Heatherbank Terrace, Stonyfell

Road Safety Audit



May 2017





Prepared By	lan Bishop Traffic Engineer	Date	24/03/17
	T: 08 8202 4703 E: ibishop@raa.com.au		

Approved By	Charles Mountain Senior Manager Road Safety	Date	08/05/17
	T: 08 8202 4568 E: CMountain@raa.com.au		

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1 Introduction

1.1 Introduction

In March 2017, RAA received a number of enquiries from members about a slow point that had been constructed on Heatherbank Terrace, Stonyfell. An initial site visit was undertaken to establish the nature of members concern. In response to the initial site visit, RAA have undertaken a formal Road Safety Audit within the proximity of the intersections of Wurinya Avenue, Karri Street and Heatherbank Terrace.

This report outlines the findings of the Road Safety Audit and provides recommendations for the consideration of The City of Burnside Council.

1.2 About the Road Safety Audit

A road safety audit is a formal examination of an existing or proposed road or intersection, by an independent and qualified multidisciplinary team. The purpose of the audit is to identify risks and hazards that may result in a collision and provide broad recommendations that will reduce the probability and/or consequence of a collision occurring.

The audit is conducted in accordance with the *Austroads Guide to Road Safety, Part* 6: *Road Safety Audit*, which defines a multi-stage review process for the audit, and incorporates the following stages:

- Feasibility / Concept Design
- Preliminary Design
- Detailed Design
- Construction (Road Works)
- Pre-Opening to Traffic
- Existing Road Audits

The Road Safety Audit undertaken on Heatherbank Terrace is classed as an existing road audit.



1.3 Road Safety Audit Team

The road safety audit team comprised of the following members of staff:



Ian Bishop is a Traffic Engineer at RAA. He is an accredited road safety auditor and is certified in the use of Vericom accelerometers for road operations. He has over 10 years' experience in Civil & Traffic Engineering including highways, intersection design and modelling, road safety mass action treatments and the design and implementation of local area traffic management.



Charles Mountain is the Senior Manager – Road Safety at RAA. He has extensive experience in transport, traffic and road safety. Prior to joining RAA he had over 25 years' experience in local government managing a wide variety of traffic, access and parking issues. He has qualifications in engineering, business management and is a qualified road safety auditor.



1.4 Background

Heatherbank Terrace is a residential street in Stonyfell running in an east-west direction, connecting Hallet Road to Penfold Road. The street is characterised by a steep grade, which peaks at 16%, running downhill in the westbound direction.



Source: Google Maps

Figure 1 – Location of driveway link on Heatherbank Terrace

Between 2006 and 2015, there were 7 crashes reported on Heatherbank Terrace involving property damage to vehicles. The only crash that occurred within the vicinity of the driveway link was a "hit parked vehicle" crash in 2011. Since the driveway link was installed in 2016, RAA is not aware of any crashes having occurred on Heatherbank Terrace.

Traffic surveys were conducted in November 2013, which recorded an average annual daily traffic volume (AADT) of 1168 vehicles per day and an 85th percentile speed of 62km/h. A second traffic survey was undertaken in November 2016, which showed a traffic volume of 962 vehicles per day and the 85th percentile speed was found to be 56km/h.



2 Site Investigation

RAA undertook the Road Safety Audit on 26th April 2017 at 15:20. Weather at the time of the assessment was overcast but ground conditions were dry. A night audit was not performed but may be undertaken at a later date.

3 Audit Findings

3.1 Heatherbank Terrace

a) Steep Grade – Heatherbank Terrace is characterised by a steep grade, which peaks at 16%. RAA undertook grade measurements immediately prior to, on and after the driveway link using a Vericom VC4000 which suggested an approximate grade of 14.1% at that locality. The installation of driveway links on grades exceeding 10% is not desirable since it necessitates an increased level of braking while negotiating the geometry. There is an increased risk of loss of control on steeper grades. Additionally, the change of grade at either end of the driveway link can cause vehicles to scrape at the crest and may inflict damage to vehicles. There is evidence of this occurring (Figure 3)

It is recommended that other forms of traffic calming devices should be considered which would reduce the driver's workload on a steep grade. Should a driveway link be maintained, it is recommended that the changes of grade are assessed and managed in accordance with the requirements outlined in DPTI's "Manual of Legal Responsibilities and Technical Requirements for Traffic Control Devices" document. Reference also should also be made to AS2890.1 which stipulates change of grade requirements for accesses, to reduce the risk of vehicle damage.



Figure 2 – Steep grade on approach to the driveway link.





Figure 3 – Evidence of vehicles scraping the pavement at the eastern side of the driveway link.

b) Excessive vehicle speed – It is understood that the driveway link was installed to stop vehicles travelling at speed in excess to the posted limit. Excess speed increases the crash risk, particularly at intersections. The driveway link acts as a standalone traffic calming device and does not necessarily address speed issues throughout Heatherbank Terrace.

