

# **Appendix H**

## Traffic, Transport and Accessibility

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# South Dural Urban Release Area

Traffic, Transport and Accessibility Assessment

South Dural Residents and Ratepayers Group

15 January 2009

**DRAFT**

## South Dural Urban Release Area

Prepared for

**South Dural Residents and Ratepayers Group**

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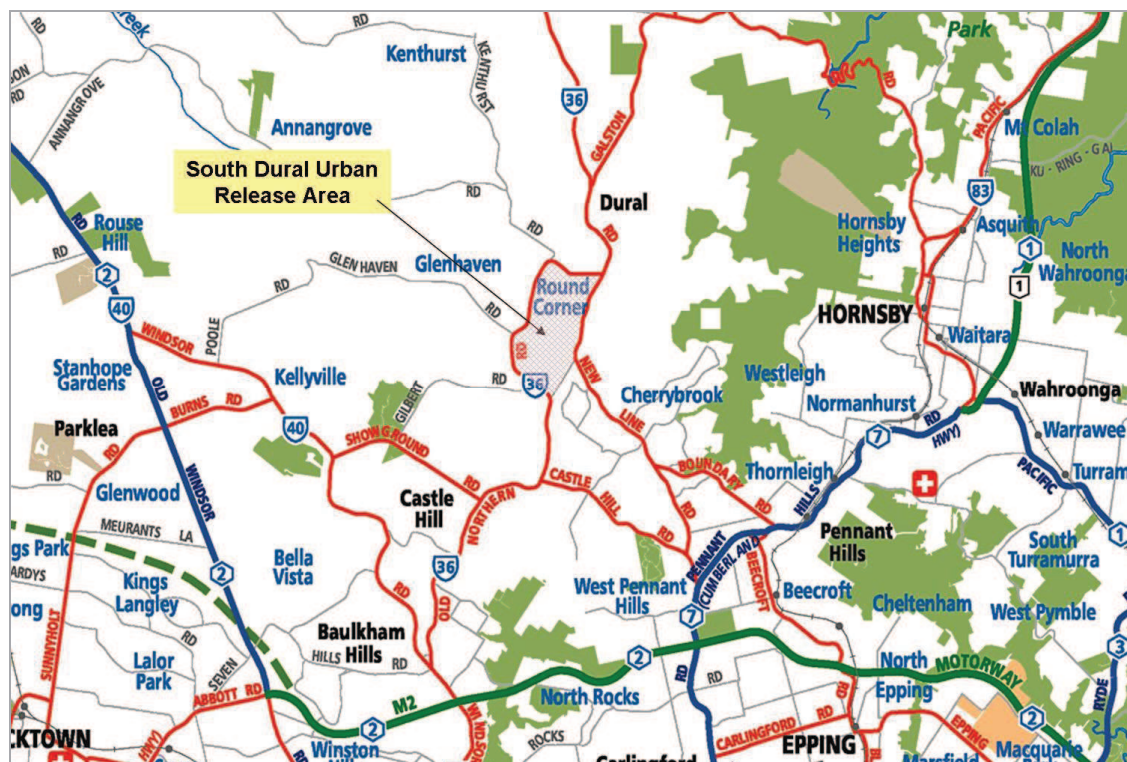
## 1.0 Introduction

### 1.1 Background

Maunsell Australia Pty Ltd (Maunsell) has been appointed by South Dural Residents and Ratepayers Group Incorporated (SDRRG) to prepare a Traffic Impact Assessment (TIA) for the proposed rezoning of 240 ha of land at South Dural. The TIA will assist in the development of a Concept Structure Plan for the Department of Planning (DoP).

The South Dural Urban Release Area (South Dural) is located within the Local Government Area (LGA) of Hornsby. Old Northern Road to the west of the study area forms the boundary of Hornsby LGA and Baulkham Hills LGA. The release area is approximately 6km to the north east of Baulkham Hills, 11km to the west of Hornsby, and 25km to the north west of Sydney. The study area is approximately 240 ha and the proposed housing strategy for the area would yield approximately 2,300 residential dwellings and a local neighbourhood centre. The study area in its regional context is shown in **Figure 1.1**.

Figure 1.1: Regional Context of South Dural Urban Release Area



Source: UBD, 2008

### 1.2 Purpose and Scope

The purpose of this report is to provide a review of the potential traffic impacts of the proposed 2,300 residential dwellings on the external road network. The assessment involves determining the level of trip generation associated with the proposed development within the study area and will provide recommendations on the traffic requirement as a result of the development trips. The report also provides a proposed access strategy for the study area and recommends the geometric layouts required for all access points.

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## 1.3 Report Framework

The report has been structured into the following sections:

- **Section 2** details the existing transport conditions in the locality for all modes of transport;
- **Section 3** reviews the impacts of changes to the traffic flow and road network, prior to future development of South Dural;
- **Section 4** describes the details of the proposed development within the study area;
- **Section 5** details the access strategy for the development;
- **Section 6** provides a traffic impact assessment of the proposed development and surrounding road network and identifies appropriate transport infrastructure to cater for the forecast traffic flows; and
- **Section 6** provides summary and conclusions of the report.

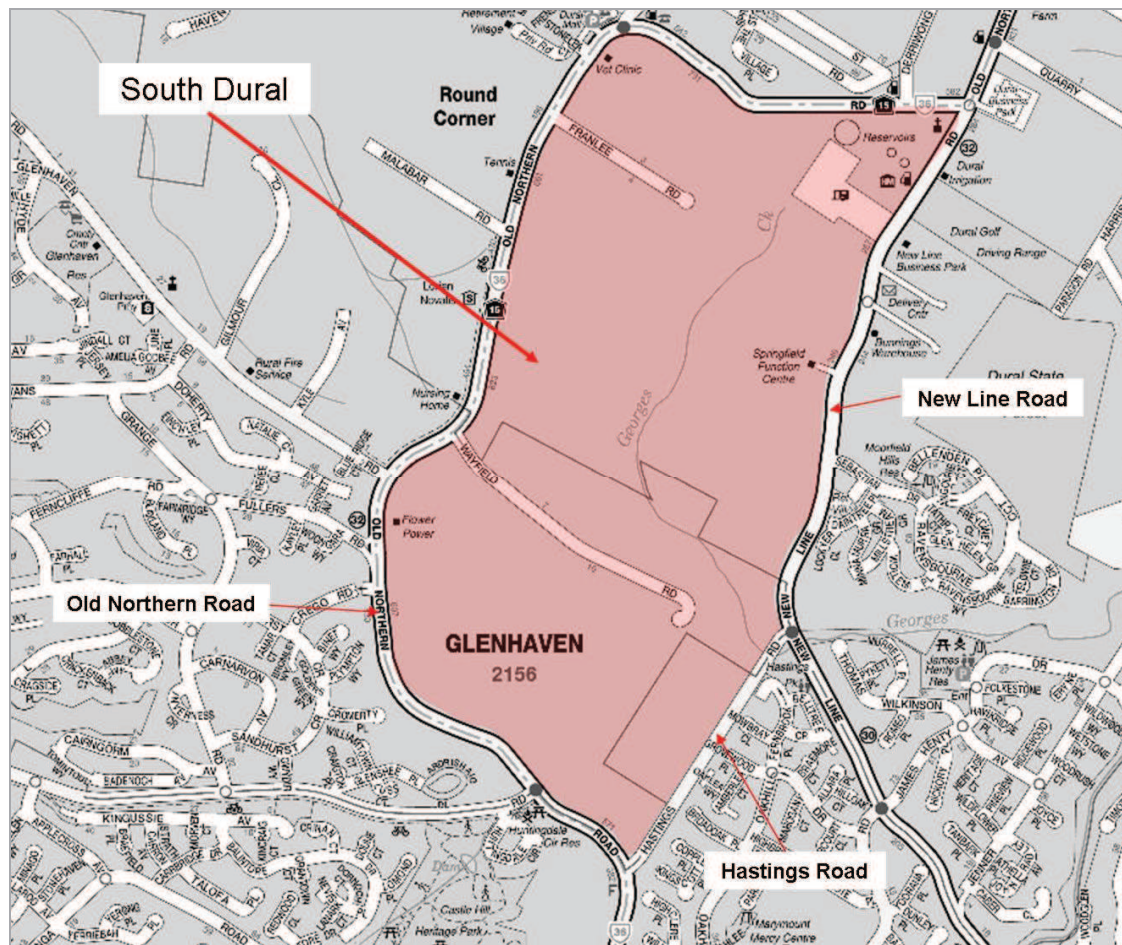
## 2.0 Existing conditions

### 2.1 Site Description

South Dural is located between Round Corner and Castle Hill, to the north west of Sydney. The site area is approximately 240 ha. The study area is surrounded by existing residential area in Castle Hill, Glenhaven and Cherrybrook. There is a small retail centre in Round Corner and a light industrial area to the east of the study area, north of Sebastian Drive.

The study area is bounded by Old Northern Road to the north, south and west and by Hastings Road and New Line Road to the east. The location of the site is shown in **Figure 2.1**.

Figure 2.1: Location of South Dural



Source: UBD, 2008

The site is currently occupied by rural residential dwellings with the remaining area being open grass land and woodland. Most of the current dwellings or properties have direct access to Old Northern Road or New Line Road. Wayfield Road and Franlee Road form the current internal road network of the site as well as providing access to some properties from Old Northern Road.



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## 2.2 Travel Behaviour

### 2.2.1 Journey to Work data

Journey to Work data (JTW) includes details of the origin and destination of trips, together with characteristics of the journey such as mode of travel. 2006 JTW data has been analysed to determine the current distribution of trips from the study area.

South Dural is located on the boundary of the Baulkham Hills and Hornsby LGAs. Therefore, the existing (2006) JTW data for all modes of transport from Baulkham Hills and Hornsby LGA has been analysed and is summarised in **Table 2.1** and **Table 2.2**.

**Table 2.1: Journey to Work destinations from Baulkham Hills LGA (all modes)**

Destination	Total Trips	Proportion
Baulkham Hills	23,890	31%
Parramatta	9,204	12%
Sydney	8,309	11%
Blacktown	6,218	8%
Hornsby	4,440	6%
Ryde	4,174	5%
Auburn	2,250	3%
Holroyd	1,800	2%
Willoughby	1,760	2%
North Sydney	1,760	2%
Fairfield	1,397	2%
Other Areas	10,977	16%
<b>Total</b>	<b>76,179</b>	<b>100%</b>

Source: Journey to Work (2006)

**Table 2.2: Journey to Work destinations by any mode from Hornsby LGA (all modes)**

Destination	Total Trips	Proportion
Hornsby	20,901	30%
Sydney	11,483	17%
Ryde	5,461	8%
Baulkham Hills	4,462	6%
Ku-ring-gai	4,297	6%
Willoughby	3,919	6%
Parramatta	3,683	5%
North Sydney	3,154	5%
Blacktown	1,418	2%
Auburn	1,264	2%
Warringah	1,239	2%
Other Areas	8,110	12%
<b>Total</b>	<b>69,391</b>	<b>100%</b>

Source: Journey to Work (2006)

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The JTW data for both LGAs shows that a high proportion of trips are self contained within the Baulkham Hills (31%) and Hornsby (30%). Other major destinations that people travelled to work include Parramatta, Sydney, Blacktown and Ryde.

