road Mid-block Y Thru roads at Intersections Y Intersecting roads at Intersections

Road Section	Cway	Start RPC	Start Dist	End RPC	End Dist	Tdist Start	Tdist End	Number of Crashes Fatal	Hosp.	Medical	Minor	PDO	Total
U18B TOOWONG - EVERTON PARK		1A	1.400	3A	0.180	1.400	2.000	0	1	5	3	0	9

Intersections

All Intersections N

Queensland Government

Road Crash 2
CRASH DETAIL REPORT

Crash No.	Date	Day	Hour	DCA	No. Units	Street/s
20240671921	14-NOV-2023	Tue	16	301 Veh: Same [	2	Rouen Rd

Nature: 03 Rear-end
Severity: 3 RECEIVED MEDICAL TREATME

RSect: U18B Toowong - Everton Park
RPC: 1A
Cway: 1
Direction: N
Dist from RPC: 1.441
Inter.:
Tdist: 1.441
Road Surface: Sealed - dry

Alignment: Vertical: 1 Level
Horizontal: 1 Straight
Feature: 99 No feature
Traffic Control: 99 No Traffic Control

Units	Age	Gender	Unit Type	Dirn.	Intended Action	BAC
1	personal in		01 Car, Station Wagon	N	01 Go Straight Ahead	N/A
2			01 Car, Station Wagon	N	11 Stay Stopped	N/A

Description

Crash occurred 14/11/2023 - Matter reported to police via XXX via email 12/3/24 - XXX sent email with report to an email address for station that has no members attached to receive email. Email sent following phone call to reporting officer on 12/4/24. Report of traffic crash unable to be read and transcribed report resent to reporting officer 16/4/24. - The location of the crash is not within the division of reporting officer, and details of the location are unknown (eg intersection type, possible cameras in area). Due to delay in reporting (4 months following crash), matter reported for insurance purpose only. - Details below are based only on the report of traffic incident to police, and due to the delay in reporting and police not attending scene, it is recommended that no further police time be allocated to this matter. Rouen Rd, Bardon, near intersection of Rainworth Rd. U1 XXX, XXX. U2 XXX, XXX. I personal information
personal information
personal information
personal information
personal U2 CTP STATES: Vehicle 2, driven by injured person, was facing North and stationery in a line of traffic about 70 metres South of the entry point to roundabout at Rouen Road / Rainworth Road, Bardon Q 4065. Vehicle 1 was travelling in the same lane as Vehicle 2 but has failed to stop in time to avoid a collision with the rear of Vehicle 2

Contributing Circumstances

2 NOT APPLICABLE
1 DRIVER CONDITIONS - MISCELLANEOUS

Queensland Government

Road Crash 2
CRASH DETAIL REPORT

Crash No.	Date	Day	Hour	DCA	No. Units	Street/s
20221808288	30-AUG-2022	Tue	18	301 Veh: Same D	2	Rainworth Rd Rouen Rd

Nature: 03 Rear-end
Severity: 4 MINOR INJURY - FIRST AID OR

RSect: U18B Toowong - Everton Park
RPC: 1A
Cway: 2
Direction: N
Dist from RPC: 1.536
Inter.:
Tdist: 1.536
Road Surface: Sealed - wet

Alignment: Vertical: 2 Grade
Horizontal: 3 Curved-View open
Feature: 15 Roundabout
Traffic Control: 09 Give Way

Units	Age	Gender	Unit Type	Dirn.	Intended Action	BAC
1	personal i		01 Car, Station Wagon	N	01 Go Straight Ahead	0
2			01 Car, Station Wagon	N	01 Go Straight Ahead	0

Description

Unit 1 in this matter isxdriving aa white Hyundai I30 Hatch QLD reg x. Unit 2 is xa Black Kia Carnival QLD reg x Police attended the incidnet at the time. Assessments were made and both cars were driven from the location by the involved parties. No injuries were reported at the time of the incident. QAS attended. Conditions on the night were wet. The location is a known hotspot due to the amount of traffic that passes through the area. Some parts of Rouen Road are exceptionally slippery when wet. This matter was reported to police as per CTP insurance claim policy. Unit 2 provided a version: "Both vehilce 1 and vehicle 2 were travelling northwest on Rouen Rd Bardon. Before entering the roundaout between Rainworth Rd and Rouen Rd, Vehicle 2 was brought into a stationary position to give way to vehicles in the roundabout. However, Vehicle 1 failed to slow down, rar ending vehicle 2. As a result of the accident, the driver of vehicle 2 s personal information The driver of vehicle 1 caused the accident by failing to 1) operate the vehicle with due car and attenion 2) observe the road circumstances and avoid the collision 3) maintain a safe following distance." Unit 1 stated that per was following behind the other car when it stopped at the roundabout. Unit 1 attempted to stop but was unable to do so. Recommend no action be taken in relation to this incident. This was a minor TA in wet slippery conditions.

