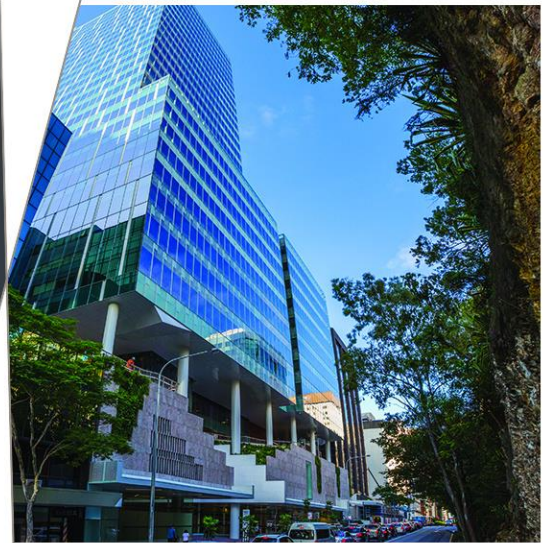


Signalised Mid-Block Pedestrian Crossing

Link Road, St Ives

80019113



Prepared for
Ku-ring-gai Council

24 July 2019

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1 Introduction

1.1 Background

Ku-ring-gai Council has commissioned Cardno to undertake a warrant assessment for a signalised mid-block pedestrian crossing at Link Road, St Ives. This project follows a number of Council Local Traffic Committee recommendations which has previously included intersection studies. More specifically, the most recent LTC decision (28/02/19) in relation to this project is as follows:

That Council investigate the feasibility of a mid-block signalised pedestrian crossing on Link Road, between the roundabout at Link Road/Stanley Street and Newhaven Place, and report back to the Traffic Committee.

The location of proposed signalised mid-block pedestrian crossing and its surrounds is illustrated **Figure 1-1**.

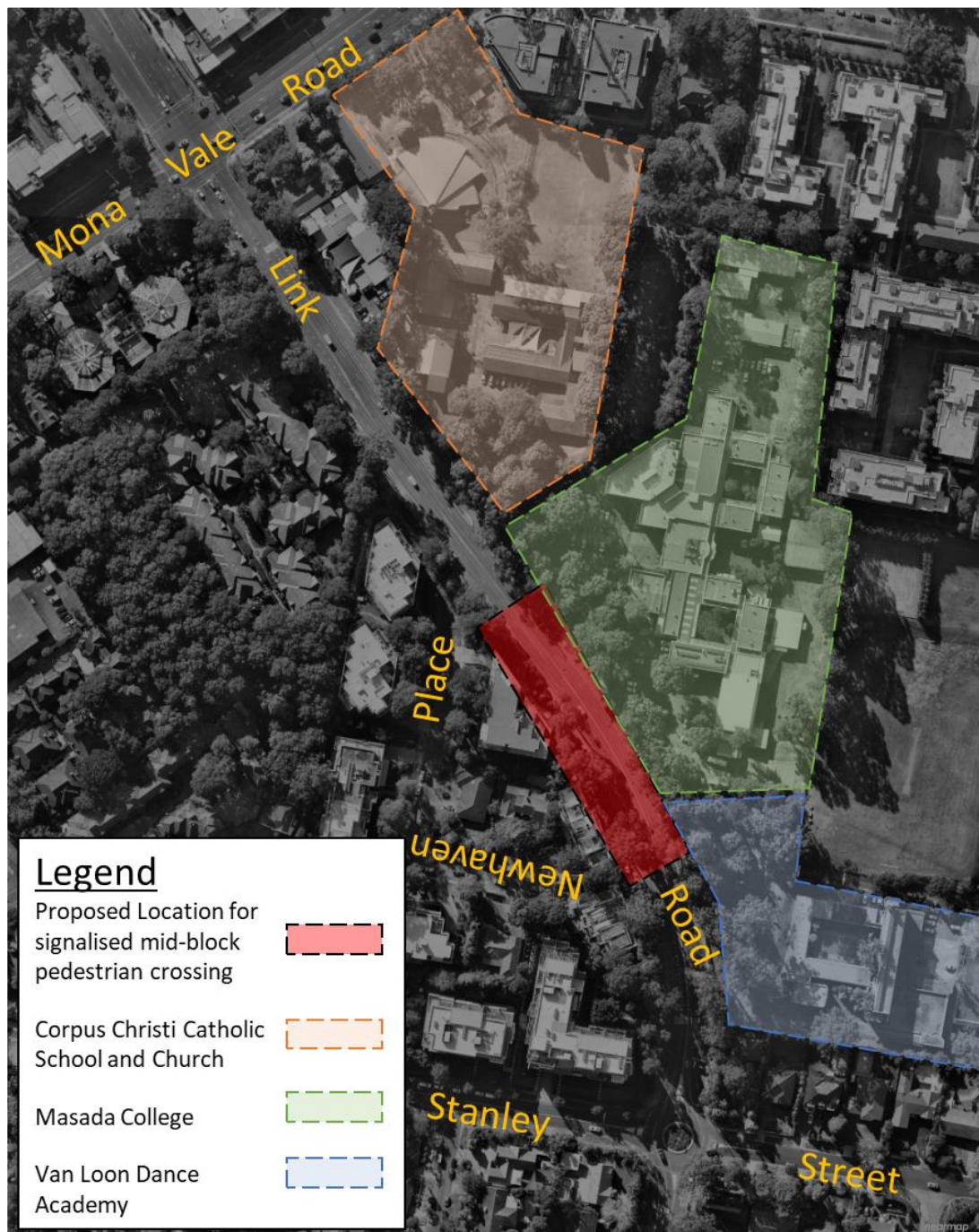


Figure 1-1 Site Location and its surrounds

1.2 Scope of Works

This report will cover the following:

- > Analyse traffic and pedestrian survey data
- > Undertake a signalised mid-block pedestrian crossing warrant assessment
- > Assess the performance of the signalised pedestrian crossing using SIDRA
- > Analyse crash history on Link Road for a 5 year period

1.3 Referenced Documents

The following documents have been referenced this preparing this report:

- > Traffic Signal Design Section 2 – Warrants (Roads and Maritime Services, 2008)
- > Guide to Traffic Management (Austroads) Roads and Maritime Services Supplement – Part 6 (Roads and Maritime Services, 2011)
- > Definitions and notes to support LGA Visualisations (NSW Centre for Road Safety, 2016)

2 Traffic and Pedestrian Survey Data

Trans Traffic Survey have been commissioned by Cardno to undertake pedestrian and traffic counts on Link Road, St Ives. Since no pedestrian crossing exists at the location of the proposed signalised mid-block pedestrian crossing, Cardno is required to estimate the number of pedestrians that would cross at the location if one were to exist. To undertake this task, Cardno requested the traffic surveyors to separate pedestrians which originate from Link Road to cross at the south leg of Mona Vale Road / Link Road intersection. The survey locations are illustrated in **Figure 2-1**.

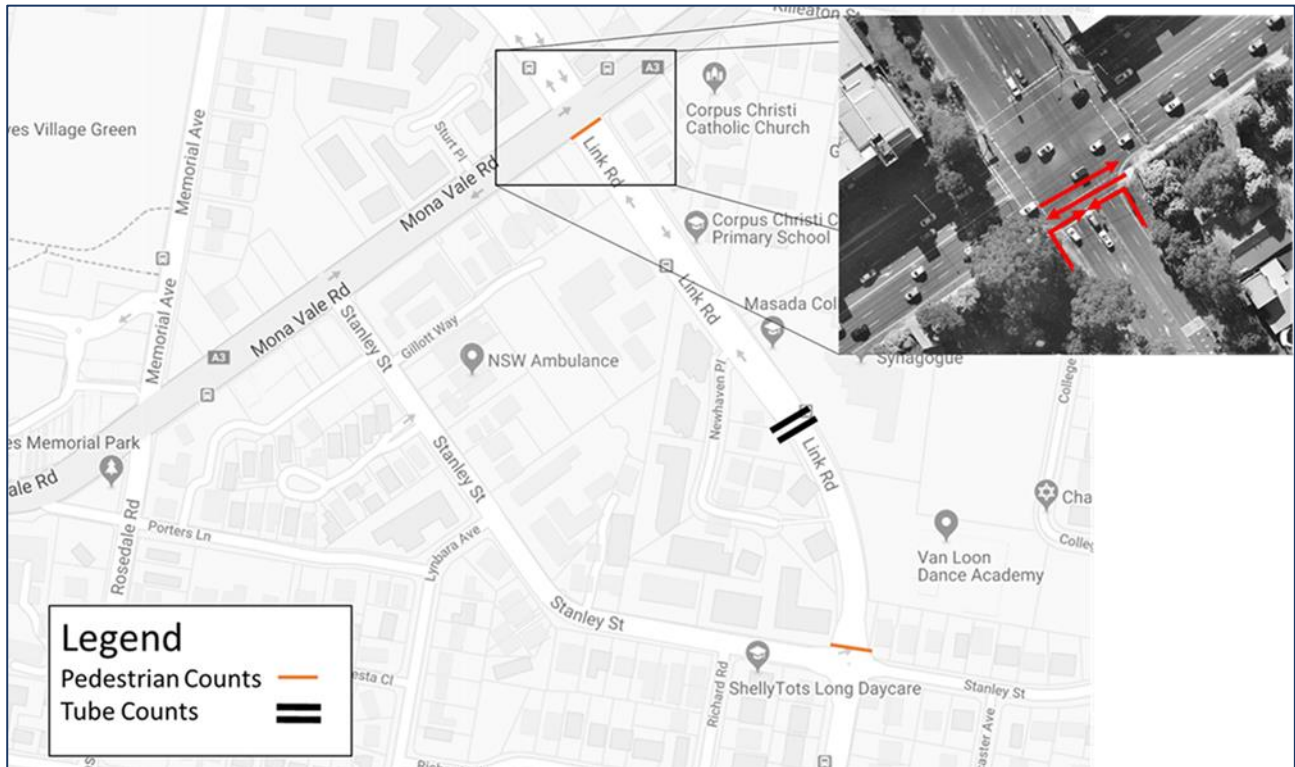


Figure 2-1 Traffic Survey Locations

2.2 Tube Counts

Cardno has commissioned Trans Traffic Surveys to undertake tube counts at Link Road. The summary of the speed profiles on Link Road over the Thursday and Saturday is illustrated in **Figure 2-2**, **Figure 2-3**, **Figure 2-4** and **Figure 2-5**. It should be noted Link Road has a signposted speed of 60km/h and also subject to school zone speeds.