It is therefore recommended that if safer traffic speeds are to be achieved, a suite of traffic calming devices are implemented along Heatherbank Terrace to ensure a consistent speed reduction throughout.

c) Challenging geometry – The audit team observed a number of light vehicles encountering difficulty in negotiating the driveway link. The kerbs may not be visible to drivers in some vehicles as a result of the combination of the narrow lane, tight curve radii and the grade of the driveway. The result was some light vehicles partially mounting the kerb. Heavy vehicles also appear to have difficulty negotiating the curves and aprons have been retrofitted on the inner radii. The challenging radius may increase the risk of vehicles departing the driveway midsection as a result of the motorists' inability to see the proximity of the kerb to the side of the vehicle, or for less skilled motorists.

If the driveway link is to remain, it is recommended the radii of the curves are increased, or the lane width increased, to assist traffic to negotiate the link.





Figure 4 – Numerous scrape and scuff marks along the kerb indicate vehicles are encountering difficulty negotiating the geometry.

d) Kerb drop on aprons – Aprons have been constructed on the inner radius of the curves to accommodate heavy vehicle swept paths. The aprons have been constructed lower than the kerb height. Any light vehicle which unintentionally mounts the kerb may incur rim damage and once over, the kerb may act as a guide rail for the wheels, resulting in some loss of control.

It is recommended that the aprons are reconstructed to be level with the top of the kerb.



Figure 5 – Vertical drop of approximately 100mm onto the apron on the inner curve, long scuff marks indicates kerb is acting as a guide rail for errant vehicles and light vehicles may experience difficulty returning to the lane.



e) Driveway link access radii and kerb height – In the eastbound direction, the driveway link positions vehicles towards the centre of the road. In order to continue east on Heatherbank Terrace, the vehicle must turn left to stay within the eastbound traffic lane. The curve radii are sharp for this left turn manoeuvre and the kerb height is high. There is a risk of vehicles cutting the kerb and sustaining damage. Additionally, there is a side entry pit which may also sustain damage from this movement and the collapse of the cover from such a manoeuvre is a risk.

It is recommended that the curve radii at the access onto the driveway link is increased and the side entry pit relocated, or an alternative drainage solution is developed.



Figure 6 – Entry radii into the driveway link are sharp and side entry pits are located immediately adjacent, increasing the risk of damage to vehicles and pits covers.





Figure 7 – Kerb height at driveway link entry radius is at least 150mm. Vehicles turning sharply in our out of the driveway link are at risk of sustaining damage.

f) Erosion – Exposed areas of the landscape area are prone to erosion, particularly since the driveway link occurs on a steep grade. Wash out of material will reduce the skid resistance on sections of Heatherbank Terrace that are critical for braking and cornering.

It is recommended that jute matting is installed on any remaining exposed sections of the nature strip and appropriate ground cover plants are introduced to stabilise the topsoil. Additionally, the concrete apron should be extended to reduce topsoil exposure to heavy vehicle over-run.



Figure 8 – Evidence of erosion within main landscaping.





Figure 9 – Evidence of erosion adjacent to apron.

g) Eastbound delineation – Three roadside marker posts have been provided on the north side of the driveway access. Since Heatherbank Terrace has been realigned with a 90 degree curve onto Wurinya Avenue, a unidirectional marker may be more appropriate.

It is recommended that a unidirectional marker is installed on the north side of the driveway in the eastbound direction in accordance with AS1742.2 to improve delineation.

 h) Warning signs – Warning signs corresponding to the change of priority are absent on all approaches to the site. The addition of modified intersection warning sign (W9-1) in accordance with AS1742.2 would clarify the change of priorities and reduce the likelihood of confusion.

It is recommended that warning signs W9-1 (L) be installed on Heatherbank Terrace in either direction.



 Asphalt hump on road – An asphalt hump has been constructed on the east side of the driveway link in the eastbound lane. It is unlikely that this will be visible at night and may present a hazard for cyclists and vehicles travelling in the eastbound direction. The hump also serves to divert stormwater from the kerbside which is



not desirable since water sheeting may occur in high rainfall events, which could present a hydroplaning hazard.

It is recommended that the hump is removed and stormwater redesigned to avoid the need for physical deflections within a trafficable area.



Figure 11 – Asphalt hump constructed within traffic lane to deflect stormwater.

3.2 Wurinya Avenue

 a) Warning signs – Warning signs corresponding to the change of priority are absent on all approaches to the site. The addition of modified intersection warning sign (W9-1) in accordance with AS1742.2 would clarify the change of priorities and reduce the likelihood of confusion.

It is recommended that warning sign W9-2 (R) be installed on Wurinya Avenue.





3.3 Karri Street

 b) Warning signs – Warning signs corresponding to the change of priority are absent on all approaches to the site. The addition of modified intersection warning sign (W9-1) in accordance with AS1742.2 would clarify the change of priorities and reduce the likelihood of confusion.

It is recommended that warning sign W9-2 (R) be installed on Karri Street.



4 Summary & Recommendations

The road safety audit at the driveway link on Heatherbank Terrace has identified a number of recommendations, a summary of which is provided in Table 1 below. Suggested priorities have also been included, where 1 is high priority and 3 is low priority. A further table is provided in Appendix A to enable the road authority to respond to the audit.