Contributing Circumstances

2 ROAD - WET/SLIPPERY
1 ROAD - WET/SLIPPERY

Queensland Government

Road Crash 2
CRASH DETAIL REPORT

Crash No.	Date	Day	Hour	DCA	No. Units	Street/s
20201901565	08-SEP-2020	Tue	00	301 Veh: Same [	2	Runic St

RSect U18B Toowong - Everton Park
Cway 2 Direction N
Inter. 500 U18B/RainworthN52/RunicN53/BoundaryN5
Road Surface Sealed - dry

RPC 1A
Dist from RPC 1.550
Tdist 1.550

Nature 03 Rear-end
Severity 3 RECEIVED MEDICAL TREATME
Alignment: Vertical 1 Level
Horizontal 1 Straight
Feature 99 No feature
Traffic Control 99 No Traffic Control

Units	Age Gender	Unit Type	Dirn.	Intended Action	BAC
1	personal inf	01 Car, Station Wagon	N	98 Unknown/Not Stated	N/A
2		01 Car, Station Wagon	N	11 Stay Stopped	N/A

Description
Veh 2 was hit from behind by a unknown white Vehicle. Veh 1 hit and run. No CCTV and no vehicle details provided. Please file pending fresh information. Veh 2 advised we would not be able to take action without further information.

Contributing Circumstances
2 NOT APPLICABLE
1 DRIVER DECAMPED
1 MISCELLANEOUS

Queensland Government

Road Crash 2
CRASH DETAIL REPORT

Crash No.	Date	Day	Hour	DCA	No. Units	Street/s
20230874794	27-MAY-2023	Sat	17	806 Off Path: Cu	1	Rainworth Rd Rouen Rd

Nature: 09 Motor cycle or pedal cycle overt
Severity: 3 RECEIVED MEDICAL TREATME

RSect: U18B Toowong - Everton Park
RPC: 1A
Cway: 2
Direction: E
Dist from RPC: 1.550
Tdist: 1.550
Inter.: 500 U18B/RainworthN52/RunicN53/BoundaryN5
Road Surface: Sealed - dry

Alignment: Vertical: 1 Level
Horizontal: 3 Curved-View open
Feature: 15 Roundabout
Traffic Control: 09 Give Way

Units	Age	Gender	Unit Type	Dirn.	Intended Action	BAC
1	personal in		06 Motor Cycle	E	04 Make Left Turn	0

Description

Involvements Unit 1 Rider: S personal infor XXX (XXX), Indooroopilly Highway Patrol Unit 1 vehicle: Marked 2019 Yamaha FJR1300 Motorcycle QLD rego XXX Incident On 27 May 2023 at about 1710hrs Unit 1 was travelling along Boundary Road Bardon and has gone to make a left hand turn into Rainworth Rd Bardon. Unit 1 has proceeded into the turn and has hit loose gravel on the outside of the roadway which has caused the rider to lose control of his vehicle dropping the bike onto the right hand side. Unit 1 rider and bike have slid across the roadway coming to rest about halfway through the corner. Inquiries The reporting officer has been contacted by the rider of Unit 1. The rider has advised that they had notified the DDO (perso XXX) of the incident. The reporting officer has then attended the occurrence address and liaised with Unit 1 rider. Also on scene was S/C XXXX, Indooroopilly Highway Patrol (rostered shift) and S/C XXXX (off duty) who were both contacted by the rider of Unit 1. The reporting officer has conducted an RBT on the driver of Unit 1 which returned a negative result. Unit 1 rider advised that there was a member of the public who may have captured the incident on dashcam. Unit 1 provided the name of XXXX M: XXX. Contacted the number and message left for XXXX to make contact. Unit 1 rider l personal information
personal information via S/C XXXX. Unit 1 vehicle sustained a damaged right hand side mirror, a damaged throttle, scratches to the right hand pannier and scratches to the right hand side crash bars. Recommendations It is recommended that no further action be taken in relation to this matter.