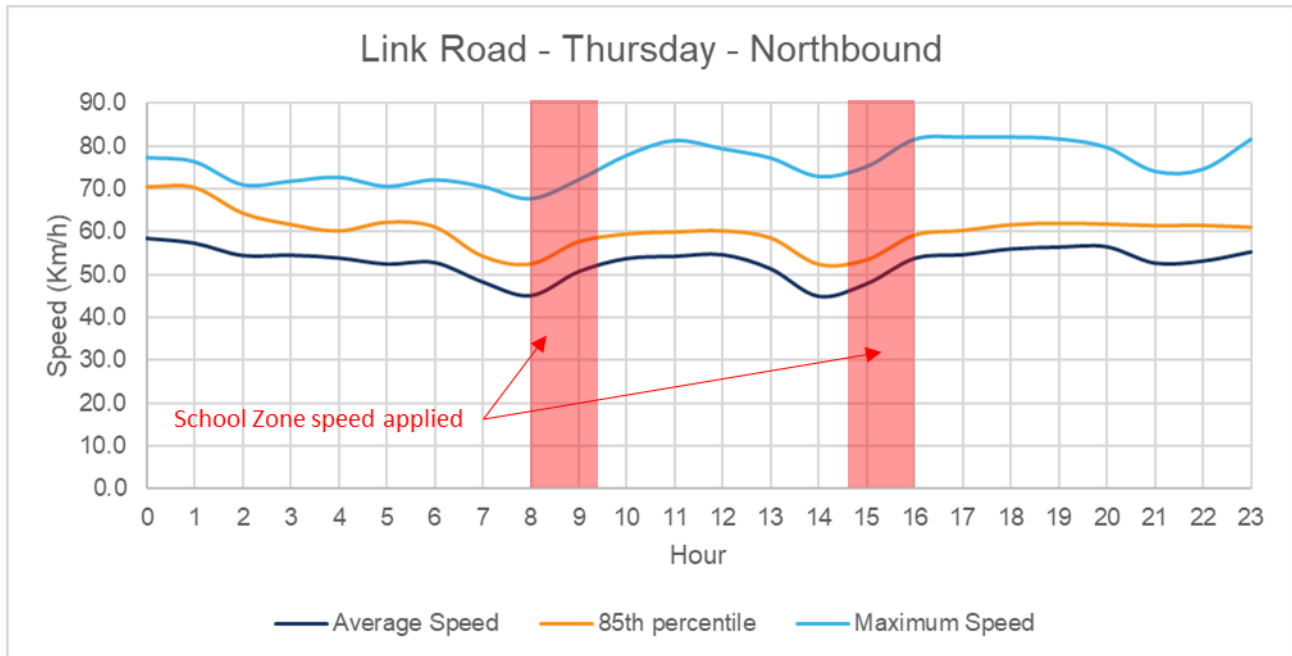


Figure 2-2 Speed Profile on Link Road – Thursday Northbound

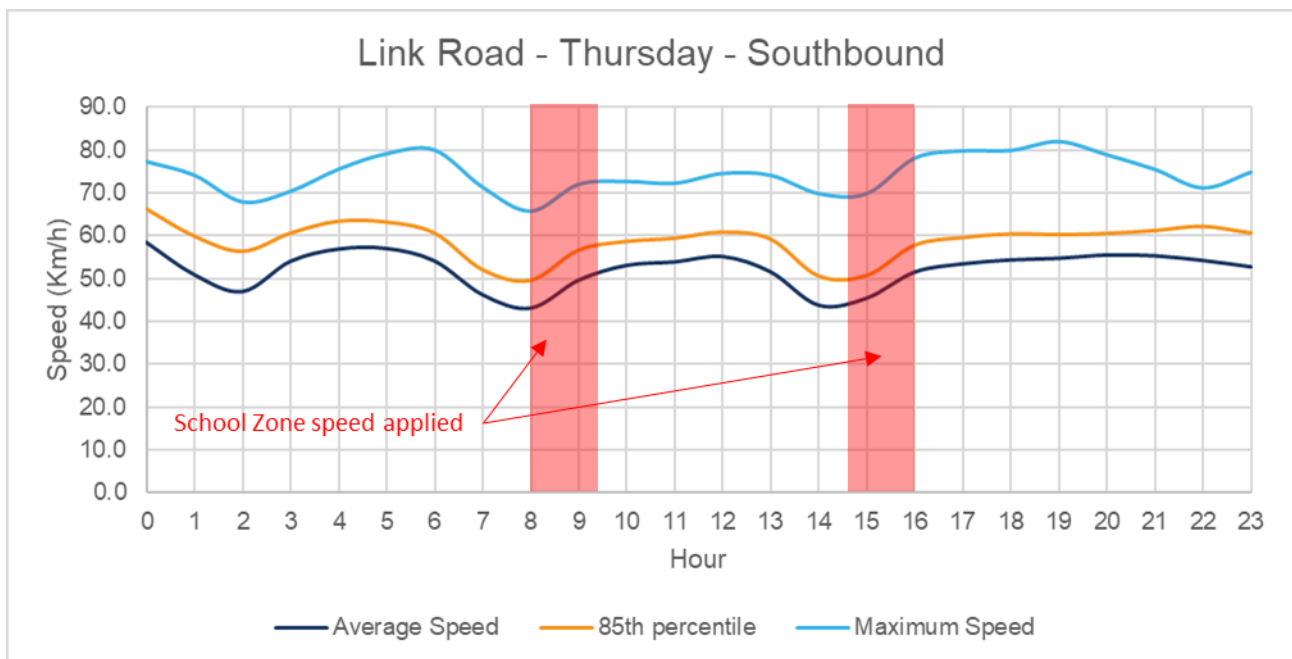


Figure 2-3 Speed Profile on Link Road – Thursday Southbound

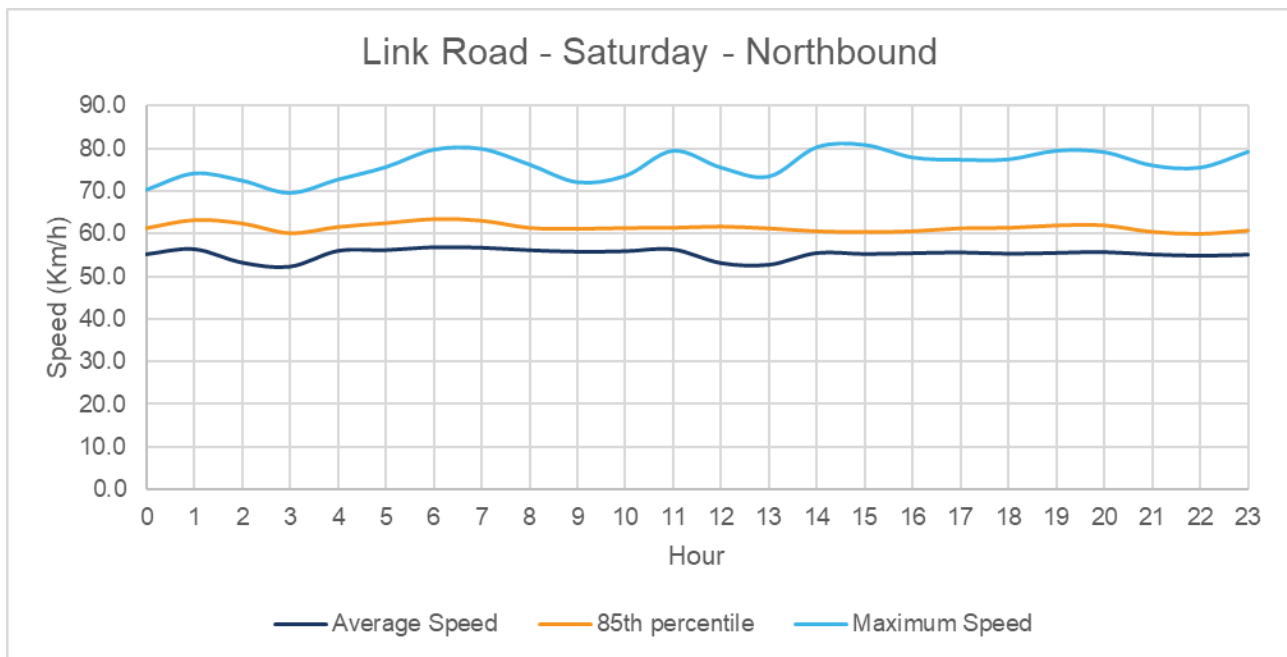


Figure 2-4 Speed Profile on Link Road – Saturday Northbound

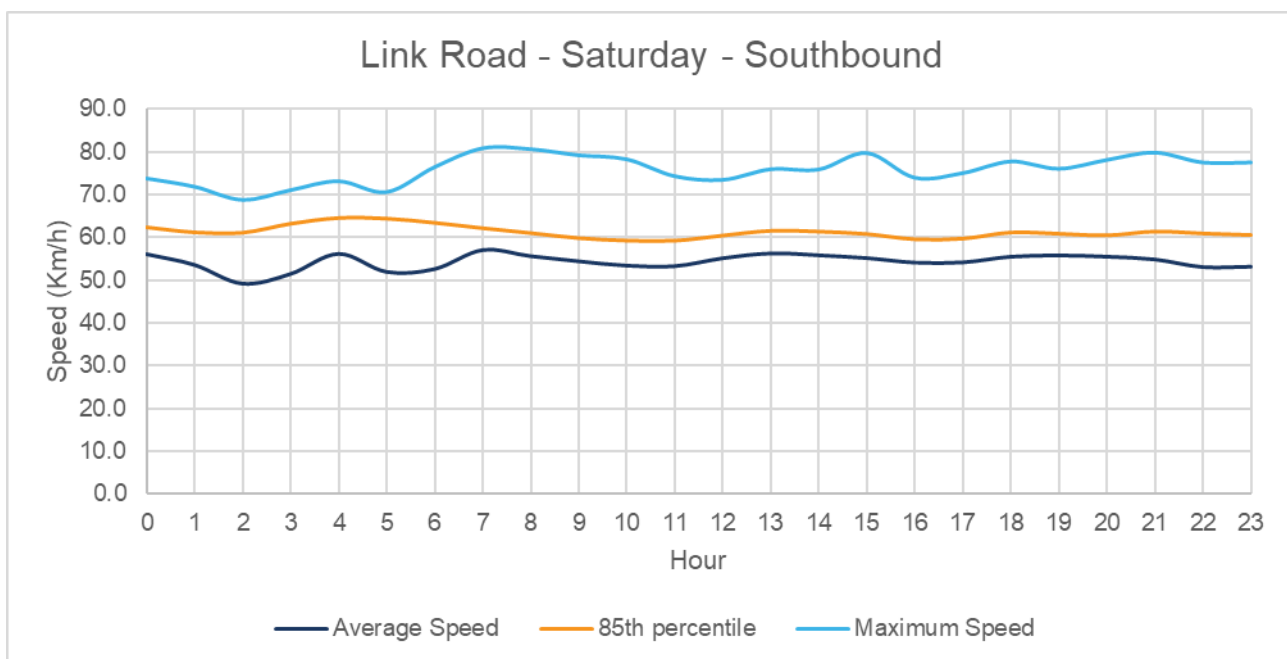


Figure 2-5 Speed Profile on Link Road – Saturday Southbound

From the above graphs, it is noted that the 85th percentile speed on Link Road during the morning school zone was 51.0km/h and 52.1km/h during the afternoon school zone..

Ku-ring-gai Council has provided some traffic data for Link Road from 2016. Speed profiles have been provided in **Figure 2-6** and **Figure 2-7** for Thursday and Saturday respectively.

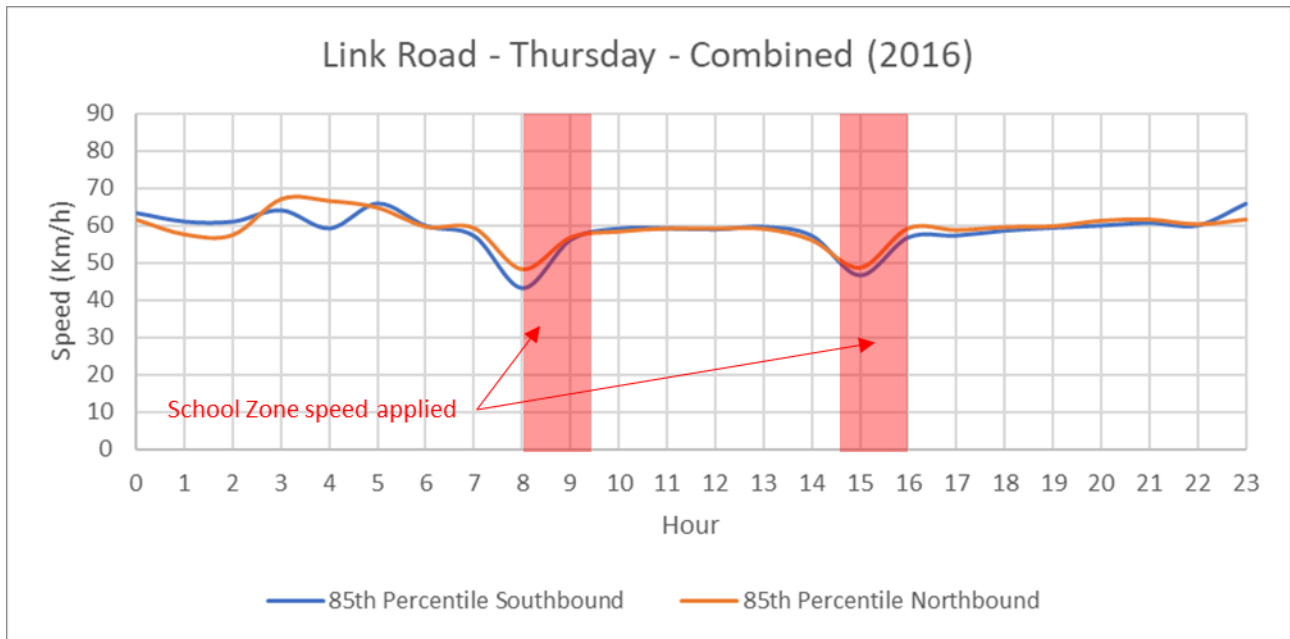


Figure 2-6 Speed Profile on Link Road – Thursday (2016)

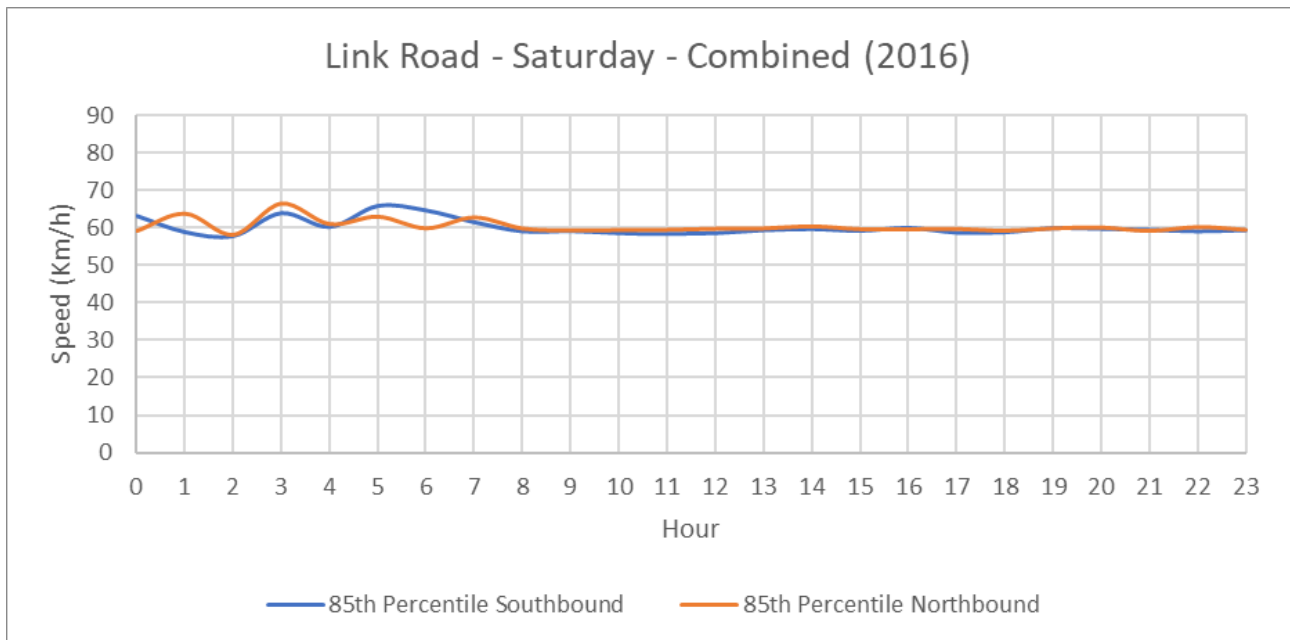


Figure 2-7 Speed Profile on Link Road – Saturday (2016)

It is noted that the 85th percentile speed during school zone hours is similar in 2016 as it is in 2019.

Northbound and southbound traffic volumes from the tube counts are provided in **Table 2-1** and **Table 2-2** respectively.

Table 2-1 Northbound Traffic Volumes on Link Road

Day	Monday (01/07/19)	Tuesday (02/07/19)	Wednesday (03/07/19)	Thursday (04/07/19)	Friday (05/07/19)	Saturday (06/07/19)	Sunday (07/07/19)