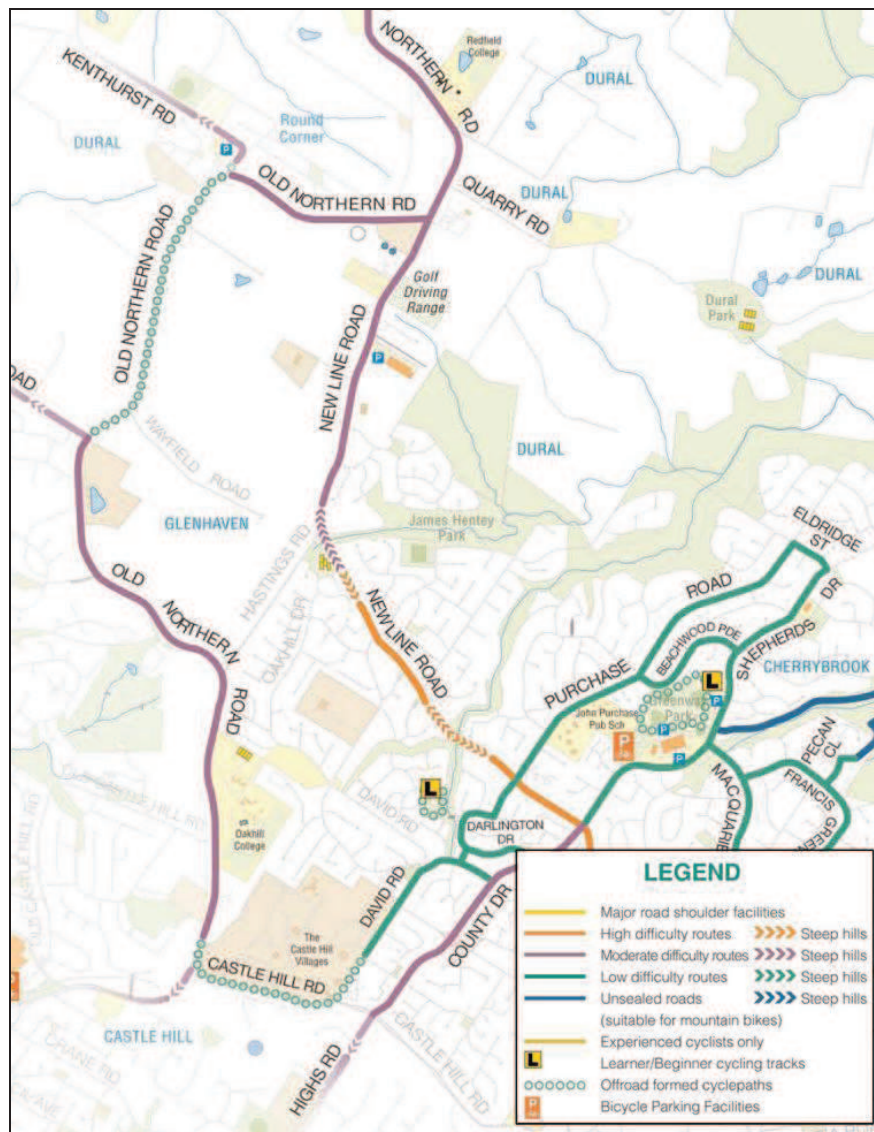
## 2.3 Pedestrian and Cycle Facilities

There is a dedicated shared path on the western side of Old Northern Road between Glenhaven Road and Kenthurst Road, as shown in **Figure 2.2**. Cyclists are allowed to cycle on road along other sections of Old Northern Road and New Line Road in the vicinity of the study area.

Pedestrian footpaths are provided on the northern end of Old Northern Road between Kenthurst Road and New Line Road, in the vicinity of Round Corner. There are also footpaths along New Line Road near the commercial areas and function centre to the east of the study area. No footpaths are provided on Hastings Road.

There are currently no dedicated pedestrian crossings at Old Northern Road, New Line Road and Hastings Road, except at the intersection of Old Northern Road/Kenthurst Road.

Figure 2.2: Cycle Map

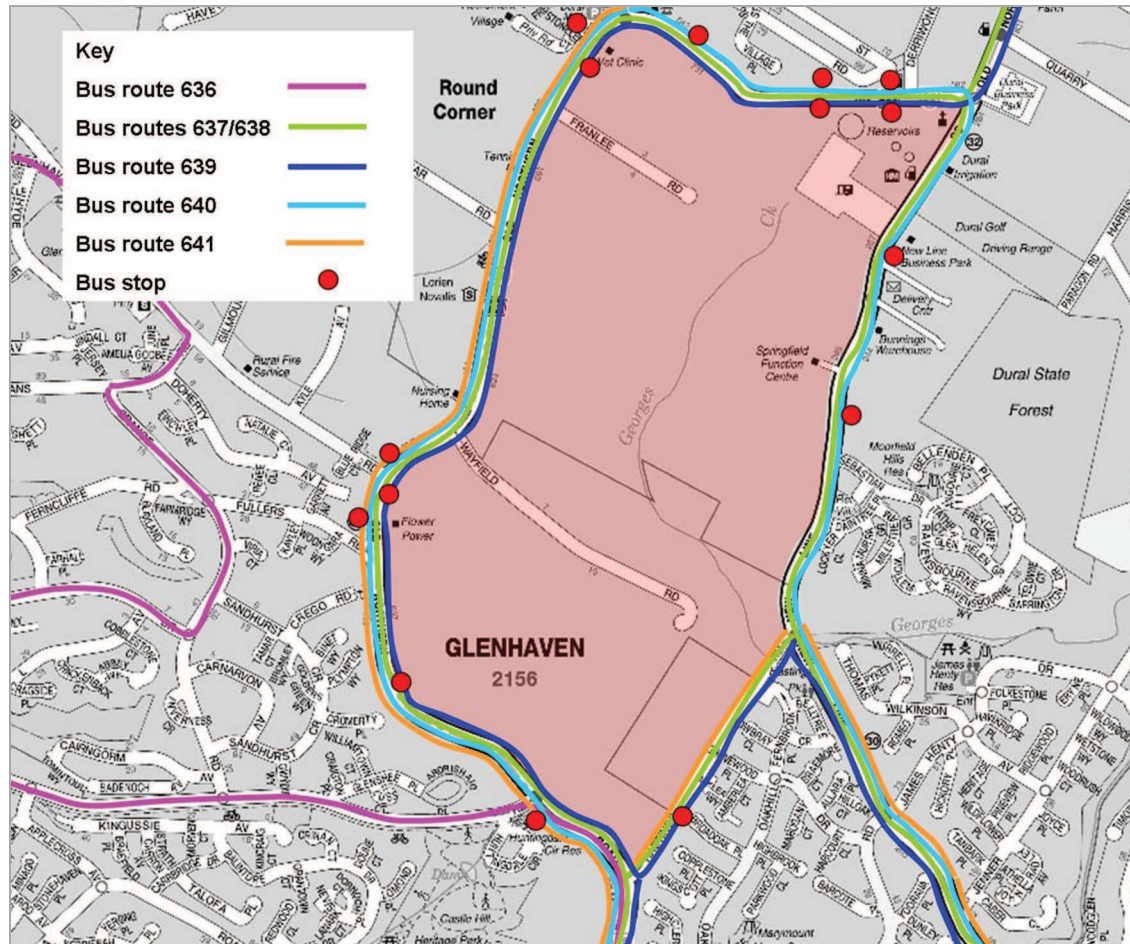


Source: Hornsby Shire Cycling Map 2008

## 2.4 Bus Facilities

Hillsbus runs 7 public bus routes (Routes 636 -641) that currently service the study area and its vicinity. The bus routes and bus stop locations in the vicinity of the site are shown in **Figure 2.3**.

Figure 2.3: Bus routes and bus stop locations



Source: Maunsell 2008

The bus routes travel along Old Northern Road, New Line Road and Hastings Road and there are bus stops located along the length of these roads. The details and service frequencies of each bus route are summarised in **Table 2.3**.

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**Table 2.3: Frequency of bus routes**

Route and bus service	AM peak (0700-0900)			PM peak (1600-1800)			Off peak (1000-1500)		
	Weekday	Sat	Sun	Weekday	Sat	Sun	Weekday	Sat	Sun
636 Glenhaven to Castle Hill and Pennant Hills	4	1	1	3	2	2	5	5	5
636 Pennant Hills and Castle Hill to Glenhaven	0	1	0	4	2	3	6	5	5
637 Dural and Round Corner to Castle Hill and Pennant Hills	1	-	-	0	-	-	0	-	-
637 Glenorie to Castle Hill and Pennant Hills (via Old Northern Rd)	5	1	1	2	0	1	3	3	2
637 Glenorie to Castle Hill and Pennant Hills (via New Line Rd)	2	-	-	0	-	-	0	-	-
637 Pennant Hills and Castle Hill to Glenorie (via Old Northern Rd)	2	0	0	3	1	1	3	2	2
637 Pennant Hills and Castle Hill to Glenorie (via New Line Rd)	0	-	-	3	-	-	1	-	-
638 Berrilee and Galston to Castle Hill and Pennant Hills (via Old Northern Rd)	3	1	0	1	0	1	0	2	0
638 Berrilee and Galston to Castle Hill and Pennant Hills (via New Line Rd)	2	-	-	1	-	-	-	0	-
638 Pennant Hills and Castle Hill to Galston and Berrilee (via Old Northern Rd)	2	0	0	6	1	1	3	4	2
638 Pennant Hills and Castle Hill to Galston and Berrilee (via New Line Rd)	1	-	-	1	-	-	0	-	-
639 Pitt Town Rd, Kenthurst to Castle Hill and Pennant Hills (via Old Northern Rd)	3	1	-	0	0	-	1	2	-
639 Pennant Hills and Castle Hill to Pitt Town Rd, Kenthurst	0	0	-	4	0	-	1	2	-
640 Porters Rd, Kenthurst to Castle Hill and Pennant Hills (via Old Northern Rd)	3	1	-	1	0	-	1	2	-
640 Porters Rd, Kenthurst to Castle Hill and Pennant Hills (via New Line Rd)	1	-	-	0	-	-	0	-	-
640 Pennant Hills and Castle Hill to Porters Rd, Kenthurst (via Old Northern Rd)	0	0	-	4	0	-	1	2	-
641 Annangrove Rd to Castle Hill and Pennant Hills	2	1	-	1	0	-	2	1	-
641 Pennant Hills and Castle Hill to Annangrove Rd	0	0	-	4	0	-	1	2	-

Source: Hillsbus.com.au, 2008

The bus timetable shows that the study area is well serviced in the weekday peak hours however there are limited bus services on the weekend.

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## 2.5 Rail Facilities

The closest train station is located approximately 10km east of the study area at Pennant Hills. Pennant Hills station is serviced by the Northern Line which runs between Hornsby and North Sydney via Strathfield. The bus routes described in Section 2.4 connect Pennant Hills station to the study area and are timetabled to coincide with the train services. The frequency of trains servicing Pennant Hills station is shown in **Table 2.4**.

**Table 2.4: Frequency of train services at Pennant Hills Station**

Direction	AM peak (0700-0900)			PM peak (1600-1800)			Off peak (1000-1500)		
	Weekday	Sat	Sun	Weekday	Sat	Sun	Weekday	Sat	Sun
Pennant Hill to City	7	4	4	7	4	4	11	10	10
City to Pennant Hills	7	4	4	10	4	4	11	10	10

Source: Cityrail.info, 2008

During the weekdays, rail services operate between Pennant Hills and City at approximately every 15 minutes in the AM peak. Additional outbound train services operate during the PM peak from City to Pennant Hills. During the weekday off peak hours and weekends, trains run in either direction at approximately every 30 minutes.

## 2.6 Road Network

The main roads in the vicinity of the study area are Old Northern Road, New Line Road and Hastings Road. Glenhaven Road and Gilbert Road connect to Old Northern Road and provide links to the surrounding areas including Castle Hill and Kellyville.

### 2.6.1 Old Northern Road

Old Northern Road runs along the southern, western and northern boundary of the study area. It runs in north-south direction from Castle Hill Road to Kenthurst Road and in east-west direction between Kenthurst Road and New Line Road. Old Northern Road is a sealed road with predominantly one lane in each direction in the vicinity of the study area. However, the road widens to 2 lanes in each direction at the intersections. Gilbert Road and Kenthurst Road intersect with Old Northern Road and both intersections are controlled by traffic signals. New Line Road meets Old Northern Road at a two lane roundabout. **Figure 2.4** shows a typical cross-section of Old Northern Road in the vicinity of the study area.

**Figure 2.4: Old Northern Road south of Glenhaven Road (looking south)**



Source: Maunsell, 2008

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The majority of the road in the vicinity of the study area has a speed limit of 60km/hr, except there is a 40km/hr school zone south of Malabar Road. The school zone is operational on school days between 8am and 9.30am and 2.30pm and 4pm. Parking is not permitted along the section of the road bordering the site.

## 2.6.2 New Line Road

New Line Road is an arterial road that runs in a north-south direction from Old Northern Road at the north-eastern corner of the study area to the Cumberland Highway. It has one lane in each direction between Old Northern Road and Hastings Road. Roundabouts are located at the intersections of Old Northern Road, Sebastian Drive as well as the access to Bunnings. The speed limit along New Line Road is 60km/hr. There are no parking lanes along the road. **Figure 2.5** shows a section of New Line Road.

**Figure 2.5: New Line Road approaching Old Northern Road roundabout (looking north)**



Source: Maunsell, 2008

## 2.6.3 Hastings Road

Hastings Road is a 4 lane road that connects Old Northern Road to New Line Road. Parking is not permitted along its entire length and it has a speed limit of 60km/hr. The intersection of Hastings Road and New Line Road is controlled by traffic signals. **Figure 2.6** shows a section of Hastings Road.