Contributing Circumstances

1 ROAD - GRAVEL/DIRT

Crash No.	Date	Day	Hour	DCA	No. Units	Street/s
20230291816	14-FEB-2023	Tue	15	302 Veh: Same [	2	Rainworth Rd Rouen Rd

Nature: 03 Rear-end
Severity: 4 MINOR INJURY - FIRST AID OR

RSect: U18B Toowong - Everton Park
RPC: 1A
Alignment: Vertical: 2 Grade
Cway: 2
Direction: W
Dist from RPC: 1.550
Horizontal: 1 Straight
Inter.: 500 U18B/RainworthN52/RunicN53/BoundaryN5
Tdist: 1.550
Feature: 15 Roundabout
Road Surface: Sealed - wet
Traffic Control: 09 Give Way

Units	Age	Gender	Unit Type	Dirn.	Intended Action	BAC
1	personal ir		01 Car, Station Wagon	W	04 Make Left Turn	N/A
2			01 Car, Station Wagon	W	07 Slow Or Stop	N/A

Description

Scene: The occurrence address is Rainworth Road at the intersection of Rouen Road BARDON. The road is in good sealed condition. The weather conditions at the time of the incident were wet, rainy and overcast. Incident: The occurrence time is approximately 3:07pm on 14/2/2023. At this time, U2 approached and stopped at the intersection of Rainworth Road and Rouen Road BARDON. As U2 driver was waiting for a safe gap in traffic to proceed onto Rouen Road, U1 has failed to stop safely behind U2 and collided with U1s rear. Vehicle & Damage Sustained: Unit 1 is a White Toyota Landcruiser bearing QLD registration xxxxxx. Unit 1 sustained minor damage to the front bumper. Unit 2 is a White Jaguar F Pace station wagon bearing QLD registration xxxxx Unit 2 sustained minor damage to the rear bumper Drivers, Passengers Unit 1 driver was a xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx of xxxxxxxxxxxxxx xxxxxxx. The driver was the holder of a current QLD class C type P2 licence xxxxxxxxxx. The drivers licence is to expire on personal Unit 1 driver sustained unknown injuries as a result of the crash. Unit 2 driver was a xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx of xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx. The driver was the holder of a current QLD class O type C licence xxxxxxxxx. The drivers licence is to expire on personal Unit 2 driver s personal information pers Unit 2 front left passenger was a xxxxxxxxxxxxxxxxxxxxx of xxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx. Unit 2 front left passenger personal information personal

Contributing Circumstances

1 ROAD - WET/SLIPPERY
2 ROAD - WET/SLIPPERY
1 DRIVER CONDITIONS - MISCELLANEOUS

Road Crash 2
CRASH DETAIL REPORT

Crash No.	Date	Day	Hour	DCA	No. Units	Street/s
20220706121	25-FEB-2022	Fri	06	301 Veh: Same D	2	Rainworth Rd Rouen Rd

Nature: 03 Rear-end
Severity: 3 RECEIVED MEDICAL TREATME

RSect: U18B Toowong - Everton Park
RPC: 1A
Alignment: Vertical: 4 Dip
Horizontal: 1 Straight
Cway: 3
Direction: S
Dist from RPC: 1.585
Feature: 15 Roundabout
Inter.:
Tdist: 1.585
Road Surface: Sealed - dry
Traffic Control: 09 Give Way

Units	Age	Gender	Unit Type	Dirn.	Intended Action	BAC
1		personal	01 Car, Station Wagon	S	01 Go Straight Ahead	N/A
2			01 Car, Station Wagon	S	11 Stay Stopped	N/A

Description

INCIDENT - U1 REAR ENDED U2 AT ROUNDABOUT WHILST U2 WAS STATIONARY. BOTH UNITS HEADING SOUTH ON BOUNDARY ROAD INTENDING TO TRAVEL STRAIGHT AHEAD. REPORTED VIA LAWYERS FOR CTP CLAIM - DETAILS LIMITED. CTP CLAIM UPLOADED

Contributing Circumstances

2 NOT APPLICABLE
1 DRIVER CONDITIONS - MISCELLANEOUS

Queensland Government

Road Crash 2
CRASH DETAIL REPORT

Crash No.	Date	Day	Hour	DCA	No. Units	Street/s
20230741236	03-MAY-2023	Wed	05	001 Pedn: Near	2	Boundary Rd

Nature: 10 Hit pedestrian
Severity: 4 MINOR INJURY - FIRST AID OR

RSect: U18B Toowong - Everton Park
RPC: 1A
Alignment: Vertical: 1 Level
Cway: 2
Direction: N
Dist from RPC: 1.602
Horizontal: 3 Curved-View open
Inter.:
Tdist: 1.602
Feature: 99 No feature
Road Surface: Sealed - dry
Traffic Control: 11 Pedestrian Crossing