00:00	11	19	19	23	46	60	78
01:00	6	7	8	7	22	35	43
02:00	10	8	6	3	16	18	26
03:00	5	4	4	7	5	13	18
04:00	13	8	17	14	15	17	14
05:00	48	29	29	37	44	19	17
06:00	171	160	182	201	203	127	79
07:00	423	430	409	562	511	231	163
08:00	569	583	612	645	612	388	273
09:00	465	458	496	449	532	529	411
10:00	406	436	470	434	419	631	543
11:00	380	411	427	433	488	659	563
12:00	416	449	425	476	474	629	614
13:00	410	435	504	494	536	653	525
14:00	558	641	614	692	697	699	580
15:00	715	716	771	817	851	635	520
16:00	822	914	865	853	822	599	524
17:00	923	925	894	942	822	585	456
18:00	842	773	766	793	763	390	324
19:00	379	453	458	485	399	240	214
20:00	214	247	282	304	238	185	172
21:00	177	171	236	290	246	197	140
22:00	98	140	153	176	189	200	88
23:00	41	61	56	106	140	197	33
Total	8102	8478	8703	9243	9090	7936	6418
% Heavy	3.86%	4.34%	3.83%	3.79%	3.82%	2.34%	1.95%

From the table, the following hours had volumes of over 600 veh/h (only volumes on Thursday and Saturday will be considered):

- > Thursday
 - 8:00 to 9:00 – 645 veh
 - 14:00 to 15:00 – 692 veh
 - 15:00 to 16:00 – 817 veh
 - 16:00 to 17:00 – 853 veh
 - 17:00 to 18:00 – 942 veh
 - 18:00 to 19:00 – 793 veh
- > Saturday
 - 10:00 to 11:00 – 631 veh

- 11:00 to 12:00 – 659 veh
- 12:00 to 13:00 – 629 veh
- 13:00 to 14:00 – 653 veh
- 14:00 to 15:00 – 699 veh
- 15:00 to 16:00 – 635 veh