**Figure 2.6: Hastings Road north of Old Northern Road (looking north)**



Source: Maunsell, 2008

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## 2.6.4 Glenhaven Road

Glenhaven road provides access to Glenhaven and Kellyville to the west of the study area. At the section east of Evans Road, it has one lane in each direction with a parking lane on the southern side of the carriageway. It has a speed limit of 60km/hr and a load limit of 8 tonnes. Glenhaven Road connects with Old Northern Road at a priority-controlled intersection.

## 2.6.5 Gilbert Road

Gilbert Road is a collector road that provides a link between Old Northern Road and Showground Road to the south west of the study area. It has a 4 lane carriageway with two trafficable lanes and two parking lanes. It has a speed limit of 60km/hr. Vehicles 8 tonnes and over are not permitted to use Gilbert Road.

## 2.7 Traffic Volumes

### 2.7.1 Daily Traffic Counts

RTA Traffic Volume Data has been obtained to determine the historical traffic growth and current mid-block traffic flows in the surrounding area. **Table 2.5** shows historical Average Annual Daily Traffic (AADT) volumes at stations in the vicinity of the proposed development site. The location of the stations and the AADT for 2005 at these stations is shown in **Figure 2.7**.

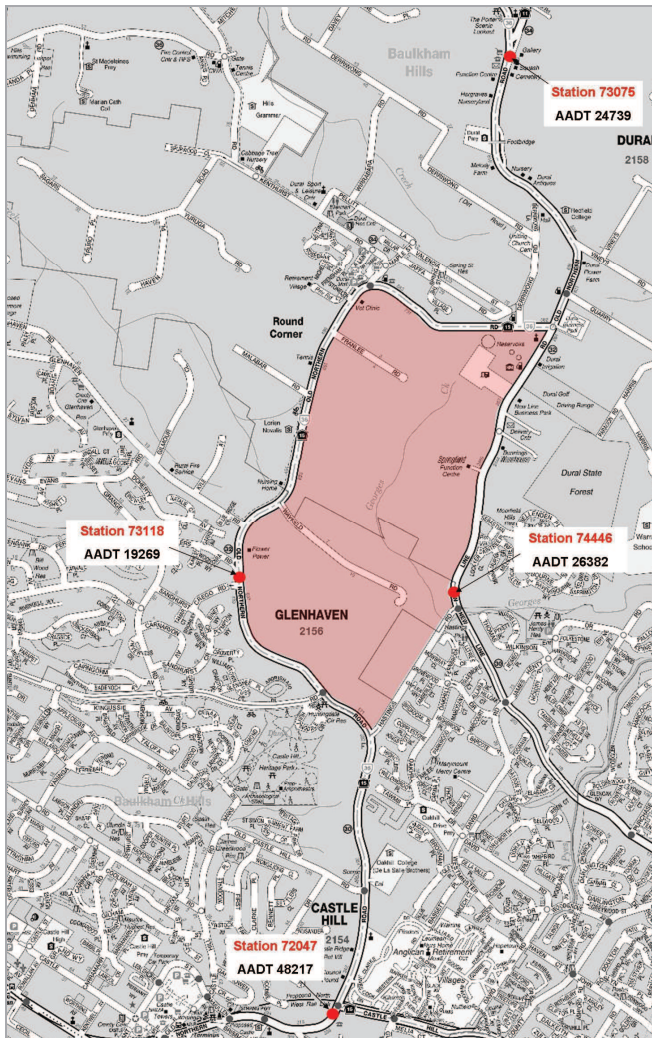
**Table 2.5: Historical Traffic Volumes and Growth**

Station Number	Location	1993	1996	1999	2002	2005	% growth
73118	Old Northern Road	14975	15787	17332	18630	19269	2.12%
74446	New Line Road	21649	24131	26378	26261	26382	1.66%
73075	Old Northern Road	18844	20783	22844	23210	24739	2.29%
72047	Old Northern Road	-	45557	43025	47609	48217	0.63%

Source: RTA Traffic Volume Data

The data shows that between 1993 and 2005, there has been an average yearly growth rate of 1.68% in the surrounding area.

Figure 2.7: 2005 AADT data in the vicinity of the site



Source: RTA Traffic Volume Data 2005

The 2005 AADT shows that there were approximately 19,000 vehicles per day on Old Northern Road and approximately 26,000 vehicles daily on New Line Road in the vicinity of the study area.

### 2.7.2 Intersection counts

Manual traffic counts were undertaken by Australasian Traffic Surveys (ATS) at the AM (6:30 to 9:30) and PM (16:30 to 18:30) peak hours on 15<sup>th</sup> May 2008 at the following intersections:

- Old Northern Road / Glenhaven Road;
- Old Northern Road / Gilbert Road;
- Old Northern Road / Hastings Road; and
- New Line Road / Hastings Road.

Traffic counts at the intersection of Old Northern Road and New Line Road were taken on 6<sup>th</sup> June 2008 during the same peak hour time period. SCATS data for the signalised intersection of Old Northern Road and Kenthurst Road (TCS site 2954) on 15<sup>th</sup> May 2008 was provided by the RTA.

Analysis of the data shows that the AM peak period for the network was between 7.30am and 8.30am and the PM peak was between 5pm and 6pm.



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The surveyed traffic data and a summary of the network turning traffic flows within the study area are included as **Appendix A**.

The latest traffic data shows that traffic flow in the peak hour traffic direction on Old Northern Road is approaching 1,000 veh/hr and that of New Line Road has exceeded 1,000 veh/hr. This implies that both roads are approaching capacity for a two lane road during the peak hours. Traffic flow on Hastings Road is relatively low (approximately 500 to 700 veh/hr) compared to the rest of the road network surrounding the study area.

## 2.8 Intersection Assessment

Intersection assessment based on the surveyed traffic data has been carried out using SIDRA 3.2, a computer based modelling package which calculates isolated intersection performance.

The main performance indicators for SIDRA 3.2 include:

- Degree of saturation (DoS) – a measure of the ratio between traffic volumes and the capacity of the intersection;
- Average delay – how long in seconds the average vehicle waits at the intersection; and
- Level of service (LoS) – a measure of the overall performance of the intersection (**Table 2.6**).

**Table 2.6: Performance Criteria for Intersections**

Level of Service	Average Delay (secs/veh)	Traffic Signals and Roundabouts	Give Way and Stop Signs
A	Less than 14	Good Operation	Good Operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals incidents will cause excessive delays	At capacity; requires other control mode
F	>70	Roundabouts require other control mode	At capacity; requires other control mode

Source: Guide to Traffic Generating Developments, RTA, 2002

The existing performance of the following intersections has been assessed:

- Old Northern Road / Hastings Road (priority controlled T intersection);
- Old Northern Road / Gilbert Road (signalised intersection);
- Old Northern Road / Glenhaven Road (priority controlled T intersection);
- Old Northern Road / Kenthurst Road (signalised intersection);
- Old Northern Road / New Line Road (roundabout); and
- New Line Road / Hastings Road (signalised intersection).

**Table 2.7** summarises the existing intersection operation in the AM peak period and **Table 2.8** summarises the existing intersection operation of the PM peak period. More detailed results are presented as **Appendix B**.

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**Table 2.7: AM Peak Hour Intersection Performance**

Intersection	Int Type	LoS	DoS	Ave Delay (s)	Worst Movement delay (s)	Longest Queue (m)	Longest Queue Movement
Old Northern Rd / Hastings Rd	Priority	F*	0.983	15.1	130.2	93	Hastings Road right turn
Old Northern Rd / Gilbert Rd	Signals	C	0.900	31.6	49.7	182	Gilbert Road right turn
Old Northern Rd / Glenhaven Rd	Priority	F*	0.936	10.9	96.7	67	Glenhaven Road right turn
Old Northern Road / Kenthurst Road	Signals	B	0.782	24.5	51.3	167	Old Northern Road eastbound thru
Old Northern Road / New Line Road	Round about	A	0.792	12.7	17.2	68	Old Northern Road eastbound left turn
New Line Rd / Hastings Rd	Signals	B	0.847	26.2	48.0	183	New Line Road northbound

Source: Maunsell, 2008

LoS – Level of Service, DoS – Degree of Saturation

\* Level of Service for Priority intersections is based on the worst movement average delay.

Level of Service for Signalised intersections is based on average intersection delay.

The SIDRA results for the AM peak suggest that most of the intersections surrounding the study area are operating at/close to capacity (DoS > 0.8). The priority intersections at Glenhaven Road and Hastings Road with Old Northern Road operate unsatisfactorily and have significant delays and queuing at the minor approaches as it is very difficult to find a gap to enter into the main stream traffic at Old Northern Road.

At the intersection of Old Northern Road/Gilbert Road, it is observed that large amount of green time has been given to the traffic on Old Northern Road. This has caused significant queuing on the Gilbert Road approach, especially the right turn movement into Old Northern Road.

The intersections of Old Northern Road/Kenthurst Road, Old Northern Road/New Line Road and New Line Road/Hastings Road operate with small amount of spare capacity.

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**Table 2.8: PM Peak Hour Intersection Performance Assessment**

Intersection	Int Type	LoS	DoS	Ave Delay (s)	Worst Movement delay (s)	Longest Queue (m)	Longest Queue Movement
Old Northern Rd / Hastings Rd	Priority	F*	0.956	11.9	119.2	72	Hastings Road right turn
Old Northern Rd / Gilbert Rd	Signals	C	0.867	31.3	52.1	184	Old Northern Road northbound
Old Northern Rd / Glenhaven Rd	Priority	D*	0.824	9.4	47.6	62	Old Northern Road southbound right turn
Old Northern Road / Kenthurst Road	Signals	B	0.882	27.7	43.7	154	Old Northern Road westbound right turn
Old Northern Road / New Line Road	Round about	A	0.467	9.8	14.9	26	New Line Road northbound
New Line Rd / Hastings Rd	Signals	C	0.909	32.1	55.3	207	New Line Road northbound

Source: Maunsell, 2008

LoS – Level of Service, DoS – Degree of Saturation

\* Level of Service for Priority intersections is based on the worst movement average delay.

Level of Service for Signalised intersections is based on average intersection delay.

The SIDRA results for the PM peak suggest that all the intersections are operating at/close to capacity (DoS > 0.8), except the roundabout at Old Northern Road/New Line Road. The priority intersections are not performing satisfactorily due to delays experienced on the minor approaches. Significant queuing is observed on the northbound direction at other intersections at Old Northern Road and New Line Road with heavy traffic movements returning home in this direction.

### 3.0 Future Transport Conditions

This section reviews the likely impacts of changes to the traffic flows and the road network for the future assessment year before any proposed development occurs in South Dural. Future year assessment will be undertaken for 2018 (10 years from existing) when it is anticipated that the development would be completed and fully occupied by this time.

#### 3.1 Background Traffic Growth

A growth rate of 1.68% per annum has been determined based on historical RTA Traffic Volume Data. This yearly growth rate has been applied to the existing network flows to determine the future traffic conditions in 2018 (without the proposed development). There are no significant development sites within the immediate vicinity of the site. Therefore, it is assumed that this background growth rate will cover any traffic generation associated with other proposed local in-fill developments. The estimated traffic volumes at key intersections under this scenario (2018 without development) are presented in **Appendix C**.

#### 3.2 Mitigation Measures

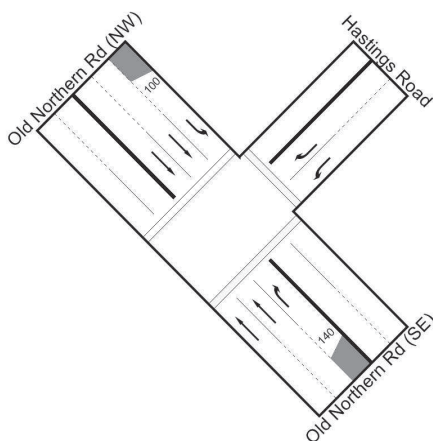
To cater for the background traffic growth in the vicinity of the study area, local infrastructure upgrades are required for the road network to continue to operate effectively.

Old Northern Road and New Line Road are currently approaching capacity during the peak hours. With the background traffic growth, it is assumed that both roads in the vicinity of the study area will need to be duplicated before 2018.