Units	Age	Gender	Unit Type	Dirn.	Intended Action	BAC
1	personal i		01 Car, Station Wagon	N	01 Go Straight Ahead	N/A
2			10 Pedestrian	E	27 Cross Carriageway	N/A

Description

What Happened At approximately 10:00hrs on 05/05/2023 Unit2 attended The Gap Police Station to report a TA with injury. At approximately 06:00hrs on 03/05/2023 Unit 2 was walking personal i northbound along Boundary Road, Bardon. As Unit 2 started crossing pedestrian crossing on Boundary Rd, Bardon when per was hit by Unit 1. Units involved Unit 1 Red Suzuki Swift 2005 with QLD reg x Driver - x Authorised person/Driver - x Unit 2 Pedestrian: x Injuries. Unit 1 - Unknow. Unit 2 - Unit 2 fell on the ground and personal information personal information personal information Unit 2 did not attend a doctor to report injuries. Reporting Officer's investigations Police did not attend. Unit 2 attended the station to make a report. There are nil other witnesses and nil CCTV footage or dash cam. Attempted to contact Unit 1 to obtain a version to no avail, message left. Reporting Officer's recommendation U1 version to be obtained for completeness and appropriate action taken if necessary.

Contributing Circumstances

2 NOT APPLICABLE
1 VIOLATION - FAIL TO GIVE WAY ON PEDEST
1 ANIMAL UNCONTROLLED - ON ROAD

Crash No.	Date	Day	Hour	DCA	No. Units	Street/s
20191828165	19-AUG-2019	Mon	16	301 Veh: Same D	2	Boundary St Warburton St

RSect U18B Toowong - Everton Park
Cway 2 Direction N
Inter. 16707 Int. U18B and Warburton Rd
Road Surface Sealed - dry

RPC 3A
Dist from RPC 0.060
Tdist 1.880

Nature 03 Rear-end
Severity 3 RECEIVED MEDICAL TREATME
Alignment: Vertical 1 Level
Horizontal 2 Curved-View obscured
Feature 11 T junction
Traffic Control 99 No Traffic Control

Units	Age	Gender	Unit Type	Dirn.	Intended Action	BAC
1	personal i		02 Utility, Panel Van	N	01 Go Straight Ahead	N/A
2			02 Utility, Panel Van	N	11 Stay Stopped	N/A

Description

Unit 2 was travelling on Boundary Street, towards Enoggera. Unit 2 had just come through the roundabout with Warburton Street and was stationary in traffic. Unit one has exited the roundabout and hit unit 2 from behind. The drivers have exchanged details and unit one was towed from the scene.

Contributing Circumstances

2 NOT APPLICABLE
1 DRIVER CONDITIONS - MISCELLANEOUS

Queensland Government

Road Crash 2
CRASH DETAIL REPORT

Crash No.	Date	Day	Hour	DCA	No. Units	Street/s
20191359039	15-JUL-2019	Mon	11	104 Veh: Adjace	2	Hebe St / Warburton St

RSect: U18B Toowong - Everton Park
Cway: 3 Direction: N
Inter.: 16707 Int. U18B and Warburton Rd
Road Surface: Sealed - dry

RPC: 3A
Dist from RPC: 0.060
Tdist: 1.880

Nature: 02 Angle
Severity: 2 ADMITTED TO HOSPITAL
Alignment: Vertical: 4 Dip
Horizontal: 3 Curved-View open
Feature: 15 Roundabout
Traffic Control: 09 Give Way

Units	Age Gender	Unit Type	Dirn.	Intended Action	BAC
1	personal in	01 Car, Station Wagon	S	03 Make Right Turn	0
2		06 Motor Cycle	N	01 Go Straight Ahead	96

Description

Police from Indooroopilly were called to attend a 2 vehicle traffic crash with injury. U1 driver has failed to giveway to his right at the round about and has collided with U2, causing injuries. Location: Boundary Rd/ Warburton St, Bardon. On arrival QAS were in attendance and were treating U2 driver xx for a personal information was unable to assist Police with a version due to per injuries. Will be spoken to at a later date. U2 vehicle was towed. U1 driver provided a version and has made full admissions to being at fault and was issued with a fail to giveway at a round about TIN. U2's bike has knocked flat a street sign at the round about. On the 2nd July 2019 at 13:45hrs U2 -xx) - has called the station making a request for information relating to this incident. U2 stated that pe had just recently been personal information personal information A version was provided fromxx. Matter can be finalised. This matter has been overviewed by Sgtxx. Unit 1 issued TIN at scene. This matter can now be finalised.

Contributing Circumstances

2 NOT APPLICABLE
1 VIOLATION - DISOBEY GIVE WAY SIGN