Table 2-2 Southbound Traffic Volumes on Link Road

Day	Monday (01/07/19)	Tuesday (02/07/19)	Wednesday (03/07/19)	Thursday (04/07/19)	Friday (05/07/19)	Saturday (06/07/19)	Sunday (07/07/19)
00:00	8	11	11	13	20	33	31
01:00	9	6	6	5	11	18	27
02:00	4	8	3	3	13	11	12
03:00	8	8	4	6	9	9	10
04:00	38	32	42	34	29	17	19
05:00	141	141	146	138	123	46	36
06:00	556	547	515	539	551	110	74
07:00	990	954	933	1047	885	218	103
08:00	918	966	944	1012	958	310	253
09:00	557	601	653	626	569	458	441
10:00	441	417	462	456	529	553	459
11:00	401	437	484	485	488	672	538
12:00	436	415	454	435	475	589	542
13:00	326	410	404	424	384	555	446
14:00	421	455	440	488	484	504	485
15:00	622	679	618	772	782	540	465
16:00	584	617	622	681	653	522	511
17:00	624	627	676	672	600	569	501
18:00	327	376	374	411	378	377	292
19:00	221	266	232	345	253	200	185
20:00	150	146	186	224	170	148	129
21:00	107	167	143	142	137	137	84
22:00	62	56	83	80	109	142	58
23:00	18	21	32	33	69	113	12
Total	7969	8363	8467	9071	8679	6851	5713
% Heavy	4.81%	4.99%	4.76%	5.43%	5.32%	3.42%	2.56%

From the table, the following hours had volumes of over 600 veh/h (only volumes on Thursday and Saturday will be considered):

- > Thursday
 - 7:00 to 8:00 – 1047 veh
 - 8:00 to 9:00 – 1012 veh
 - 9:00 to 10:00 – 626 veh
 - 15:00 to 16:00 – 772 veh
 - 16:00 to 17:00 – 681 veh

- 17:00 to 18:00 – 672 veh
- > Saturday
 - 11:00 to 12:00 – 672 veh

From the tube counts, the following one hour periods meet the required 600 veh/h traffic warrants:

- > Thursday
 - 8:00 to 9:00 – 645 veh southbound and 1012 veh northbound
 - 15:00 to 16:00 – 817 veh southbound and 772 veh northbound
 - 16:00 to 17:00 – 853 veh southbound and 681 veh northbound
 - 17:00 to 18:00 – 942 veh southbound and 672 northbound
- > Saturday
 - 11:00 to 12:00 – 659 veh southbound and 672 veh northbound

2.3 Pedestrian Counts

Pedestrian counts were collected at the southern leg of Mona Vale Road / Link Road intersection and the northern leg of Horace Street / Stanley Street / Link Road Intersection. The complete pedestrian counts are provided in **Appendix A**.

A summary of the pedestrian counts at the two intersections are provided in **Table 2-3**, **Table 2-4**, **Table 2-5** and **Table 2-6**. Since the warrant only applies to the pedestrian movements that will utilise the proposed signalised mid-block pedestrian crossing on Link Road, only the pedestrian movements originating from Link Road are tabulated.

Table 2-3 Pedestrian Data Northern Leg of Horace Street / Stanley Street / Link Road - Thursday

Time	Westbound			Eastbound			Total
	Adult	Children	Elder	Adult	Children	Elder	
6:00 - 7:00	2	0	0	0	1	0	3
6:15 - 7:15	2	0	0	2	1	0	5
6:30 - 7:30	2	0	0	6	1	0	9
6:45 - 7:45	2	0	0	8	0	0	10
7:00 - 8:00	1	0	1	10	2	0	14
7:15 - 8:15	1	0	1	13	3	0	18
7:30 - 8:30	1	0	1	15	6	0	23
7:45 - 8:45	2	0	1	15	6	0	24
8:00 - 9:00	2	0	0	15	4	0	21
8:15 - 9:15	2	0	0	10	3	0	15
8:30 - 9:30	5	2	0	4	0	0	11
8:45 - 9:45	6	2	1	4	0	0	13
9:00 - 10:00	10	2	1	3	0	0	16
14:30 - 15:30	0	0	0	2	2	0	4
14:45 - 15:45	0	5	0	2	2	0	9
15:00 - 16:00	7	9	0	4	3	0	23
15:15 - 16:15	7	13	0	5	4	0	29
15:30 - 16:30	7	13	0	4	2	0	26
15:45 - 16:45	7	8	0	4	2	0	21
16:00 - 17:00	1	5	0	2	1	0	9

Time	Westbound			Eastbound			Total
	Adult	Children	Elder	Adult	Children	Elder	
16:15 - 17:15	2	2	0	1	0	0	5
16:30 - 17:30	2	2	0	1	0	0	5
16:45 - 17:45	3	2	0	3	0	0	8
17:00 - 18:00	3	1	0	5	0	0	9
17:15 - 18:15	2	0	0	8	0	0	10
17:30 - 18:30	4	0	0	9	0	0	13

The above table indicates the highest pedestrian volumes crossing on the northern leg of Horace Street / Stanley Street / Link Road is at 15:15 – 16:15 with 29 pedestrians crossing with 59 per cent of pedestrians being children. Though the percentage of children crossing is high, the crossing cannot be considered as predominately used by children.

Table 2-4 Pedestrian Data Southern Leg of Mona Vale Road / Link Road - Thursday

Time	Westbound from Link Road			Eastbound from Link Road			Total
	Adult	Children	Elder	Adult	Children	Elder	
6:00 - 7:00	0	0	0	0	0	0	0
6:15 - 7:15	0	0	0	0	0	0	0
6:30 - 7:30	0	0	0	0	0	0	0
6:45 - 7:45	2	0	0	0	0	0	2
7:00 - 8:00	2	0	0	0	0	0	2
7:15 - 8:15	3	0	0	0	0	0	3
7:30 - 8:30	3	0	0	0	0	0	3
7:45 - 8:45	1	0	0	1	0	0	2
8:00 - 9:00	2	0	0	1	0	0	3
8:15 - 9:15	1	0	0	2	0	0	3
8:30 - 9:30	1	0	0	2	0	0	3
8:45 - 9:45	1	0	0	1	0	0	2
9:00 - 10:00	0	0	0	1	0	0	1
14:30 - 15:30	7	0	0	3	1	0	11
14:45 - 15:45	6	0	0	6	5	0	17
15:00 - 16:00	4	0	0	11	8	0	23
15:15 - 16:15	5	0	0	8	7	0	20
15:30 - 16:30	1	0	0	8	7	0	16
15:45 - 16:45	6	1	0	5	3	0	15
16:00 - 17:00	6	1	0	0	0	0	7
16:15 - 17:15	5	1	0	0	0	0	6
16:30 - 17:30	6	1	0	0	0	0	7
16:45 - 17:45	5	0	0	0	0	0	5
17:00 - 18:00	5	0	0	0	0	0	5
17:15 - 18:15	5	0	0	1	5	0	11
17:30 - 18:30	6	0	0	1	5	0	12

The above table indicates the highest pedestrian volumes crossing on the southern leg of Mona Vale Road / Link Road is at 15:00 – 16:00 with 23 pedestrians crossing with 35 per cent of pedestrians being children. The crossing cannot be considered as predominately used by children.

The combined pedestrian crossing at the northern leg of Horace Street / Stanley Street / Link Road and southern leg of Mona Vale Road / Link Road does not reach 50 ped/h.

Table 2-5 Pedestrian Data Northern Leg of Horace Street / Stanley Street / Link Road - Saturday

Time	Westbound			Eastbound			Total
	Adult	Children	Elder	Adult	Children	Elder	
9:00 - 10:00	12	2	2	25	5	3	49
9:15 - 10:15	13	1	2	28	5	3	52
9:30 - 10:30	10	0	0	25	1	3	39
9:45 - 10:45	8	1	0	20	1	1	31
10:00 - 11:00	6	1	0	15	0	1	23
10:15 - 11:15	4	1	0	15	1	0	21
10:30 - 11:30	3	1	0	15	1	0	20
10:45 - 11:45	6	1	0	14	1	0	22
11:00 - 12:00	9	1	0	13	1	0	24
11:15 - 12:15	12	1	0	11	0	0	24
11:30 - 12:30	17	5	0	12	0	0	34
11:45 - 12:45	25	10	0	9	0	0	44
12:00 - 13:00	28	11	0	7	0	0	46
12:15 - 13:15	26	11	0	7	0	0	44
12:30 - 13:30	23	7	0	4	0	0	34
12:45 - 13:45	12	1	0	7	0	0	20
13:00 - 14:00	7	0	0	8	0	0	15
13:15 - 14:15	7	0	0	7	0	0	14
13:30 - 14:30	7	0	0	7	0	0	14
13:45 - 14:45	5	0	0	6	0	0	11
14:00 - 15:00	11	0	0	12	1	0	24

The above table indicates the highest pedestrian volumes crossing on the northern leg of Horace Street / Stanley Street / Link Road is at 9:15 – 10:15 with 52 pedestrians crossing. The crossing cannot be considered as predominately used by children.

Table 2-6 Pedestrian Data Southern Leg of Mona Vale Road / Link Road - Saturday

Time	Westbound			Eastbound			Total
	Adult	Children	Elder	Adult	Children	Elder	
9:00 - 10:00	1	0	0	0	0	0	1
9:15 - 10:15	3	0	0	0	0	0	3
9:30 - 10:30	3	0	0	0	0	0	3
9:45 - 10:45	2	0	0	0	0	0	2
10:00 - 11:00	4	0	0	0	0	0	4
10:15 - 11:15	2	0	0	0	0	0	2
10:30 - 11:30	2	0	0	0	0	0	2
10:45 - 11:45	2	0	0	1	0	0	3

Time	Westbound			Eastbound			Total
	Adult	Children	Elder	Adult	Children	Elder	
11:00 - 12:00	0	0	0	1	0	0	1
11:15 - 12:15	0	0	0	1	0	0	1
11:30 - 12:30	0	0	0	3	3	0	6
11:45 - 12:45	0	0	0	2	3	2	7
12:00 - 13:00	0	0	0	2	3	2	7
12:15 - 13:15	0	0	0	2	3	2	7
12:30 - 13:30	0	0	0	0	0	2	2
12:45 - 13:45	0	0	0	0	0	0	0
13:00 - 14:00	0	0	0	0	0	0	0
13:15 - 14:15	0	0	0	0	0	0	0
13:30 - 14:30	0	0	0	0	0	0	0
13:45 - 14:45	1	0	0	0	0	0	1
14:00 - 15:00	1	0	0	0	0	0	1

The above table indicates the highest pedestrian volumes crossing on the southern leg of Mona Vale Road / Link Road is at 11:45 – 12:45, 12:00 – 13:00 and 12:15 – 13:15 with 7 pedestrians crossing. The crossing cannot be considered as predominately used by children.