It is understood that the RTA is planning for the signalisation of intersection at Old Northern Road/Hastings Road, due to its current poor level of service. Therefore, it is assumed that this intersection will be upgraded to traffic signals with additional turning lanes for any future year assessment. The proposed layout of this intersection is shown in **Figure 3.1**.

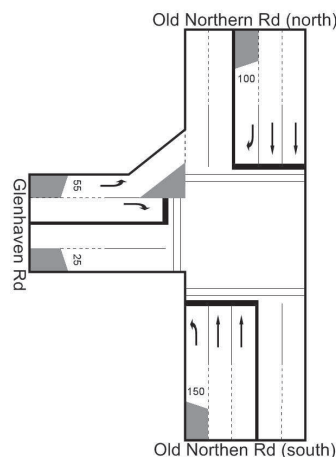
With the duplication of Old Northern Road, more delays are expected for traffic from Glenhaven Road to be able to find a gap to enter the main road. To maintain a reasonable level of service for this intersection while maintaining all traffic movements, it is proposed that this intersection will be signalised with additional turning lanes when Old Northern Road is duplicated. The proposed layout of this intersection is shown in **Figure 3.2**.

**Figure 3.1: Proposed Layout of Old Northern Road/Hastings Road (2018 Base)**



Source: Maunsell, 2008

**Figure 3.2: Proposed Layout of Old Northern Road/Glenhaven Road (2018 Base)**



Source: Maunsell, 2008

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Apart from the above major intersection upgrades, a short left turn lane of 100m is required on the western approach of the Old Northern Road/New Line Road and on the southern approach of Old Northern Road/Gilbert Road to maintain reasonable level of service in the future year. Intersection layouts for the 2018 without development scenario are included as **Appendix C**.

## 3.3 Intersection Assessment

The intersections within the study area with the proposed upgrades discussed in **Section 3.3** have been assessed using SIDRA Intersection 3.2. The results are presented in **Table 3.1** and **Table 3.2** for the future year scenario. Detailed results are provided in **Appendix D**.

**Table 3.1: 2018 AM Peak Intersection Performance – without proposed development**

Intersection	Int Type	LoS	DoS	Ave Delay (s)	Worst Movement delay (s)	Longest Queue (m)	Longest Queue Movement
Old Northern Rd / Hastings Rd	Signals	B	0.701	23.6	44.3	129	Hastings Road left turn
Old Northern Rd / Gilbert Rd	Signals	C	0.717	29.3	42.3	129	Gilbert Road right turn
Old Northern Rd / Glenhaven Rd	Signals	B	0.630	19.0	42.2	101	Old Northern Road northbound thru
Old Northern Road / Kenthurst Road	Signals	B	0.807	24.8	40.7	139	Old Northern Road westbound right turn
Old Northern Road / New Line Road	Round about	B	0.968	24.6	54.0	248	New Line Road northbound
New Line Rd / Hastings Rd	Signals	B	0.751	20.0	49.5	132	New Line Road northbound

Source: Maunsell, 2008

LoS – Level of Service, DoS – Degree of Saturation

Level of Service for Signalised intersections is based on average intersection delay.

**Table 3.2: 2018 PM Peak Intersection Performance – without proposed development**

Intersection	Int Type	LoS	DoS	Ave Delay (s)	Worst Movement delay (s)	Longest Queue (m)	Longest Queue Movement
Old Northern Rd / Hastings Rd	Signals	B	0.848	22.9	42.2	127	Old Northern Road southbound left turn
Old Northern Rd / Gilbert Rd	Signals	B	0.700	27.7	49.6	126	Old Northern Road northbound
Old Northern Rd / Glenhaven Rd	Signals	B	0.836	27.4	47.5	150	Old Northern Road southbound right turn
Old Northern Road / Kenthurst Road	Signals	C	0.910	34.5	60.1	227	Old Northern Road westbound right turn
Old Northern Road / New Line Road	Round about	A	0.703	11.3	16.7	62	New Line Road northbound
New Line Rd / Hastings Rd	Signals	B	0.836	25.2	58.7	177	New Line Road northbound

Source: Maunsell, 2008

LoS – Level of Service, DoS – Degree of Saturation

Level of Service for Signalised intersections is based on average intersection delay.

# DRAFT

The SIDRA results show that all intersections with the proposed upgrades will be operating with small amount of spare capacity and acceptable level of service in the future year scenario during both peak hour periods.

## 4.0 Proposed Development

The proposed development at South Dural is estimated to yield approximately 2,940 dwellings ranging from residential lots of various densities to integrated housing. The dwelling type and the number of lots of each type of housing are shown in **Table 4.1**. The estimates of residential dwellings have been prepared by Inspire Urban Design & planning.

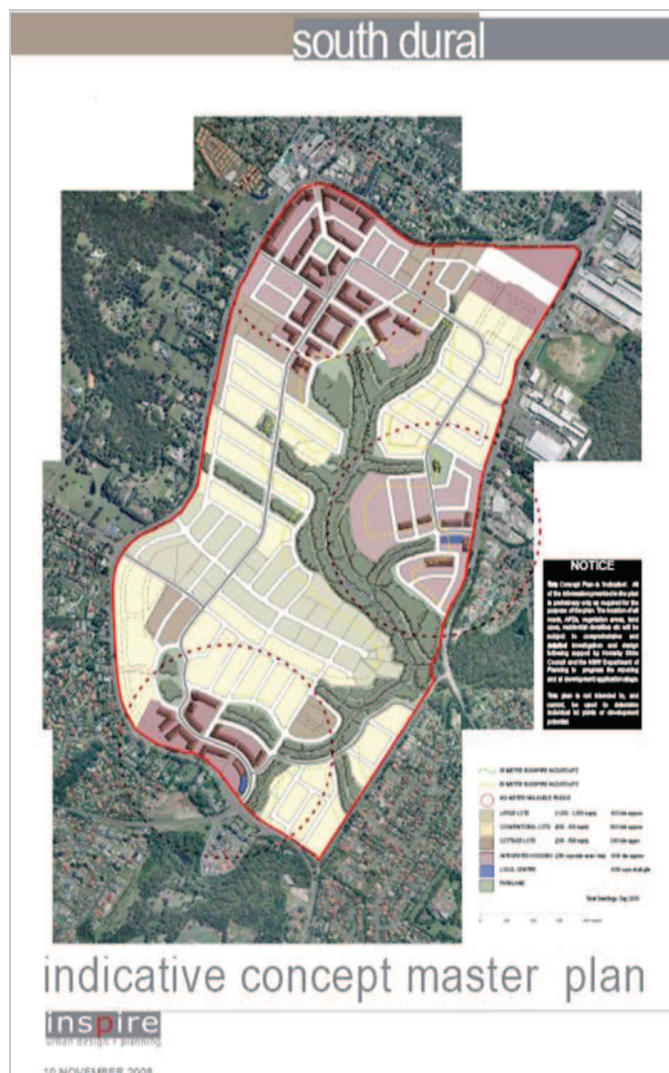
**Table 4.1: Proposed Dwelling Type and Number**

Dwelling Type	Number of Dwellings (approximately)
Large Lots	100
Conventional Lots	800
Cottage Lots	240
Integrated Housing	1,800

Source: Inspire Urban Design and Planning, 2008

The total area of retail space within the proposed development is estimated to be approximately 1,000m<sup>2</sup>. The proposed master plan for South Dural is shown in **Figure 4.1**.

**Figure 4.1: Proposed Master Plan Layout**



Source: Inspire Urban Design and Planning, 2009

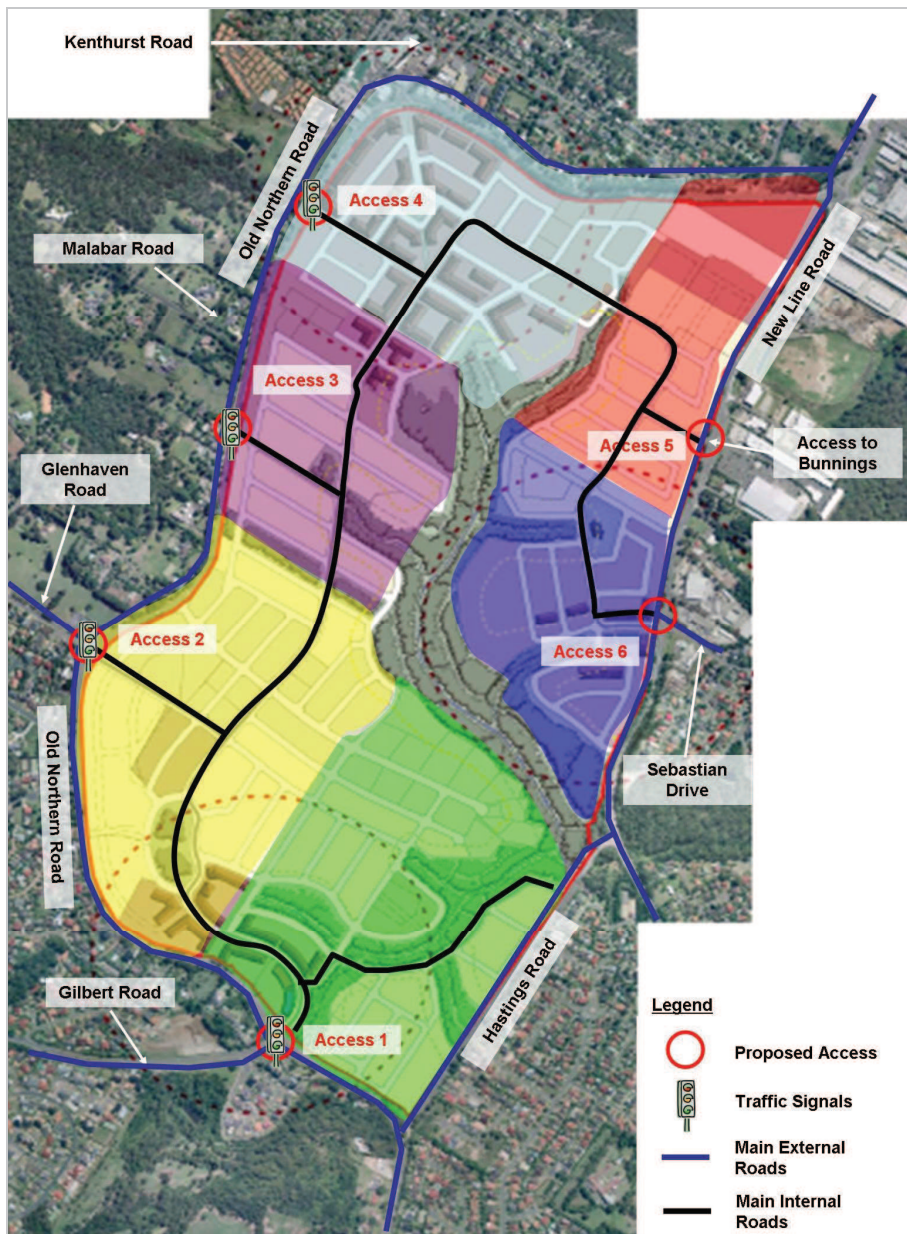
## 5.0 Access Strategy

An access strategy for the site has been developed to determine the number of accesses the site requires to accommodate for the development traffic. This has been based on the number of trips expected to be generated by the development, the distribution of these trips to the surrounding areas and the internal road layout within the development.

### 5.1 Site Access

The site will generate approximately 1,900 vehicle movements in each peak hour. This would require 6 access locations to effectively manage traffic movements and to ensure that the environmental capacity levels for residential roads (approximately 300 vehicles per hour) are not exceeded. **Figure 5.1** shows the indicative location of proposed accesses and the lot catchment area for each access.

Figure 5.1: Access Strategy Plan



Source: Maunsell, 2008



# DRAFT

Proposed access points to/from the development are situated at the following locations:

- Old Northern Road – at existing signalised intersection opposite Gilbert Road (Access 1);
- Old Northern Road – at proposed signalised intersection opposite Glenhaven Road (Access 2);
- Old Northern Road – new signalised access south of Malabar Road (Access 3);
- Old Northern Road – new signalised access north of Malabar Road (Access 4);
- New Line Road – at existing roundabout with access to Bunnings (Access 5); and
- New Line Road – at proposed roundabout with Sebastian Drive (Access 6).

Based on Journey to Work Data 2006, the majority of trips (64%) from the study area are assumed to travel south and east towards Sydney, Parramatta, Ryde and Blacktown. This means that the majority of trips could potentially enter and leave the development via Access 1.