Item No.	Risk / Hazard Description	Recommendation	Priority
3.1 –	Heatherbank Terrace		
(a)	The steep grade may affect drivers the ability to negotiate driveway link. The change of grade at driveway link may result in damage to the underside of vehicles.	 Consider alternative traffic calming solutions. Ensure change of grade meets the requirements outlined DPTI's "Manual of Legal Responsibilities and Technical Requirements for Traffic Control Devices" document or those of AS2890.1. 	1
(b)	Excessive vehicle speed. Driveway link in isolation will not reduce speed throughout Heatherbank Terrace.	 Install a suite of traffic calming device to ensure desired speed is enforced along Heatherbank Terrace in its entirety 	2
(C)	Challenging geometry for both heavy and light vehicles.	 Consider alternative traffic calming devices. Increase curve radii. 	2
(d)	Kerb drop on aprons may inflict damage to vehicles.	 Reconstruct apron level to the top of the kerbing. 	1
(e)	Driveway access radii sharp with high kerbs may inflict damage to vehicles.	 Reconstruct access with wider radii Relocate side entry pit on north east side. 	1

Table 1 – Summary of Recommendations



Item No	Risk / Hazard Description	Recommendation	Priority
(f)	Soil erosion and washout may reduce pavement skid resistance.	 Install jute matting to exposed areas of landscaping. Plant exposed areas with appropriate spreading ground cover. Extend concrete apron where exposure to heavy vehicle turning movements will continue. 	3
(g)	Eastbound delineation could be improved.	 Install unidirectional marker on the north side, in the eastbound direction. 	3
(h)	Warning signs corresponding to change of priority are absent on all approaches.	 Install warning sign W9-1 (L) in both the westbound and eastbound directions. W9-1 (L) 	2
(i)	Asphalt hump in the traffic lane may pose a hazard to cyclists and vehicles and could cause sheeting of water across the road.	 Remove hump Re-design drainage. 	1
3.2 -	Wurinya Avenue		
(a)	Absence of warning sign corresponding to the change of priority.	 Install warning sign W9-2 (R) southbound. W9-2 (R) 	2



Item No.	Risk / Hazard Description	Recommendation	Priority
<u> 3.3 –</u>	Karri Street		
(a)	Absence of warning sign corresponding to the change of priority.	 Install warning sign W9-2 (R) northbound. W9-2 (R) 	2



5 Concluding Statement

This road safety audit has been conducted by the audit team through an on-site inspection for the purposes of identifying infrastructure and/or environmental issues that may present safety risks for road users.

The identified issues have been noted in this report and the accompanying recommendations have been submitted for the consideration of the road authority.

- Lel

08/05/17

fan Bishop Traffic Engineer Lead Auditor

05105117

Charles Mountain Senior Manager Road Safety Auditor



Appendix A – Response to Road Safety Audit





ltem No	Risk / Hazard Description	Recommendation	Priority	Authority Response
3.1 -	General			
(a)	The steep grade may affect drivers the ability to negotiate driveway link. The change of grade at driveway link may result in damage to the underside of vehicles.	 Consider alternative traffic calming solutions. Ensure change of grade meets the requirements outlined DPTI's "Manual of Legal Responsibilities and Technical Requirements for Traffic Control Devices" document or those of AS2890.1. 	1	
(b)	Excessive vehicle speed. Driveway link in isolation will not reduce speed throughout Heatherbank Terrace.	 Install a suite of traffic calming device to ensure desired speed is enforced along Heatherbank Terrace in its entirety 	2	
(c)	Challenging geometry for both heavy and light vehicles.	 Consider alternative traffic calming devices. Increase curve radii. 	2	
(d)	Kerb drop on aprons may inflict damage to vehicles.	 Reconstruct apron level to the top of the kerbing. 	1	
(e)	Driveway access radii sharp with high kerbs may inflict damage to vehicles.	 Reconstruct access with wider radii Relocate side entry pit on north east side. 	1	

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Item No.	Risk / Hazard Description	Recommendation	Priority	Authority Response
(f)	Soil erosion and washout may reduce pavement skid resistance.	 Install jute matting to exposed areas of landscaping. Plant exposed areas with appropriate spreading ground cover. Extend concrete apron where exposure to heavy vehicle turning movements will continue. 	3	
(g)	Eastbound delineation could be improved.	 Install unidirectional marker on the north side, in the eastbound direction. 	3	
(h)	Warning signs corresponding to change of priority are absent on all approaches.	 Install warning sign W9-1 (L) in both the westbound and eastbound directions. W9-1 (L) 	2	



Item No.	Risk / Hazard Description	Recommendation	Priority	Authority Response
(i)	Asphalt hump in the traffic lane may pose a hazard to cyclists and vehicles and could cause sheeting of water across the road.	 Remove hump Re-design drainage. 	1	
3.2 -	Wurinya Avenue		•	
(a)	Absence of warning sign corresponding to the change of priority.	 Install warning sign W9-2 (R) southbound. W9-2 (R) 	2	
<u> 3.3 – </u>	Karri Street			
(a)	Absence of warning sign corresponding to the change of priority.	 Install warning sign W9-2 (R) northbound. W9-2 (R) 	2	