The combined pedestrian crossing at the northern leg of Horace Street / Stanley Street / Link Road and southern leg of Mona Vale Road / Link Road does not reach 60 ped/h.

3 Warrant Assessment

Roads and Maritime Services provide the warrants for a signalised mid-block pedestrian crossing in Traffic Signal Design Section 2 – Warrants (RMS, 2008). The warrants set by Roads and Maritime Services is provided in **Table 3-1**.

Table 3-1 Signalised Mid-block Pedestrian Crossing Warrant Criteria

Warrant	Comments	Warrant met
a) For each of four one-hour periods of an average day:		
i. The pedestrian flow crossing the road exceeds 250 persons/hour; and	Peak pedestrian volumes don't exceed 60 ped/h in any hours surveyed for this warrant.	X
ii. The vehicular flow exceeds 600 vehicles/hour in each direction or, where there is a central median of at least 1.2m wide, 1000 vehicles/hour in each direction	Traffic volumes meet the warrant of 600 veh/h on Thursday during four one-hour periods, namely: <ul style="list-style-type: none"> 8:00 to 9:00 15:00 to 16:00 16:00 to 17:00 17:00 to 18:00 	✓
b) For each of eight one-hour periods of an average day:		
i. The pedestrian flow exceeds 175 persons/hour; and	Peak pedestrian volumes don't exceed 60 ped/h in any hours surveyed for this warrant.	X
ii. The vehicular flow exceeds 600 vehicles/hour in each direction or, where there is a central median of at least 1.2m wide, 1000 vehicles/hour in each direction; and	Traffic volumes do not meet the warrant of 600 veh/h on either day during eight one-hour periods.	X
iii. There is no other pedestrian crossing or signalised marked foot crossing within a reasonable distance	A signalised pedestrian crossing is located approximately 300m north west of the proposed signalised pedestrian crossing at Mona Vale Road.	X
c) The crossing is used predominately by children and for each of two one-hour periods of an average day:		
i. The pedestrian flow exceeds 50 persons/hour; and	Pedestrian flow meets warrant on Saturday, however, the pedestrian crossing is not used predominately by children.	X
ii. The vehicular flow exceeds 600 vehicle/hour in each direction	Traffic volumes meet the warrant of 600 veh/h on Thursday, however, the pedestrian crossing is not used predominately by children.	X
d) At least 50% of pedestrians using the crossing are elderly or people with disabilities and for each of two one-hour periods of an average day:		
i. The pedestrian flow exceeds 50 persons/hour; and	Pedestrian flow meets warrant on Saturday, however, the pedestrian crossing does not have at least 50% of pedestrians using the crossing as elderly or people with disabilities	X
ii. The vehicular flow exceeds 600 vehicles/hour in each direction	Traffic volumes meet the warrant of 600 veh/h on Thursday, however, the pedestrian crossing does not have at least 50% of pedestrians using the crossing as elderly or people with disabilities.	X

Warrant	Comments	Warrant met
e) The flow warrant for a pedestrian crossing is realised but its provision could cause a hazard to pedestrians because of the width of the carriageway, insufficient sight distance to the crossing, or the speed or number of vehicles	Flow warrant for a pedestrian crossing is not met. However, if the warrant was met, the provision of it will cause hazard to pedestrians because of the width of the carriageway (14m, 4 lanes), insufficient sight distance (see section 5.2) and the speed or number of vehicles.	X
f) There is a large seasonal variation in the traffic flow (such as at a holiday resort) and it can be shown to meet the general criterion during the busy season, even if during the rest of the year the general criterion is not met	N/A	X
g) The location has been the site of two or more pedestrian casualties over a three-year period that could have been prevented by traffic signals	The location does not meet this warrant (see section 5.1).	X
h) The site meets the warrants for pedestrian crossing, but a signalised marked foot crossing would improve traffic flow by enabling it to be coordinated with another site or sites	The site does not meet the warrant for pedestrian crossing.	X

The number of vehicles travelling on Link Road is considered sufficient to meet the warrants for a, c and d, however, the pedestrian volumes are too low to meet any of the warrants. The signalised mid-block pedestrian crossing does not meet any of the warrants as outlined in Traffic Signal Design Section 2 – Warrants (RMS, 2008).

4 Traffic Assessment

Whilst the warrants appear to not be met, Cardno has undertaken a traffic analysis of the mid-block pedestrian crossing using SIDRA 8.0 to provide an informed picture to Council. The SIDRA movement summary is provided in **Appendix B**.

The impact of the proposed signalised mid-block pedestrian crossing is summarised in **Table 4-1**.

Table 4-1 SIDRA Analysis Movement Summary

Scenario	Degree of Saturation	Average Delay	Level of Service	95% Back of Queue (m)	
				Northbound	Southbound
AM Peak – Thursday (8:00 – 9:00)	0.369	2.3	A	20.2	37.0
PM Peak – Thursday (17:00 – 18:00)	0.319	1.4	A	25.8	17.0
Midday Peak – Saturday (11:00 – 12:00)	0.242	2.1	A	20.5	21.2

The results of this assessment indicate that the signalised mid-block pedestrian crossing will perform at Level of Service A during all peak hours of the week.

5 Safety Review

5.1 Crash Data

Cardno received crash data from Ku-ring-gai Council that provides 5 years of crash data on Link Road until September 2018. **Table 5-1** provides a summary of all the crash data. **Figure 5-1** illustrates the locations the crashes occurred. A description of RUM codes has been provided in **Appendix C**.

Table 5-1 Crash Data

Crash ID	Date	RUM Code
847904	12/08/2013	34
1012639	24/02/2014	13
1033277	07/07/2014	10
1075730	03/08/2015	30
852341	19/09/2013	10
1069197	29/05/2015	30

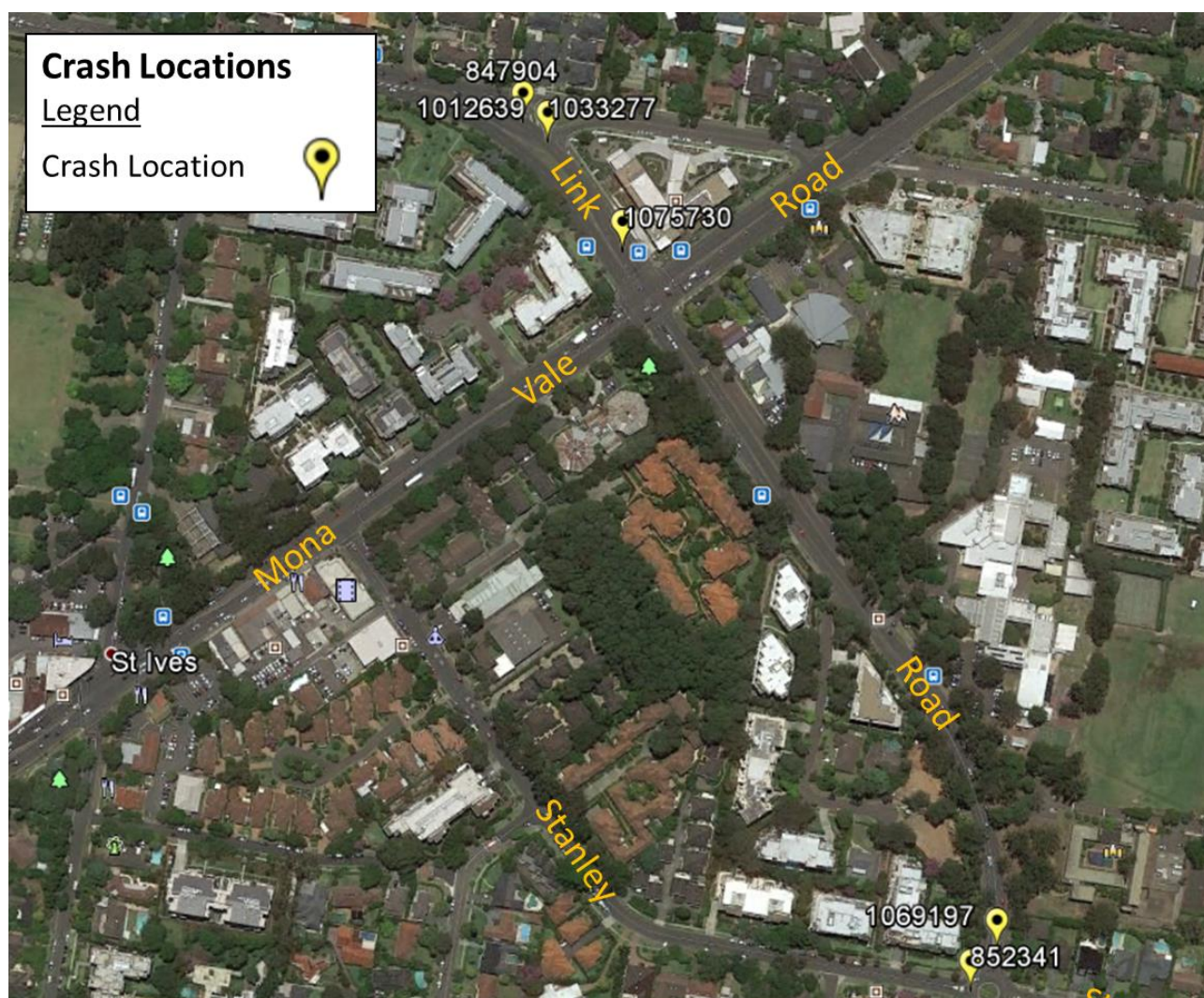


Figure 5-1 Crash Locations
Source: Google Earth Pro

According to the RUM codes, none of the crashes on Link Road during the 5 years of data involved pedestrians.