To alleviate the amount of vehicles using Access 1 and to reduce the amount of vehicles travelling through the development, three additional accesses are proposed on Old Northern Road. These additional access locations are proposed at the intersection with Glenhaven Road, south of Malabar Road as well as north of Malabar Road (Accesses 2, 3 and 4). These accesses are also expected to accommodate vehicles travelling between the development and Round Corner as well as Baulkham Hills.

Two other accesses are proposed on New Line Road (Accesses 5 and 6) to accommodate for vehicle movements generated by the eastern side of the development.

All accesses should be designed or upgraded to provide safe access and egress for emergency vehicles to access the proposed development in the event of a bush fire.

## 5.2 Internal Road Network

The proposed master plan for South Dural shows the internal connecting roads between the various parts of the proposed development. It will be important to design the internal road layout to minimise opportunities for rat-running particularly for traffic using the internal collector road system as an alternative to avoid the heavy traffic flows on the external road network. The limited capacity at the intersection of Old Northern Road/Gilbert Road (Access 1), in particular the turning lanes in and out of the study area has been designed to avoid all southbound traffic during the AM peak using the internal road and this access as their preferred route and vice versa.

All internal roads should be designed or upgraded to provide safe access and egress for emergency vehicles to access the proposed development in the event of a bush fire. Perimeter roads following the proposed riparian corridor with appropriate setback zones should be allowed to promote effective bush fire management.

All the site access roads will connect to a main internal collector road as shown in **Figure 5.1**. This collector road will link neighbourhoods, local centre and the local streets within the proposed development.

## 5.3 Pedestrians and Cyclists

Internal cycle and pedestrian (shared) paths will be connected to existing shared path on Old Northern Road. The proposed traffic signals at Glenhaven Road (Access 2), Access 3 and Access 4 will improve pedestrian/cyclist connection between the study area and Round Corner.

Internal cycle and pedestrian paths will also be connected to existing footpaths and on-road cycle network on New Line Road. Footpaths may need to be provided at certain sections of roads surrounding the study area, especially from the access locations to bus stops.

## 5.4 Public Transport

The majority of the study area will be within the 400m catchment of current bus routes operating on Old Northern Road, New Line Road and Hastings Road. Therefore, most of the residents will be within a 400m safe walking distance of an existing or potential bus route operating on the external road network.

The proposed development may support the provision of improved service frequencies. There is potential to serve the site directly by diverting an existing bus route on Old Northern Road to operate along the internal collector road, if demand is sufficient when the whole site is completed. This proposal will be discussed with the bus operator and MoT.

If a bus route is to be operated along the internal collector road and some of the site accesses, these roads will need to be designed to accommodate bus movements.

## 6.0 Traffic Impact Assessment

This section assesses the likely traffic impacts of the proposed development on the local road network and recommends mitigation measures to alleviate any impacts.

### 6.1 Traffic Generation

The RTA Guide to Traffic Generating Developments (2002) has been used to determine the number of vehicle trips the development will generate.

It has been assumed that the lifestyle lots, conventional lots and cottage lots are of low density and the integrated housing is of medium density. Therefore the following peak hour (AM and PM peak) trip rates have been used:

- Low density residential – 0.85 trips per dwelling; and
- Medium density residential – 0.5 trips per dwelling.

Using these trip rates, the proposed development in South Dural will generate a total of 1,870 vehicle movements during each of the peak hours. It has been assumed that during the AM peak 80% of trips will be leaving the site and 20% will enter the site, due to the residential nature of the development. This distribution is reversed during the PM peak.

For the purpose of this analysis it has been assumed that trips generated by the local centre within the development will be self-contained and therefore have not been included in the assessment of the external road network.

### 6.2 Traffic Distribution and Assignment

Trip distribution and assignment for the development trips has been determined based on existing Journey to Work pattern, as described in **Section 2.2**. The traffic pattern of both Baulkham Hills and Hornsby LGAs has been taken into account of determining the trip distribution pattern of the proposed development. **Table 6.1** shows the destinations/travel directions and the proportion of development trips that will be travelling to.

**Table 6.1: Distribution of Proposed Development Trips**

Destination	% of trips
Baulkham Hills	19%
Hornsby	17%
South	56%
East	5%
West	2%

Source: Journey to Work (2006)

The total amount of development trips have been split between the six catchment areas of the proposed development, as seen in **Figure 5.1**. It has been assumed that vehicles will, in general, use the access associated with the catchment area. The distribution of trips in the AM peak has been reversed in the PM peak.

Development trips have been added to the 2018 base network according to the distribution pattern as illustrated in **Table 6.1**. The turning flows for all intersections are included as **Appendix E**.

# DRAFT

## 6.3 Intersection Assessment

All the proposed access points and key intersections surrounding the study area have been modelled in SIDRA Intersection 3.2. The intersection performance results are shown in the following tables (Table 6.2 and Table 6.3). Detailed results are provided in Appendix F.

**Table 6.2: 2018 AM Peak Intersection Performance – with proposed development**

Intersection	Int Type	LoS	DoS	Ave Delay (s)	Worst Movement delay (s)	Longest Queue (m)	Longest Queue Movement
Old Northern Rd / Hastings Rd	Signals	C	0.926	39.3	61.1	289	Hastings Road left turn
Old Northern Rd / Gilbert Rd / Access 1	Signals	D	0.869	44.4	71.0	166	Old Northern Road southbound
Old Northern Rd / Glenhaven Rd / Access 2	Signals	C	0.773	34.6	56.6	272	Old Northern Road southbound
Old Northern Road / Access 3	Signals	A	0.536	11.0	47.4	119	Old Northern Road northbound
Old Northern Road / Access 4	Signals	B	0.801	24.3	38.4	176	Old Northern Road northbound
Old Northern Road / Kenthurst Road	Signals	B	0.840	27.0	51.1	160	Old Northern Road westbound right turn
Old Northern Road / New Line Road	Round about	E	1.105	68.0	226.5	905	New Line Road northbound
	Signals	D	0.950	44.8	78.9	242	Old Northern Road southbound right turn
New Line Road / Access to Bunnings / Access 5	Round about	A	0.540	6.9	15.4	48	New Line Road northbound
New Line Road / Sebastian Drive / Access 6	Signals	B	0.735	16.2	35.3	130	New Line Road northbound
New Line Rd / Hastings Rd	Signals	B	0.867	24.2	51.5	169	New Line Road northbound

Source: Maunsell, 2008

LoS – Level of Service, DoS – Degree of Saturation

Level of Service for Signalised intersections is based on average intersection delay.

**Table 6.3: 2018 PM Peak Intersection Performance – with proposed development**

Intersection	Int Type	LoS	DoS	Ave Delay (s)	Worst Movement delay (s)	Longest Queue (m)	Longest Queue Movement
Old Northern Rd / Hastings Rd	Signals	C	0.998	30.8	87.5	227	Old Northern Road northbound right turn
Old Northern Rd / Gilbert Rd / Access 1	Signals	D	0.834	50.8	75.0	211	Old Northern Road northbound
Old Northern Rd / Glenhaven Rd / Access 2	Signals	C	0.887	40.9	67.0	240	Old Northern Road southbound right turn

# DRAFT

Intersection	Int Type	LoS	DoS	Ave Delay (s)	Worst Movement delay (s)	Longest Queue (m)	Longest Queue Movement
Old Northern Road / Access 3	Signals	A	0.530	14.5	53.8	126	Old Northern Road southbound
Old Northern Road / Access 4	Signals	A	0.597	13.1	69.7	176	Old Northern Road southbound
Old Northern Road / Kenthurst Road	Signals	E	1.000	57.8	120.1	449	Kenthurst Road right turn
Old Northern Road / New Line Road	Round about	A	0.819	13.4	21.0	97	New Line Road northbound
	Signals	C	0.846	33.5	47.4	126	Old Northern Road southbound right turn
New Line Road / Access to Bunnings / Access 5	Round about	A	0.760	7.0	16.7	110	New Line Road northbound
New Line Road / Sebastian Drive / Access 6	Signals	A	0.776	12.3	46.9	212	New Line Road northbound
New Line Rd / Hastings Rd	Signals	C	0.911	37.6	81.4	338	New Line Road northbound

Source: Maunsell, 2008

LoS – Level of Service, DoS – Degree of Saturation

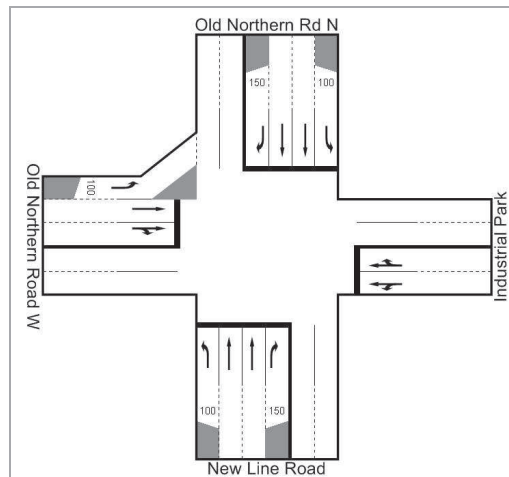
\* Level of Service for Priority intersections is based on the worst movement average delay.

Level of Service for Signalised intersections is based on average intersection delay.

The SIDRA analysis shows that intersections of Old Northern Road/Hastings Road and New Line Road/Hastings Road will both operate satisfactorily with the additional development traffic on the road network during both peak periods. Queueing at both intersections has increased when compared to the 2018 base case.

The intersection of Old Northern Road/New Line Road has been assessed as a roundabout (same geometry as in 2018 base case). However, the intersection will not operate satisfactorily (DoS >1) with extensive queueing on New Line Road during the AM peak. Therefore, the intersection has also been assessed as traffic signals and it operates satisfactorily with improved level of service during both peak hours. The proposed layout of the signalised intersection is shown in **Figure 6.1**.

**Figure 6.1: Potential Traffic Signals Layout at Old Northern Road/New Line Road**



Source: Maunsell, 2008

# DRAFT

All the intersections associated with the proposed access locations will operate satisfactorily during the AM and PM peak periods in 2018, by introducing the access roads and additional turning lanes leading into the proposed development. Lengthening of the right turn lane onto Glenhaven Road to 150m is required to accommodate the high amount of right turning traffic in the PM peak period.

The intersection of Old Northern Road/Kenthurst Road operates adequately in the AM peak period however it operates at capacity in the PM peak period due to a heavy right turn from Old Northern Road to Kenthurst Road. The heavy right turn is not attributable to development traffic as it is evident in 2018 base case scenario.

At this stage, it is proposed that all movements are allowed at all the accesses, except a right turn ban is proposed from Old Northern Road into Access 2 opposite Glenhaven Road.

All proposed intersection layouts for 2018 (with development scenario) are included as **Appendix E**.

## 6.4 Infrastructure Funding

The costs of proposed infrastructure upgrades will be fully or partially contributed by the developers of South Dural in order to alleviate the impacts generated by their development. If the proposed upgrades offer sole benefits to the development (access roads and internal roads), then they would be fully funded by the developer.

If the upgrades satisfy not only the demand of the new development, but also some regional traffic demand or to make up some existing deficiency, then only a portion of the cost for the proposed upgrade will be apportioned to the developer.

Upon agreement of the proposed infrastructure package and an associated scope of works for each measure, a more thorough scrutiny of likely costs can be undertaken if appropriate within the context of the planning process.

# DRAFT

## 7.0 Conclusion

Maunsell has prepared a TIA for the proposed development of South Dural in Sydney's north west. The proposed development includes approximately 2,940 residential dwellings and a small local centre at the southern edge of the proposed development. The proposed development in South Dural is not considered to have an adverse traffic impact on the surrounding road network.

### 7.1 Access Strategy

The development will require six access points on to the local road network. The number of accesses has been determined through the amount of trips the development is expected to generate and the environmental capacity of the access roads.

Four signalised access points will be provided along Old Northern Road opposite Gilbert Road, Glenhaven Road, south of Malabar Road and south of Kenthurst Road. These signalised intersections will formalise pedestrian crossing movements across Old Northern Road.

Two access points will also be provided on New Line Road to cater for the eastern side of the development. The proposed access opposite Bunnings will be controlled by a roundabout, while the other proposed access opposite Sebastian Drive will be controlled by traffic signals.

The internal road network will consist of a main collector road that runs through the site, connecting the neighbourhoods, the local centre and local streets within the development.

All internal roads should be designed or upgraded to provide safe access and egress for emergency vehicles to access the proposed development in the event of a bush fire. Perimeter roads following the proposed riparian corridor with appropriate setback zones should be allowed to promote effective bush fire management.

### 7.2 Intersection Performance

It is determined, as part of this study that road network upgrades are required to cater for the background traffic growth in the future years before the development of South Dural. These upgrades include:

- Duplication of Old Northern Road between Hastings Road and New Line Road;
- Duplication of New Line Road between Old Northern Road and Hastings Road;
- Signalisation of Old Northern Road/Hastings Road;
- Signalisation of Old Northern Road/Glenhaven Road;
- Addition of short (100m) left turn lane on the western approach of the Old Northern Road/New Line Road; and
- Addition of short (100m) left turn lane on the southern approach of Old Northern Road/Gilbert Road.

The infrastructure upgrades will provide additional capacity such that the road network can continue to operate effectively during both peak periods in 2018 before South Dural development occurs.

All intersections within the study area have been modelled with additional development trips and access roads and turning lanes leading to the proposed development. The SIDRA analyses confirm that all intersections and accesses will operate at appropriate level of service, with inherent reserve capacity.

# DRAFT

## 7.3 Transport and Accessibility

Internal cycle and pedestrian (shared) paths will be connected to existing shared path on Old Northern Road. The proposed traffic signals at Glenhaven Road (Access 2), Access 3 and Access 4 will improve pedestrian/cyclist connection between the site and Round Corner.

Internal cycle and pedestrian paths will also be connected to existing footpaths and on-road cycle network on New Line Road. Footpaths may need to be provided at certain sections of roads surrounding the study area, especially from the access locations to bus stops.

The majority of the study area will be within the 400m catchment of current bus routes operating on Old Northern Road, New Line Road and Hastings Road. Therefore, most of the residents will be within a 400m safe walking distance of an existing or potential bus route operating on the external road network.

The proposed development may support the provision of improved service frequencies. There is potential to serve the site directly by diverting an existing bus route on Old Northern Road to operate along the internal collector road, if demand is sufficient when the whole site is completed. This proposal will be discussed with the bus operator and MoT.

If a bus route is to be operated along the internal collector road and some of the site accesses, these roads will need to be designed to accommodate bus movements.

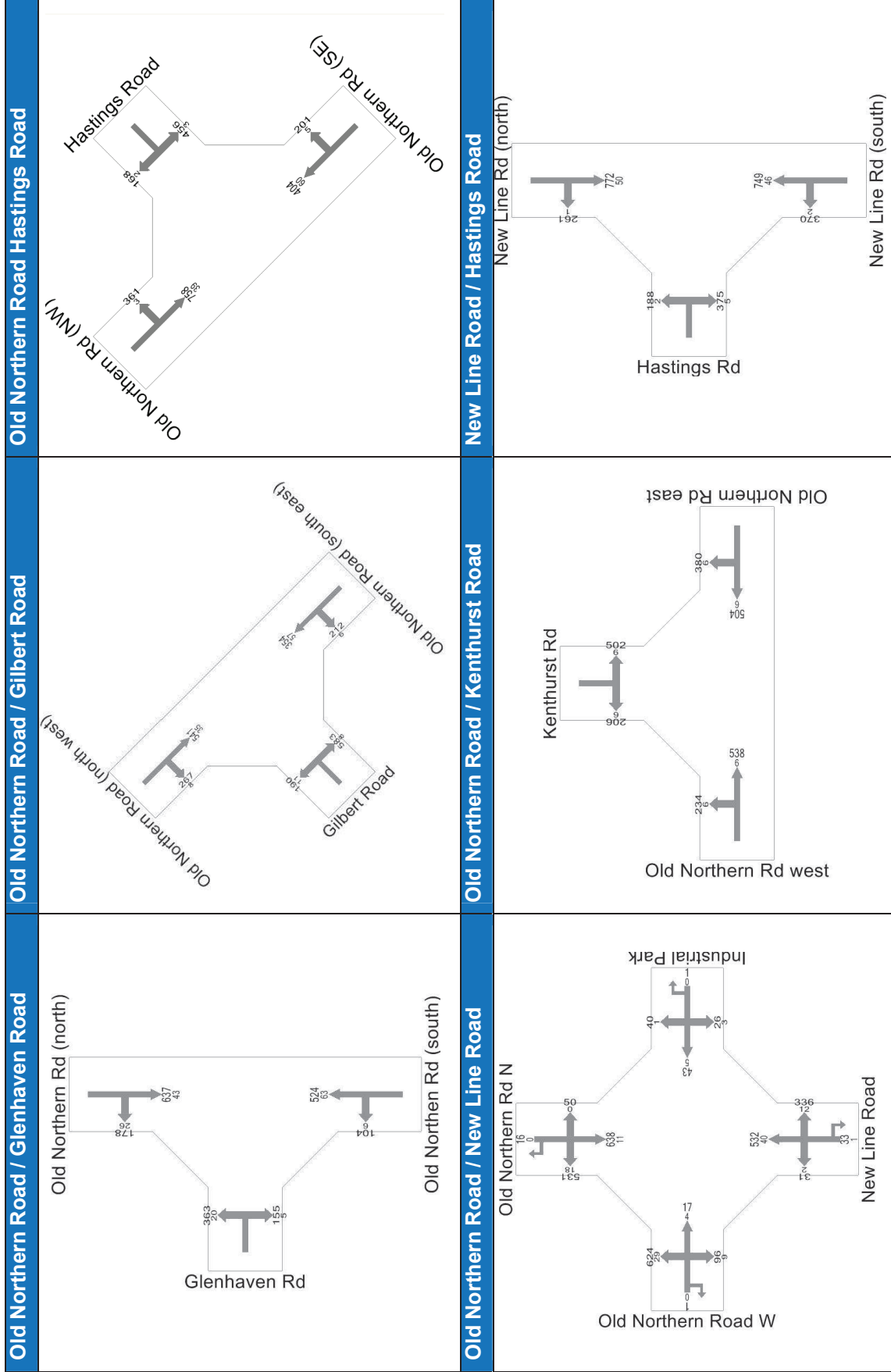


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## Appendix A Surveyed Traffic Data and Existing Traffic Flows

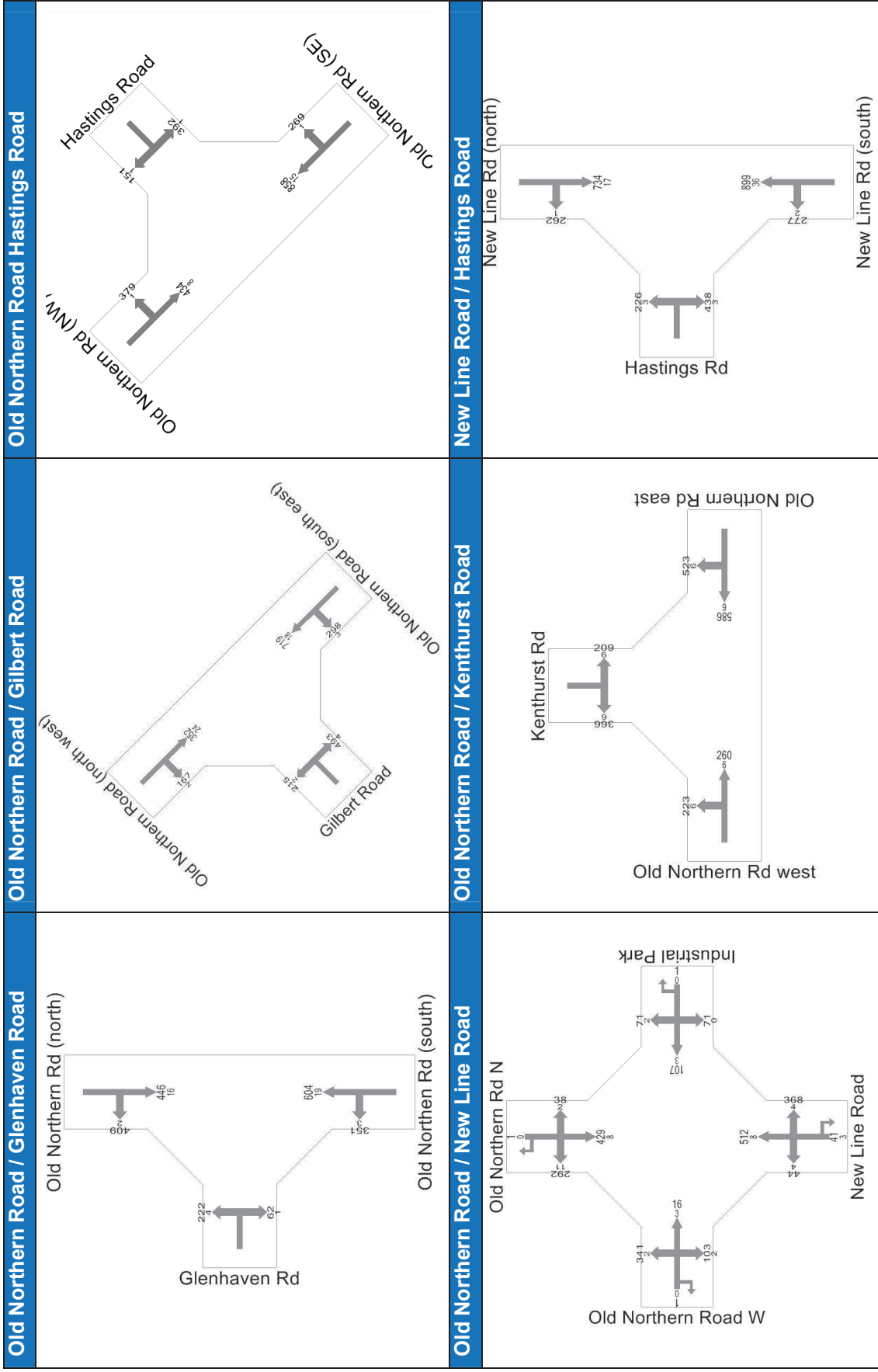
# DRAFT

## 2008 AM Peak Turning Flows



# DRAFT

## 2008 PM Peak Turning Flows



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## Appendix B 2008 SIDRA Results

# Movement Summary

## Glenhaven Road / Old Northern Road

2008 AM peak

Give-way

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>Old Northern Rd (south)</b>										
1	L	110	5.5	0.383	8.4	LOS A	0	0.00	0.67	49.0
2	T	587	10.7	0.384	0.0	LOS A	0	0.00	0.00	60.0
<b>Approach</b>		<b>697</b>	<b>9.9</b>	<b>0.384</b>	<b>1.3</b>	<b>LOS A</b>		<b>0.00</b>	<b>0.11</b>	<b>57.9</b>
<b>Old Northern Rd (north)</b>										
8	T	680	6.3	0.363	0.0	LOS A	0	0.00	0.00	60.0
9	R	204	12.7	0.303	14.4	LOS A	14	0.68	0.94	43.4
<b>Approach</b>		<b>884</b>	<b>7.8</b>	<b>0.363</b>	<b>3.3</b>	<b>LOS A</b>	<b>14</b>	<b>0.16</b>	<b>0.22</b>	<b>55.1</b>
<b>Glenhaven Rd</b>										
10	L	383	5.2	0.351	10.0	LOS A	13	0.51	0.82	47.1
12	R	160	3.1	0.936	96.7	LOS F	67	0.99	1.66	16.3
<b>Approach</b>		<b>543</b>	<b>4.6</b>	<b>0.933</b>	<b>35.5</b>	<b>LOS C</b>	<b>67</b>	<b>0.65</b>	<b>1.07</b>	<b>30.5</b>
<b>All Vehicles</b>		<b>2124</b>	<b>7.7</b>	<b>0.936</b>	<b>10.9</b>	<b>Not Applicable</b>	<b>67</b>	<b>0.23</b>	<b>0.40</b>	<b>46.2</b>

Symbols which may appear in this table:

Following Degree of Saturation  
 # x = 1.00 for Short Lane with resulting Excess Flow  
 \* x = 1.00 due to minimum capacity

Following LOS  
 # - Based on density for continuous movements

Following Queue  
 # - Density for continuous movement



Site: 2008 AM (base)  
 K:\60044833\_South\_Dural\4. Tech work area\4.3. Engineering\Traffic\SIDRA\with dev traffic\E\_Glenhaven Rd\_Old Northern Rd\_v2\_with dev\_v2.aap  
 Processed Aug 19, 2008 04:03:00PM

A0194, Maunsell Australia Pty Ltd, Large Office  
**Produced by SIDRA Intersection 3.2.0.1455**