5.2 Sight Distance Considerations

According to Austroads Guide to Road Design Part 4A:

At intersections, pedestrian crossing facilities should be located where there is a clear view between approaching drivers and pedestrians on the crossing or waiting to cross a roadway.

This requires that:

- > ASD should be provided between approaching vehicles (1.1m eye height) and the surface of the roadway (0m) at the crossing
- > Crossing sight distance (CSD) should be provided between approaching vehicles (1.1m eye height) and a pedestrian waiting to cross the road. The pedestrian eye height should be taken as 1.07m which represents the lower bound of the range applicable to a person in an A80 wheelchair.

CSD is:

- > Necessary to ensure that the pedestrian can see approaching traffic in sufficient time to judge a safe gap and cross the roadway
- > Calculated from the critical safe gap (in the traffic stream) and the speed of the approaching traffic
- > Given by Equation 3:

$$CSD = t_c \times \frac{V}{3.6}$$

where

CSD = sight distance required for a pedestrian to safely cross the roadway

t_c = critical safe gap (sec) = (crossing length / walking speed)

V = 85th percentile approach speed (km/h)

Using the above definitions, a CSD of ~193m is calculated with the following inputs:

- > Crossing length = 14m
- > Walking speed = 1.2m/s
- > 85th percentile approach speed = 59.6km/h

On a site visit, the sight distance was observed and recorded. **Figure 5-2** illustrates the sight distance on Link Road at the approximate location of the proposed signalised mid-block pedestrian crossing. It is observed that the sight distance does not meet the minimum criteria outlined by Austroads.



Figure 5-2 Sight Distance at the proposed signalised mid-block pedestrian crossing

6 Conclusion

The following conclusions are made in this report:

- > Traffic counts were undertaken using tube counters over a 7 day period (27/06/19 – 04/07/19)
- > Pedestrian counts were undertaken using video footage during the AM and PM peak hours on Thursday (27/06/19) and the midday peak hours on Saturday (29/06/2019)
- > The 85th percentile speed on Link Road during the morning school zone was 51.0km/h and 52.1km/h during the afternoon school zone.
- > The following one hour periods meet the required 600 veh/h traffic warrants:
 - Thursday
 - 8:00 to 9:00 – 645 veh southbound and 1012 veh northbound
 - 15:00 to 16:00 – 817 veh southbound and 772 veh northbound
 - 16:00 to 17:00 – 853 veh southbound and 681 veh northbound
 - 17:00 to 18:00 – 942 veh southbound and 672 northbound
 - Saturday
 - 11:00 to 12:00 – 659 veh southbound and 672 veh northbound
- > The total pedestrian volumes crossing Link Road did not exceed 50 on Thursday and 60 on Saturday
- > It is noted that the crossings surveyed are not predominately used by children
- > It is noted that less than 50% of pedestrians using the crossing are elderly or people with disabilities
- > The proposed signalised mid-block pedestrian crossing did not meet the warrants as outlined in Traffic Signal Design Section 2 – Warrants (RMS, 2008) due to insufficient pedestrian volume crossing Link Road
- > A SIDRA model has been prepared to assess the impacts a signalised mid-block pedestrian crossing will have on the traffic on Link Road. The results of this assessment indicate that the signalised mid-block pedestrian crossing will perform at Level of Service A during all peak hours of the week
- > There have been no crashes involving pedestrians in the 5 years of crash data
- > Sight distances at the location of the proposed signalised mid-block pedestrian crossing does not meet the minimum criteria outlined by Austroads

APPENDIX

A

PEDESTRIAN COUNTS

TURNING MOVEMENT SURVEY

Link Rd and Stanley St

GPS -33.731817, 151.166949

Date:	Thu 27/06/19
Weather:	Fine
Suburban:	St Ives
Customer:	Cardno

Pedestrian Crossing

Time		Westbound			Eastbound		
Period Start	Period End	Adult	Children	Elder	Adult	Children	Elder
6:00	6:15	0	0	0	0	0	0
6:15	6:30	0	0	0	0	0	0
6:30	6:45	0	0	0	0	1	0
6:45	7:00	2	0	0	0	0	0
7:00	7:15	0	0	0	2	0	0
7:15	7:30	0	0	0	4	0	0
7:30	7:45	0	0	0	2	0	0
7:45	8:00	1	0	1	2	2	0
8:00	8:15	0	0	0	5	1	0
8:15	8:30	0	0	0	6	3	0
8:30	8:45	1	0	0	2	0	0
8:45	9:00	1	0	0	2	0	0
9:00	9:15	0	0	0	0	0	0
9:15	9:30	3	2	0	0	0	0
9:30	9:45	2	0	1	2	0	0
9:45	10:00	5	0	0	1	0	0
14:30	14:45	0	0	0	0	0	0
14:45	15:00	0	0	0	0	0	0
15:00	15:15	0	0	0	0	0	0
15:15	15:30	0	0	0	2	2	0
15:30	15:45	0	5	0	0	0	0
15:45	16:00	7	4	0	2	1	0
16:00	16:15	0	4	0	1	1	0
16:15	16:30	0	0	0	1	0	0
16:30	16:45	0	0	0	0	0	0
16:45	17:00	1	1	0	0	0	0
17:00	17:15	1	1	0	0	0	0
17:15	17:30	0	0	0	1	0	0
17:30	17:45	1	0	0	2	0	0
17:45	18:00	1	0	0	2	0	0
18:00	18:15	0	0	0	3	0	0
18:15	18:30	2	0	0	2	0	0

TRANS TRAFFIC SURVEY

trafficsurvey.com.au



TURNING MOVEMENT SURVEY

Link Rd and Stanley St

GPS -33.731817, 151.166949

Date:	Sat 29/06/19
Weather:	Fine
Suburban:	St Ives
Customer:	Cardno

Pedestrian Crossing

Time		Westbound			Eastbound		
Period Start	Period End	Adult	Children	Elder	Adult	Children	Elder
9:00	9:15	2	1	0	3	0	1
9:15	9:30	4	1	2	5	4	0
9:30	9:45	4	0	0	9	0	2
9:45	10:00	2	0	0	8	1	0
10:00	10:15	3	0	0	6	0	1
10:15	10:30	1	0	0	2	0	0
10:30	10:45	2	1	0	4	0	0
10:45	11:00	0	0	0	3	0	0
11:00	11:15	1	0	0	6	1	0
11:15	11:30	0	0	0	2	0	0
11:30	11:45	5	1	0	3	0	0
11:45	12:00	3	0	0	2	0	0
12:00	12:15	4	0	0	4	0	0
12:15	12:30	5	4	0	3	0	0
12:30	12:45	13	6	0	0	0	0
12:45	13:00	6	1	0	0	0	0
13:00	13:15	2	0	0	4	0	0
13:15	13:30	2	0	0	0	0	0
13:30	13:45	2	0	0	3	0	0
13:45	14:00	1	0	0	1	0	0
14:00	14:15	2	0	0	3	0	0
14:15	14:30	2	0	0	0	0	0
14:30	14:45	0	0	0	2	0	0
14:45	15:00	7	0	0	7	1	0

TURNING MOVEMENT SURVEY

Link Rd and Monavale Rd

GPS: -33.727874, 151.164637

Date:	Thu 27/06/19
Weather:	Fine
Suburban:	St Ives
Customer:	Cardno

Pedestrians Movements

Time		Crossing						Crossing From West Pavement			Crossing From East Pavement		
		Eastbound			Westbound			Eastbound			Westbound		
Period Start	Period End	Adult	Children	Elder	Adult	Children	Elder	Adult	Children	Elder	Adult	Children	Elder
6:00	6:15	0	0	0	1	0	0	0	0	0	0	0	0
6:15	6:30	1	0	0	0	0	0	0	0	0	0	0	0
6:30	6:45	4	0	0	0	0	0	0	0	0	0	0	0
6:45	7:00	0	0	0	1	0	0	0	0	0	0	0	0
7:00	7:15	1	0	0	1	0	0	0	0	0	0	0	0
7:15	7:30	2	0	0	1	0	0	0	0	0	0	0	0
7:30	7:45	6	0	0	2	0	0	2	0	0	0	0	0
7:45	8:00	3	4	0	0	0	0	0	0	0	0	0	0
8:00	8:15	9	3	0	4	0	0	1	0	0	0	0	0
8:15	8:30	6	2	0	0	0	0	0	0	0	0	0	0
8:30	8:45	7	0	0	4	0	0	0	0	0	1	0	0
8:45	9:00	5	1	1	0	0	0	1	0	0	0	0	0
9:00	9:15	2	1	0	2	0	0	0	0	0	1	0	0
9:15	9:30	0	0	0	6	0	0	0	0	0	0	0	0
9:30	9:45	3	0	0	3	0	0	0	0	0	0	0	0
9:45	10:00	3	0	0	4	0	0	0	0	0	0	0	0
14:30	14:45	3	0	0	0	0	0	1	0	0	0	0	0
14:45	15:00	7	0	0	2	0	0	2	0	0	0	0	0
15:00	15:15	6	0	0	3	2	0	0	0	0	3	1	0
15:15	15:30	5	0	0	8	2	0	4	0	0	0	0	0
15:30	15:45	2	0	0	5	5	0	0	0	0	3	4	0
15:45	16:00	3	0	0	14	4	0	0	0	0	5	3	0
16:00	16:15	1	0	0	2	0	0	1	0	0	0	0	0
16:15	16:30	3	0	0	2	1	0	0	0	0	0	0	0
16:30	16:45	6	1	0	1	0	0	5	1	0	0	0	0
16:45	17:00	3	1	0	1	0	0	0	0	0	0	0	0
17:00	17:15	3	0	0	1	1	0	0	0	0	0	0	0
17:15	17:30	4	1	0	0	0	0	1	0	0	0	0	0
17:30	17:45	8	0	0	0	0	0	4	0	0	0	0	0
17:45	18:00	2	0	0	0	3	0	0	0	0	0	0	0
18:00	18:15	3	0	0	1	4	0	0	0	0	1	5	0
18:15	18:30	4	7	0	3	0	0	2	0	0	0	0	0

TURNING MOVEMENT SURVEY

Link Rd and Monavale Rd

GPS: -33.727874, 151.164637

Date:	Sat 29/06/19
Weather:	Fine
Suburban:	St Ives
Customer:	Cardno

Pedestrians Movements

Time		Crossing						Crossing From West Pavement			Crossing From East Pavement		
		Eastbound			Westbound			Eastbound			Westbound		
Period Start	Period End	Adult	Children	Elder	Adult	Children	Elder	Adult	Children	Elder	Adult	Children	Elder
9:00	9:15	1	1	0	0	0	0	0	0	0	0	0	0
9:15	9:30	1	0	0	2	0	2	0	0	0	0	0	0
9:30	9:45	1	0	0	4	0	0	1	0	0	0	0	0
9:45	10:00	5	2	0	4	0	0	0	0	0	0	0	0
10:00	10:15	8	1	0	7	1	0	2	0	0	0	0	0
10:15	10:30	2	0	0	2	0	0	0	0	0	0	0	0
10:30	10:45	3	0	0	2	0	0	0	0	0	0	0	0
10:45	11:00	6	0	0	5	0	0	2	0	0	0	0	0
11:00	11:15	5	0	0	4	0	0	0	0	0	0	0	0
11:15	11:30	4	0	0	0	0	0	0	0	0	0	0	0
11:30	11:45	0	0	0	3	0	0	0	0	0	1	0	0
11:45	12:00	2	0	1	3	1	0	0	0	0	0	0	0
12:00	12:15	2	3	0	4	0	0	0	0	0	0	0	0
12:15	12:30	4	1	0	5	4	0	0	0	0	2	3	0
12:30	12:45	3	0	0	5	0	0	0	0	0	0	0	2
12:45	13:00	3	0	0	3	0	0	0	0	0	0	0	0
13:00	13:15	3	0	0	0	0	0	0	0	0	0	0	0
13:15	13:30	5	1	0	0	0	0	0	0	0	0	0	0
13:30	13:45	6	0	0	0	0	0	0	0	0	0	0	0
13:45	14:00	1	0	0	3	0	0	0	0	0	0	0	0
14:00	14:15	0	0	0	0	0	0	0	0	0	0	0	0
14:15	14:30	2	0	0	2	0	0	0	0	0	0	0	0
14:30	14:45	1	0	0	0	0	0	1	0	0	0	0	0
14:45	15:00	0	0	0	1	0	0	0	0	0	0	0	0

APPENDIX

B

SIDRA MOVEMENT SUMMARIES

MOVEMENT SUMMARY

Site: 101 [AM Peak - Thursday]

Link Road

Site Category: (None)

Pedestrian Crossing (Signals) - Fixed Time Isolated Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Link Road												
2	T1	679	3.8	0.233	2.1	LOS A	2.8	20.2	0.30	0.26	0.30	58.0
Approach		679	3.8	0.233	2.1	LOS A	2.8	20.2	0.30	0.26	0.30	58.0
North: Link Road												
8	T1	1065	5.4	0.369	2.4	LOS A	5.1	37.0	0.35	0.31	0.35	57.7
Approach		1065	5.4	0.369	2.4	LOS A	5.1	37.0	0.35	0.31	0.35	57.7
All Vehicles		1744	4.8	0.369	2.3	LOS A	5.1	37.0	0.33	0.29	0.33	57.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate	
P1	South Full Crossing	25	24.3	LOS C	0.0	0.0	0.90	0.90	
All Pedestrians		25	24.3	LOS C			0.90	0.90	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Organisation: CARDNO (QLD) PTY LTD | Processed: Wednesday, 17 July 2019 3:22:46 PM

Project: N:\Projects\800\FY19\113_LINK RD MID-BLOCK PEDESTRIAN SIG\Des-An\Traffic\SIDRA\Link Road Signalised Mid-Block Ped Crossing.sip8

MOVEMENT SUMMARY



Site: 101 [PM Peak - Thursday]

Link Road

Site Category: (None)

Pedestrian Crossing (Signals) - Fixed Time Isolated Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Link Road												
2	T1	992	3.8	0.319	1.5	LOS A	3.6	25.8	0.27	0.24	0.27	58.6
Approach		992	3.8	0.319	1.5	LOS A	3.6	25.8	0.27	0.24	0.27	58.6
North: Link Road												
8	T1	707	5.4	0.230	1.3	LOS A	2.3	17.0	0.24	0.21	0.24	58.7
Approach		707	5.4	0.230	1.3	LOS A	2.3	17.0	0.24	0.21	0.24	58.7
All Vehicles		1699	4.5	0.319	1.4	LOS A	3.6	25.8	0.26	0.22	0.26	58.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Back of Queue Distance m	Prop. Queued	Effective Stop Rate	
P1	South Full Crossing	15	24.3	LOS C	0.0	0.0	0.90	0.90	
All Pedestrians		15	24.3	LOS C			0.90	0.90	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: N:\Projects\800\FY19\113_LINK RD MID-BLOCK PEDESTRIAN SIG\Des-An\Traffic\SIDRA\Link Road Signalised Mid-Block Ped Crossing.sip8

MOVEMENT SUMMARY



Site: 101 [Midday Peak - Saturday]

Link Road

Site Category: (None)

Pedestrian Crossing (Signals) - Fixed Time Isolated Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Link Road												
2	T1	694	2.3	0.236	2.1	LOS A	2.9	20.5	0.30	0.26	0.30	58.0
Approach		694	2.3	0.236	2.1	LOS A	2.9	20.5	0.30	0.26	0.30	58.0
North: Link Road												
8	T1	707	3.4	0.242	2.1	LOS A	2.9	21.2	0.31	0.27	0.31	58.0
Approach		707	3.4	0.242	2.1	LOS A	2.9	21.2	0.31	0.27	0.31	58.0
All Vehicles		1401	2.9	0.242	2.1	LOS A	2.9	21.2	0.31	0.26	0.31	58.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Back of Queue Distance m	Prop. Queued	Effective Stop Rate	
P1	South Full Crossing	26	24.3	LOS C	0.0	0.0	0.90	0.90	
All Pedestrians		26	24.3	LOS C			0.90	0.90	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Organisation: CARDNO (QLD) PTY LTD | Processed: Wednesday, 17 July 2019 3:22:08 PM

Project: N:\Projects\800\FY19\113_LINK RD MID-BLOCK PEDESTRIAN SIG\Des-An\Traffic\SIDRA\Link Road Signalised Mid-Block Ped Crossing.sip8

APPENDIX

C

RUM CODES DESCRIPTION

Definitions and notes to support road crash data

NSW Centre for Road Safety, June 2014

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Date:	June 2014
Version:	1.2
Reference:	Statistics
Division:	Centre for Road Safety

1 Crash statistics

1.1 Guidelines

Our statistics are confined to crashes that conform to the national guidelines for reporting and classifying road vehicle crashes. The guidelines include crashes that meet all of these criteria:

- Were reported to the police
- Occurred on a road open to the public
- Involved at least one moving road vehicle
- Involved at least one person being killed or injured or at least one motor vehicle being towed away.

Reports for some crashes are not received until well into the following year and after the annual crash database has been finalised. These amount to fewer than 1 per cent of recorded crashes and are counted in the following year's statistics.

1.2 Crash reporting

Before 2000, Section 8 (3) of the Traffic Act 1909 required a road crash in NSW to be reported to the police when any person was killed or injured, or there was property damage of more than \$500.

On 1 December 1999, the Traffic Act was repealed and replaced by new traffic legislation including the adoption of the Australian Road Rules. The new traffic legislation is found in the Road Transport (General) Act 1999 and the Road Transport (Safety and Traffic Management) Act 1999 and the regulations made under those Acts.

Rule 287 (3) of the Road Rules requires a crash to be reported to police when any person is killed or injured; when drivers involved in the crash do not exchange particulars; or when a vehicle involved in the crash is towed away.

2 Interactive crash statistics

2.1 Date of information

Data in our interactive displays was taken from our crash database on 16 April 2014.

2.2 Provisional data

The 2013 fatality data presented is provisional as at midnight 31 December 2013 and subject to change.

2.3 Date of crash

Data presented in these displays is based on the 'date of crash' and may differ slightly to other published data, based on 'reporting year'. This difference only applies to non-fatality data displayed.

2.4 Road User data

In some displays the Road User values 'Other Controller' (e.g horse riders) and 'Other Passenger' (e.g train or light rail passenger) have been suppressed. However, the Grand Total will include these values.

2.5 Injury statistics recording process change

A change in injury recording practice from mid 2010 to the end of 2011 resulted in a slightly higher number of recorded injuries in this time period. Care should be taken when comparing data from previous and following years.

2.6 Pedal cycle crashes

Many non-fatal pedal cycle crashes are not reported to police. As the NSW Police Force is our only source of crash information, statistics of pedal cycle crashes could be much higher than reported.

3 Definitions and notes

Alcohol involved in crash: Determined by whether any of the vehicle drivers or riders in the crash had an illegal level of alcohol.

Animal rider: A person sitting on or riding a horse or other animal.

Articulated truck: Any articulated tanker, semi-trailer, low loader, road train or B-double.

Bicycle rider: See Pedal cycle rider.

Bus: Includes State Transit Authority bus and long distance/tourist coach.

Car: Includes sedan, station wagon, utility (based on car design), panel van (based on car design), coupe, hatchback, sports car, passenger van and four-wheel-drive passenger vehicle.

Carriageway: That part of the road improved or designed to be ordinarily used by moving vehicles. When a road has two or more of these parts, divided by a median strip or other physical separation, each of these is a separate carriageway.

Casualty: Any person killed or injured because of a crash.

Controller: A person occupying the controlling position of a road vehicle.

Country: All local government areas except Newcastle, Lake Macquarie, Wollongong and Shellharbour, and those in metropolitan Sydney.

Crash: Any unplanned event involving a road vehicle on a road that results in death, injury or property damage and is reported to the police.

Crash type: The type of crash grouped according to the road user movement code recorded (see Road user movement code).

Driver: A controller of a motor vehicle other than a motorcycle

Emergency vehicle: Includes ambulance, fire brigade vehicle, police patrol car (or van) and tow truck.