# Movement Summary

## Glenhaven Road / Old Northern Road

2008 PM peak

Give-way

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>Old Northern Rd (south)</b>										
1	L	354	0.8	0.518	8.2	LOS A	0	0.00	0.67	49.0
2	T	623	3.0	0.517	0.0	LOS A	0	0.00	0.00	60.0
<b>Approach</b>		<b>977</b>	<b>2.3</b>	<b>0.518</b>	<b>3.0</b>	<b>LOS A</b>		<b>0.00</b>	<b>0.24</b>	<b>55.5</b>
<b>Old Northern Rd (north)</b>										
8	T	462	3.5	0.242	0.0	LOS A	0	0.00	0.00	60.0
9	R	411	0.5	0.824	28.9	LOS C	62	0.94	1.47	33.4
<b>Approach</b>		<b>873</b>	<b>2.1</b>	<b>0.823</b>	<b>13.6</b>	<b>LOS A</b>	<b>62</b>	<b>0.44</b>	<b>0.69</b>	<b>43.7</b>
<b>Glenhaven Rd</b>										
10	L	226	1.8	0.233	10.0	LOS A	7	0.53	0.80	47.0
12	R	63	1.6	0.496	47.6	LOS D	15	0.94	1.05	25.9
<b>Approach</b>		<b>289</b>	<b>1.7</b>	<b>0.495</b>	<b>18.2</b>	<b>LOS B</b>	<b>15</b>	<b>0.62</b>	<b>0.86</b>	<b>40.0</b>
<b>All Vehicles</b>		<b>2139</b>	<b>2.1</b>	<b>0.824</b>	<b>9.4</b>	<b>Not Applicable</b>	<b>62</b>	<b>0.26</b>	<b>0.51</b>	<b>47.7</b>

Symbols which may appear in this table:

Following Degree of Saturation  
 # x = 1.00 for Short Lane with resulting Excess Flow  
 \* x = 1.00 due to minimum capacity

Following LOS  
 # - Based on density for continuous movements

Following Queue  
 # - Density for continuous movement



Site: 2008 PM (base)  
 K:\60044833\_South\_Dural\4. Tech work area\4.3. Engineering\Traffic\SIDRA\with dev traffic\E\_Glenhaven Rd\_Old Northern Rd\_v2\_with dev\_v2.aap  
 Processed Aug 19, 2008 01:37:09PM

A0194, Maunsell Australia Pty Ltd, Large Office  
 Produced by SIDRA Intersection 3.2.0.1455

# Movement Summary

## Gilbert Road / Old Northern Road

### 2008 AM peak

Signalised - Fixed time

Cycle Time = 70 seconds

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>Old Northern Road (south east)</b>										
21	L	218	2.8	0.586	32.0	LOS C	79	0.91	0.83	31.9
22	T	411	13.9	0.848	33.8	LOS C	111	0.98	0.98	31.1
<b>Approach</b>		<b>629</b>	<b>10.0</b>	<b>0.848</b>	<b>33.2</b>	<b>LOS C</b>	<b>111</b>	<b>0.96</b>	<b>0.93</b>	<b>31.4</b>
<b>Old Northern Road (north west)</b>										
28	T	576	6.1	0.371	12.5	LOS A	66	0.67	0.57	44.6
29	R	275	2.9	0.882	49.7	LOS D	92	1.00	1.09	25.3
<b>Approach</b>		<b>851</b>	<b>5.1</b>	<b>0.882</b>	<b>24.5</b>	<b>LOS B</b>	<b>92</b>	<b>0.77</b>	<b>0.74</b>	<b>35.8</b>
<b>Gilbert Road</b>										
30	L	201	5.5	0.183	14.7	LOS B	31	0.46	0.75	42.9
32	R	591	1.4	0.900	45.9	LOS D	182	1.00	1.15	26.4
<b>Approach</b>		<b>792</b>	<b>2.4</b>	<b>0.900</b>	<b>38.0</b>	<b>LOS C</b>	<b>182</b>	<b>0.86</b>	<b>1.05</b>	<b>29.3</b>
<b>All Vehicles</b>		<b>2272</b>	<b>5.5</b>	<b>0.900</b>	<b>31.6</b>	<b>LOS C</b>	<b>182</b>	<b>0.86</b>	<b>0.90</b>	<b>32.1</b>

### Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P13	50	22.4	LOS C	0	0.80	0.80
P15	50	26.6	LOS C	0	0.87	0.87
<b>All Peds</b>	<b>100</b>	<b>24.5</b>	<b>LOS B</b>	<b>0</b>	<b>0.84</b>	<b>0.84</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

# Movement Summary

## Gilbert Road / Old Northern Road

### 2008 PM peak

Signalised - Fixed time

Cycle Time = 80 seconds

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>Old Northern Road (south east)</b>										
21	L	301	1.0	0.614	28.9	LOS C	110	0.85	0.84	33.4
22	T	737	2.4	0.867	32.3	LOS C	184	0.97	0.99	31.8
<b>Approach</b>		<b>1038</b>	<b>2.0</b>	<b>0.867</b>	<b>31.3</b>	<b>LOS C</b>	<b>184</b>	<b>0.93</b>	<b>0.95</b>	<b>32.2</b>
<b>Old Northern Road (north west)</b>										
28	T	376	6.4	0.222	10.2	LOS A	45	0.55	0.46	46.9
29	R	169	1.2	0.816	52.1	LOS D	64	1.00	0.96	24.6
<b>Approach</b>		<b>545</b>	<b>4.8</b>	<b>0.816</b>	<b>23.2</b>	<b>LOS B</b>	<b>64</b>	<b>0.69</b>	<b>0.61</b>	<b>36.6</b>
<b>Gilbert Road</b>										
30	L	217	0.9	0.235	20.4	LOS B	45	0.60	0.77	38.4
32	R	497	0.8	0.861	45.1	LOS D	157	1.00	1.05	26.7
<b>Approach</b>		<b>714</b>	<b>0.8</b>	<b>0.861</b>	<b>37.6</b>	<b>LOS C</b>	<b>157</b>	<b>0.88</b>	<b>0.96</b>	<b>29.5</b>
<b>All Vehicles</b>		<b>2297</b>	<b>2.3</b>	<b>0.867</b>	<b>31.3</b>	<b>LOS C</b>	<b>184</b>	<b>0.86</b>	<b>0.87</b>	<b>32.2</b>

### Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P13	50	27.2	LOS C	0	0.82	0.82
P15	50	22.5	LOS C	0	0.75	0.75
<b>All Peds</b>	<b>100</b>	<b>24.9</b>	<b>LOS B</b>	<b>0</b>	<b>0.79</b>	<b>0.79</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements



# Movement Summary

## Hastings Road / Old Northern Road

### 2008 AM peak

Give-way

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>Old Northern Rd (SE)</b>										
22	T	464	12.9	0.258	0.0	LOS A	0	0.00	0.00	60.0
23	R	206	2.4	0.601	27.4	LOS B	28	0.91	1.13	34.2
<b>Approach</b>		<b>670</b>	<b>9.7</b>	<b>0.601</b>	<b>8.4</b>	<b>LOS A</b>	<b>28</b>	<b>0.28</b>	<b>0.35</b>	<b>48.7</b>
<b>Hastings Road</b>										
24	L	459	0.7	0.591	13.7	LOS A	25	0.76	1.06	43.5
26	R	170	1.2	0.983	130.2	LOS F	93	1.00	1.96	13.0
<b>Approach</b>		<b>629</b>	<b>0.8</b>	<b>0.981</b>	<b>45.2</b>	<b>LOS D</b>	<b>93</b>	<b>0.83</b>	<b>1.31</b>	<b>26.7</b>
<b>Old Northern Rd (NW)</b>										
27	L	364	0.8	0.619	8.2	LOS A	0	0.00	0.67	49.0
28	T	797	4.9	0.619	0.0	LOS A	0	0.00	0.00	60.0
<b>Approach</b>		<b>1161</b>	<b>3.6</b>	<b>0.619</b>	<b>2.6</b>	<b>LOS A</b>		<b>0.00</b>	<b>0.21</b>	<b>56.0</b>
<b>All Vehicles</b>		<b>2460</b>	<b>4.6</b>	<b>0.983</b>	<b>15.1</b>	<b>Not Applicable</b>	<b>93</b>	<b>0.29</b>	<b>0.53</b>	<b>42.4</b>

Symbols which may appear in this table:

Following Degree of Saturation  
 # x = 1.00 for Short Lane with resulting Excess Flow  
 \* x = 1.00 due to minimum capacity

Following LOS  
 # - Based on density for continuous movements

Following Queue  
 # - Density for continuous movement



Site: 2008 AM (base)  
 K:\60044833\_South\_Dural\4. Tech work area\4.3. Engineering\Traffic\SIDRA\with dev traffic\Hastings Rd\_Old Northern Rd\_v2\_with dev.aap  
 Processed Aug 19, 2008 03:30:48PM

A0194, Maunsell Australia Pty Ltd, Large Office  
**Produced by SIDRA Intersection 3.2.0.1455**

# Movement Summary

## Hastings Road / Old Northern Road

2008 PM peak

Give-way

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>Old Northern Rd (SE)</b>										
22	T	873	1.7	0.453	0.0	LOS A	0	0.00	0.00	60.0
23	R	270	0.4	0.447	16.6	LOS B	22	0.78	1.03	41.1
<b>Approach</b>		<b>1143</b>	<b>1.4</b>	<b>0.453</b>	<b>3.9</b>	<b>LOS A</b>	<b>22</b>	<b>0.18</b>	<b>0.24</b>	<b>54.1</b>
<b>Hastings Road</b>										
24	L	393	0.3	0.343	10.2	LOS A	12	0.49	0.86	46.8
26	R	152	0.7	0.956	119.2	LOS F	72	0.99	1.72	13.9
<b>Approach</b>		<b>545</b>	<b>0.4</b>	<b>0.954</b>	<b>40.6</b>	<b>LOS C</b>	<b>72</b>	<b>0.63</b>	<b>1.10</b>	<b>28.3</b>
<b>Old Northern Rd (NW)</b>										
27	L	380	0.3	0.434	8.2	LOS A	0	0.00	0.67	49.0
28	T	442	1.8	0.434	0.0	LOS A	0	0.00	0.00	60.0
<b>Approach</b>		<b>822</b>	<b>1.1</b>	<b>0.434</b>	<b>3.8</b>	<b>LOS A</b>		<b>0.00</b>	<b>0.31</b>	<b>54.3</b>
<b>All Vehicles</b>		<b>2510</b>	<b>1.1</b>	<b>0.956</b>	<b>11.9</b>	<b>Not Applicable</b>	<b>72</b>	<b>0.22</b>	<b>0.45</b>	<b>45.2</b>

Symbols which may appear in this table:

Following Degree of Saturation  
 # x = 1.00 for Short Lane with resulting Excess Flow  
 \* x = 1.00 due to minimum capacity

Following LOS  
 # - Based on density for continuous movements

Following Queue  
 # - Density for continuous movement



Site: 2008 PM (base)  
 K:\60044833\_South\_Dural\4. Tech work area\4.3. Engineering\Traffic\SIDRA\with dev traffic\Hastings Rd\_Old Northern Rd\_v2\_with dev.aap  
 Processed Aug 19, 2008 03:30:48PM

A0194, Maunsell Australia Pty Ltd, Large Office  
 Produced by SIDRA Intersection 3.2.0.1455