Fatal crash: A crash for which there is at least one fatality.

Fatality: A person who dies within 30 days of a crash because of injuries received in that crash.

Footpath: That part of the road which is ordinarily reserved for pedestrian movement as a matter of right or custom.

Heavy truck: Any heavy rigid truck or articulated truck.

Heavy rigid truck: Any rigid lorry or rigid tanker with a tare weight in excess of 4.5 tonnes.

Injured: A person who is injured because of a crash, and who does not die from those injuries within 30 days of the crash.

Injury crash: A non-fatal crash where at least one person is injured.

Intersection crash: A crash where the first impact occurs at or within 10 metres of an intersection.

Killed: See Fatality.

LGA: The local government area where the crash occurred.

Light truck: Includes panel van (not based on car design), utility (not based on car design) and mobile vending vehicle.

Metropolitan: All local government areas in metropolitan Sydney, as well as Newcastle, Lake Macquarie, Wollongong and Shellharbour.

Motor vehicle: Any road vehicle that is mechanically or electrically powered but not operated on rails.

Motorcycle: Any mechanically or electronically propelled two or three-wheeled machine with or without sidecar. Includes solo motorcycle, motorcycle with sidecar, motor scooter, mini-bike, three-wheeled special mobility vehicle and moped (motorised 'pedal cycle').

Motorcycle passenger: A person on but not controlling a motorcycle.

Motorcycle rider: A person occupying the controlling position of a motorcycle.

Motorcyclist: Includes motorcycle riders and motorcycle passengers.

Natural lighting conditions: The natural lighting at the time of the crash.

Newcastle metropolitan area: The local government areas of Newcastle and Lake Macquarie cities.

Non-casualty crash: A crash in which at least one vehicle is towed away where there is no death and no person injured.

Passenger: Any person, other than the controller, who is in, on, boarding, entering, alighting or falling from a road vehicle at the time of the crash, provided a portion of the person is in or on the road vehicle.

Pedal cycle: Any two or three-wheeled device operated solely by pedals and propelled by human power except toy vehicles or other pedestrian conveyances. Includes bicycles with side-car, trailer or training wheels attached.

Pedal cycle passenger: A person on but not controlling a pedal cycle.

Pedal cycle rider: A person occupying the controlling position of a pedal cycle.

Pedal cyclist: Includes pedal cycle riders and pedal cycle passengers.

Pedestrian: Any person who is not in, on, boarding, entering, alighting or falling from a road vehicle at the time of the crash.

Pedestrian conveyance: Any device, ordinarily operated on the footpath, by which a pedestrian may move, or by which a pedestrian may move another pedestrian or goods. Includes non-motorised scooter, pedal car, skateboard, roller skates, in-line skates, toy tricycle, unicycle, push cart, sled, trolley, non-motorised go-cart, billycart, pram, wheelbarrow, handbarrow, non-motorised wheelchair or any other toy device used as a means of mobility.

Reporting year: The year in which the crash was recorded for reporting purposes.

Road: The area devoted to public travel within a surveyed road reserve. Includes a footpath and cycle path inside the road reserve and a median strip or traffic island.

Road vehicle: Any device (except pedestrian conveyance) upon which or by which any person or property may be transported or drawn on a road.

Road surface condition: The condition of the road surface at the crash location (e.g. wet, dry).

Road user: The class of road user (e.g. driver, pedestrian).

Road user movement code: The road user movement or RUM code describing the first impact for the crash. See Appendix A.

Speed limit: The maximum speed limit where the crash occurred.

Sydney metropolitan area: The local government areas of City of Sydney, Bankstown, Blacktown, Botany Bay, Campbelltown, Canada Bay, Canterbury, Fairfield, Holroyd, Hurstville, Liverpool, Parramatta, Penrith, Randwick, Rockdale, Ryde and Willoughby cities, Ashfield, Auburn, Burwood, Camden, Hornsby, Hunters Hill, Kogarah, Ku-ring-gai, Lane Cove, Leichhardt, Manly, Marrickville, Mosman, North Sydney, Pittwater, Strathfield, Sutherland, The Hills , Warringah, Waverley and Woollahra.

Weather: The weather conditions at the time of the crash.

Wollongong metropolitan area: The local government areas of Wollongong and Shellharbour cities.

4 Speeding and fatigue involvement

4.1 Speeding

It is not always clear from police reports if speeding (excessive speed for the prevailing conditions) was a contributing factor in a road crash.

We consider speeding to have been a contributing factor if at least one speeding motor vehicle was in a crash. We say a motor vehicle was speeding if it meets any of these conditions:

- The vehicle's driver or rider was charged with a speeding offence
- Police said the vehicle was travelling at excessive speed
- The speed of the vehicle was faster than that allowed for the licence class of the driver or rider, or the vehicle weight (introduced 1 January 2010)
- The speed of the vehicle was higher than the speed limit
- While on a curve the vehicle jack-knifed, skidded, slid or the controller lost control
- The vehicle ran off the road on a bend or turning a corner and the driver or rider was not distracted by something, or affected by drowsiness or sudden illness, and was not swerving to avoid another vehicle, animal or object, and the vehicle did not have equipment failure

4.2 Fatigue

It is not always clear from police reports if fatigue was a contributing factor in a road crash. We consider fatigue to have been a contributing factor if at least one fatigued vehicle driver or rider was in a road crash. We define a vehicle driver or rider to be fatigued if they meet any of these conditions:

- Police said the motor vehicle driver or rider was asleep, drowsy or tired
- The vehicle travelled onto the incorrect side of a straight road and had a head-on collision (and was not overtaking another vehicle and no other relevant factor was found)
- The vehicle ran off a straight road or off the road to the outside of a curve and the vehicle was not travelling at excessive speed and there was no other relevant factor found for the crash.

5 Appendix A - Road user movement code table

PEDESTRIANS (on foot or in toy/pram)	VEHICLES FROM ADJACENT DIRECTION (Intersections only)	VEHICLES FROM OPPOSING DIRECTION	VEHICLES FROM SAME DIRECTION	MANOEUVRING	OVERTAKING	ON PATH	OFF PATH, ON STRAIGHT	OFF PATH, ON CURVE OR TURNING	MISCELLANEOUS
NEAR SIDE 00	CROSS TRAFFIC 10	HEAD ON (not overtaking) 20	REAR END 30	U TURN 40	HEAD ON (including side swipe) 50	PARKED 60	OFF CARRIAGEWAY TO LEFT 70	OFF CARRIAGEWAY LEFT ON RIGHT BEND 80	FELL IN / FROM VEHICLE 90
EMERGING 01	RIGHT FAR 11	RIGHT THROUGH 21	LEFT REAR 31	U TURN INTO FIXED OBJECT / PARKED VEHICLE 41	OUT OF CONTROL 51	DOUBLE PARKED 61	LEFT OFF CARRIAGEWAY INTO OBJECT / PARKED VEHICLE 71	OFF CARRIAGEWAY LEFT ON RIGHT BEND INTO OBJECT / PARKED VEHICLE 81	LOAD OR MISSILE STRUCK VEHICLE 91
FAR SIDE 02	LEFT FAR 12	LEFT THROUGH 22	RIGHT REAR 32	LEAVING PARKING 42	PULLING OUT 52	ACCIDENT OR BROKEN DOWN 62	OFF CARRIAGEWAY TO RIGHT 72	OFF CARRIAGEWAY RIGHT ON RIGHT BEND 82	STRUCK TRAIN / AEROPANE 92
PLAYING, WORKING, LYING, STANDING ON CARRIAGEWAY 03	RIGHT NEAR 13	RIGHT / LEFT 23	LANE SIDE SWIPE 33	ENTERING PARKING 43	OVERTAKE TURNING 53	VEHICLE DOOR 63	RIGHT OFF CARRIAGEWAY INTO OBJECT / PARKED VEHICLE 73	OFF CARRIAGEWAY RIGHT ON RIGHT BEND INTO OBJECT / PARKED VEH 83	PARKED VEHICLE RUN AWAY INTO OBJECT / PARKED VEH 93
WALKING WITH TRAFFIC 04	TWO RIGHT TURNING 14	RIGHT / RIGHT 24	LANE CHANGE RIGHT (not overtaking) 34	PARKING VEHICLES ONLY 44	CUTTING IN 54	PERMANENT OBSTRUCTION ON CARRIAGEWAY 64	OUT OF CONTROL ON CARRIAGEWAY 74	OFF CARRIAGEWAY RIGHT ON LEFT BEND 84	PARKED VEHICLE RUN AWAY INTO VEHICLE 94
FACING TRAFFIC 05	RIGHT / LEFT FAR 15	LEFT / LEFT 25	LANE CHANGE LEFT 35	REVERSING 45	PULLING OUT REAR END 55	TEMPORARY ROADWORKS 65	OFF END OF ROAD / T JUNCTION 75	OFF CARRIAGEWAY RIGHT ON LEFT BEND INTO OBJECT / PARKED VEHICLE 85	STRUCK WHILE BOARDING OR ALIGHTING VEHICLE 95
ON FOOTPATH / MEDIAN 06	LEFT NEAR 16		RIGHT TURN SIDE SWIPE 36	REVERSING INTO FIXED OBJECT / PARKED VEHICLE 46		STRUCK OBJECT ON CARRIAGEWAY 66		OFF CARRIAGEWAY LEFT ON LEFT BEND 86	
DRIVEWAY 07	LEFT / RIGHT FAR 17		LEFT TURN SIDE SWIPE 37	EMERGING FROM DRIVEWAY 47		ANIMAL (not ridden) 67		OFF CARRIAGEWAY LEFT ON LEFT BEND INTO OBJECT / PARKED VEHICLE 87	
	TO LEFT TURNING 18			FROM FOOTPATH 48				OUT OF CONTROL ON CARRIAGEWAY 88	OTHER 98
OTHER PEDESTRIAN 09	OTHER ADJACENT 19	OTHER OPPOSING 29	OTHER SAME DIRECTION 39	OTHER MANOEUVRING 49	OTHER OVERTAKING 59	OTHER ON PATH 69	OTHER STRAIGHT 79	OTHER CURVE 89	UNKNOWN 99