# Movement Summary

## Old Northern Rd / New Line Rd

### 2008 AM peak

#### Roundabout

#### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>New Line Road</b>										
1	L	33	6.1	0.579	10.7	LOS A	48	0.85	0.93	46.5
2	T	572	7.0	0.584	9.5	LOS A	48	0.85	0.92	47.2
3	R	382	3.4	0.584	17.2	LOS B	45	0.85	0.99	41.9
<b>Approach</b>		<b>987</b>	<b>5.6</b>	<b>0.584</b>	<b>12.5</b>	<b>LOS A</b>	<b>48</b>	<b>0.85</b>	<b>0.95</b>	<b>44.9</b>
<b>Industrial Park</b>										
4	L	29	10.3	0.104	9.1	LOS A	5	0.76	0.78	47.1
5	T	48	10.4	0.104	8.0	LOS A	5	0.76	0.71	47.8
6	R	42	2.4	0.103	15.4	LOS B	5	0.75	0.91	43.2
<b>Approach</b>		<b>119</b>	<b>7.6</b>	<b>0.104</b>	<b>10.9</b>	<b>LOS A</b>	<b>5</b>	<b>0.76</b>	<b>0.80</b>	<b>45.8</b>
<b>Old Northern Rd N</b>										
7	L	50	0.0	0.649	10.1	LOS A	56	0.82	0.88	46.7
8	T	649	1.7	0.645	9.0	LOS A	56	0.82	0.86	47.4
9	R	565	3.2	0.645	16.7	LOS B	55	0.83	0.95	42.3
<b>Approach</b>		<b>1264</b>	<b>2.3</b>	<b>0.645</b>	<b>12.4</b>	<b>LOS A</b>	<b>56</b>	<b>0.82</b>	<b>0.91</b>	<b>44.8</b>
<b>Old Northern Road W</b>										
10	L	653	4.4	0.792	13.2	LOS A	68	0.93	1.13	44.1
11	T	21	19.0	0.269	9.3	LOS A	12	0.73	0.81	48.0
12	R	106	8.5	0.268	16.0	LOS B	12	0.73	0.92	42.9
<b>Approach</b>		<b>780</b>	<b>5.4</b>	<b>0.792</b>	<b>13.5</b>	<b>LOS A</b>	<b>68</b>	<b>0.90</b>	<b>1.10</b>	<b>44.0</b>
<b>All Vehicles</b>		<b>3150</b>	<b>4.3</b>	<b>0.792</b>	<b>12.7</b>	<b>LOS A</b>	<b>68</b>	<b>0.85</b>	<b>0.96</b>	<b>44.7</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

Following Queue

# - Density for continuous movement

# Movement Summary

## Old Northern Rd / New Line Rd

### 2008 PM peak

#### Roundabout

#### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>New Line Road</b>										
1	L	48	8.3	0.466	7.9	LOS A	26	0.63	0.68	47.9
2	T	520	1.5	0.467	6.5	LOS A	26	0.63	0.59	48.7
3	R	416	1.7	0.467	14.1	LOS A	26	0.64	0.83	43.9
<b>Approach</b>		<b>984</b>	<b>1.9</b>	<b>0.467</b>	<b>9.8</b>	<b>LOS A</b>	<b>26</b>	<b>0.64</b>	<b>0.70</b>	<b>46.4</b>
<b>Industrial Park</b>										
4	L	71	0.0	0.151	7.6	LOS A	7	0.63	0.67	47.9
5	T	110	2.7	0.151	6.7	LOS A	7	0.63	0.61	48.7
6	R	74	2.7	0.151	14.0	LOS A	6	0.63	0.85	44.0
<b>Approach</b>		<b>255</b>	<b>2.0</b>	<b>0.151</b>	<b>9.1</b>	<b>LOS A</b>	<b>7</b>	<b>0.63</b>	<b>0.70</b>	<b>47.0</b>
<b>Old Northern Rd N</b>										
7	L	40	5.0	0.400	8.3	LOS A	24	0.68	0.71	47.6
8	T	437	1.8	0.400	7.0	LOS A	24	0.68	0.64	48.4
9	R	304	3.6	0.400	14.3	LOS A	23	0.68	0.82	43.8
<b>Approach</b>		<b>781</b>	<b>2.7</b>	<b>0.400</b>	<b>9.9</b>	<b>LOS A</b>	<b>24</b>	<b>0.68</b>	<b>0.71</b>	<b>46.4</b>
<b>Old Northern Road W</b>										
10	L	343	0.6	0.384	8.3	LOS A	19	0.72	0.74	47.3
11	T	19	15.8	0.207	8.3	LOS A	8	0.67	0.72	48.4
12	R	106	1.9	0.207	14.9	LOS B	8	0.67	0.90	43.6
<b>Approach</b>		<b>468</b>	<b>1.5</b>	<b>0.384</b>	<b>9.8</b>	<b>LOS A</b>	<b>19</b>	<b>0.71</b>	<b>0.78</b>	<b>46.4</b>
<b>All Vehicles</b>		<b>2488</b>	<b>2.1</b>	<b>0.467</b>	<b>9.8</b>	<b>LOS A</b>	<b>26</b>	<b>0.66</b>	<b>0.72</b>	<b>46.5</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

Following Queue

# - Density for continuous movement

# Movement Summary

## Kenthurst Rd / Old Northern Rd

### 2008 AM peak

Signalised - Fixed time

Cycle Time = 90 seconds

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>Old Northern Rd east</b>										
5	T	504	6.0	0.378	5.4	LOS A	76	0.43	0.38	52.2
6	R	380	6.1	0.769	43.8	LOS D	129	0.98	0.92	27.3
<b>Approach</b>		<b>884</b>	<b>6.0</b>	<b>0.768</b>	<b>21.9</b>	<b>LOS B</b>	<b>129</b>	<b>0.66</b>	<b>0.61</b>	<b>37.5</b>
<b>Kenthurst Rd</b>										
7	L	502	6.0	0.541	15.7	LOS B	86	0.67	0.79	42.2
9	R	206	5.8	0.743	51.3	LOS D	81	1.00	0.90	24.9
<b>Approach</b>		<b>708</b>	<b>5.9</b>	<b>0.743</b>	<b>26.1</b>	<b>LOS B</b>	<b>86</b>	<b>0.76</b>	<b>0.82</b>	<b>35.2</b>
<b>Old Northern Rd west</b>										
10	L	234	6.0	0.266	17.7	LOS B	47	0.50	0.76	40.5
11	T	538	5.9	0.782	29.8	LOS C	167	0.95	0.89	33.0
<b>Approach</b>		<b>772</b>	<b>6.0</b>	<b>0.782</b>	<b>26.2</b>	<b>LOS B</b>	<b>167</b>	<b>0.82</b>	<b>0.85</b>	<b>34.9</b>
<b>All Vehicles</b>		<b>2364</b>	<b>6.0</b>	<b>0.782</b>	<b>24.5</b>	<b>LOS B</b>	<b>167</b>	<b>0.74</b>	<b>0.75</b>	<b>35.9</b>

### Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P3	50	39.2	LOS D	0	0.93	0.93
P5	50	20.0	LOS B	0	0.67	0.67
<b>All Peds</b>	<b>100</b>	<b>29.6</b>	<b>LOS C</b>	<b>0</b>	<b>0.80</b>	<b>0.80</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

# Movement Summary

## Kenthurst Rd / Old Northern Rd

### 2008 PM peak

Signalised - Fixed time

Cycle Time = 70 seconds

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>Old Northern Rd east</b>										
5	T	586	6.0	0.533	9.4	LOS A	99	0.65	0.58	47.7
6	R	523	5.9	0.856	40.2	LOS C	154	1.00	1.06	28.5
<b>Approach</b>		<b>1109</b>	<b>6.0</b>	<b>0.856</b>	<b>23.9</b>	<b>LOS B</b>	<b>154</b>	<b>0.81</b>	<b>0.80</b>	<b>36.2</b>
<b>Kenthurst Rd</b>										
7	L	209	6.2	0.183	10.8	LOS A	19	0.44	0.70	46.6
9	R	366	6.0	0.846	43.7	LOS D	114	1.00	1.04	27.3
<b>Approach</b>		<b>575</b>	<b>6.1</b>	<b>0.846</b>	<b>31.7</b>	<b>LOS C</b>	<b>114</b>	<b>0.80</b>	<b>0.91</b>	<b>32.2</b>
<b>Old Northern Rd west</b>										
10	L	223	5.8	0.257	19.8	LOS B	44	0.62	0.78	38.9
11	T	260	6.2	0.882	41.7	LOS C	90	1.00	1.09	28.0
<b>Approach</b>		<b>483</b>	<b>6.0</b>	<b>0.882</b>	<b>31.6</b>	<b>LOS C</b>	<b>90</b>	<b>0.83</b>	<b>0.94</b>	<b>32.1</b>
<b>All Vehicles</b>		<b>2167</b>	<b>6.0</b>	<b>0.882</b>	<b>27.7</b>	<b>LOS B</b>	<b>154</b>	<b>0.81</b>	<b>0.86</b>	<b>34.1</b>

### Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P3	50	26.6	LOS C	0	0.87	0.87
P5	50	27.5	LOS C	0	0.89	0.89
<b>All Peds</b>	<b>100</b>	<b>27.0</b>	<b>LOS B</b>	<b>0</b>	<b>0.88</b>	<b>0.88</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

# Movement Summary

## Hastings Road / New Line Road

### 2008 AM peak

Signalised - Fixed time

Cycle Time = 80 seconds

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>New Line Rd (south)</b>										
1	L	372	0.5	0.847	39.0	LOS C	183	0.97	1.02	28.9
2	T	795	5.8	0.846	32.4	LOS C	183	0.99	1.01	31.7
<b>Approach</b>		<b>1167</b>	<b>4.1</b>	<b>0.846</b>	<b>34.5</b>	<b>LOS C</b>	<b>183</b>	<b>0.98</b>	<b>1.01</b>	<b>30.8</b>
<b>New Line Rd (north)</b>										
8	T	822	6.1	0.438	0.1	LOS C#	14#	0.00	0.00	59.9
9	R	262	0.4	0.808	48.0	LOS D	89	1.00	0.96	25.8
<b>Approach</b>		<b>1084</b>	<b>4.7</b>	<b>0.808</b>	<b>11.7</b>	<b>LOS A</b>	<b>89</b>	<b>0.24</b>	<b>0.23</b>	<b>45.4</b>
<b>Hastings Rd</b>										
10	L	190	1.1	0.206	20.2	LOS B	39	0.59	0.77	38.6
12	R	380	1.3	0.826	45.1	LOS D	121	1.00	0.99	26.8
<b>Approach</b>		<b>570</b>	<b>1.2</b>	<b>0.826</b>	<b>36.8</b>	<b>LOS C</b>	<b>121</b>	<b>0.86</b>	<b>0.92</b>	<b>29.8</b>
<b>All Vehicles</b>		<b>2821</b>	<b>3.8</b>	<b>0.847</b>	<b>26.2</b>	<b>LOS B</b>	<b>183</b>	<b>0.67</b>	<b>0.69</b>	<b>34.9</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

Following Queue

# - Density for continuous movement



SIDRA SOLUTIONS

Site: 2008 AM (base)

K:\60044833\_South\_Dural\4. Tech work area\4.3. Engineering\Traffic\SIDRA\with dev traffic\Hastings Rd\_New Line Rd\_v2\_with dev.aap

Processed Aug 19, 2008 02:25:30PM

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# Movement Summary

## Hastings Road / New Line Road

2008 PM peak

Signalised - Fixed time

Cycle Time = 80 seconds

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>New Line Rd (south)</b>										
1	L	279	0.7	0.892	46.9	LOS D	207	1.00	1.11	26.2
2	T	935	3.9	0.893	39.3	LOS C	207	1.00	1.11	28.9
<b>Approach</b>		<b>1214</b>	<b>3.1</b>	<b>0.893</b>	<b>41.0</b>	<b>LOS C</b>	<b>207</b>	<b>1.00</b>	<b>1.11</b>	<b>28.2</b>
<b>New Line Rd (north)</b>										
8	T	751	2.3	0.391	0.1	LOS C#	13#	0.00	0.00	59.9
9	R	263	0.4	0.874	53.6	LOS D	95	1.00	1.06	24.2
<b>Approach</b>		<b>1014</b>	<b>1.8</b>	<b>0.874</b>	<b>14.0</b>	<b>LOS A</b>	<b>95</b>	<b>0.26</b>	<b>0.27</b>	<b>43.3</b>
<b>Hastings Rd</b>										
10	L	229	1.3	0.249	20.5	LOS B	47	0.61	0.77	38.4
12	R	441	0.7	0.909	55.3	LOS D	157	1.00	1.16	23.8
<b>Approach</b>		<b>670</b>	<b>0.9</b>	<b>0.909</b>	<b>43.4</b>	<b>LOS D</b>	<b>157</b>	<b>0.87</b>	<b>1.03</b>	<b>27.3</b>
<b>All Vehicles</b>		<b>2898</b>	<b>2.1</b>	<b>0.909</b>	<b>32.1</b>	<b>LOS C</b>	<b>207</b>	<b>0.71</b>	<b>0.80</b>	<b>31.9</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

Following Queue

# - Density for continuous movement



SIDRA SOLUTIONS

Site: 2008 PM (base)

K:\60044833\_South\_Dural\4. Tech work area\4.3. Engineering\Traffic\SIDRA\with dev traffic\Hastings Rd\_New Line Rd\_v2\_with dev.aap

Processed Aug 19, 2008 02:30:24PM

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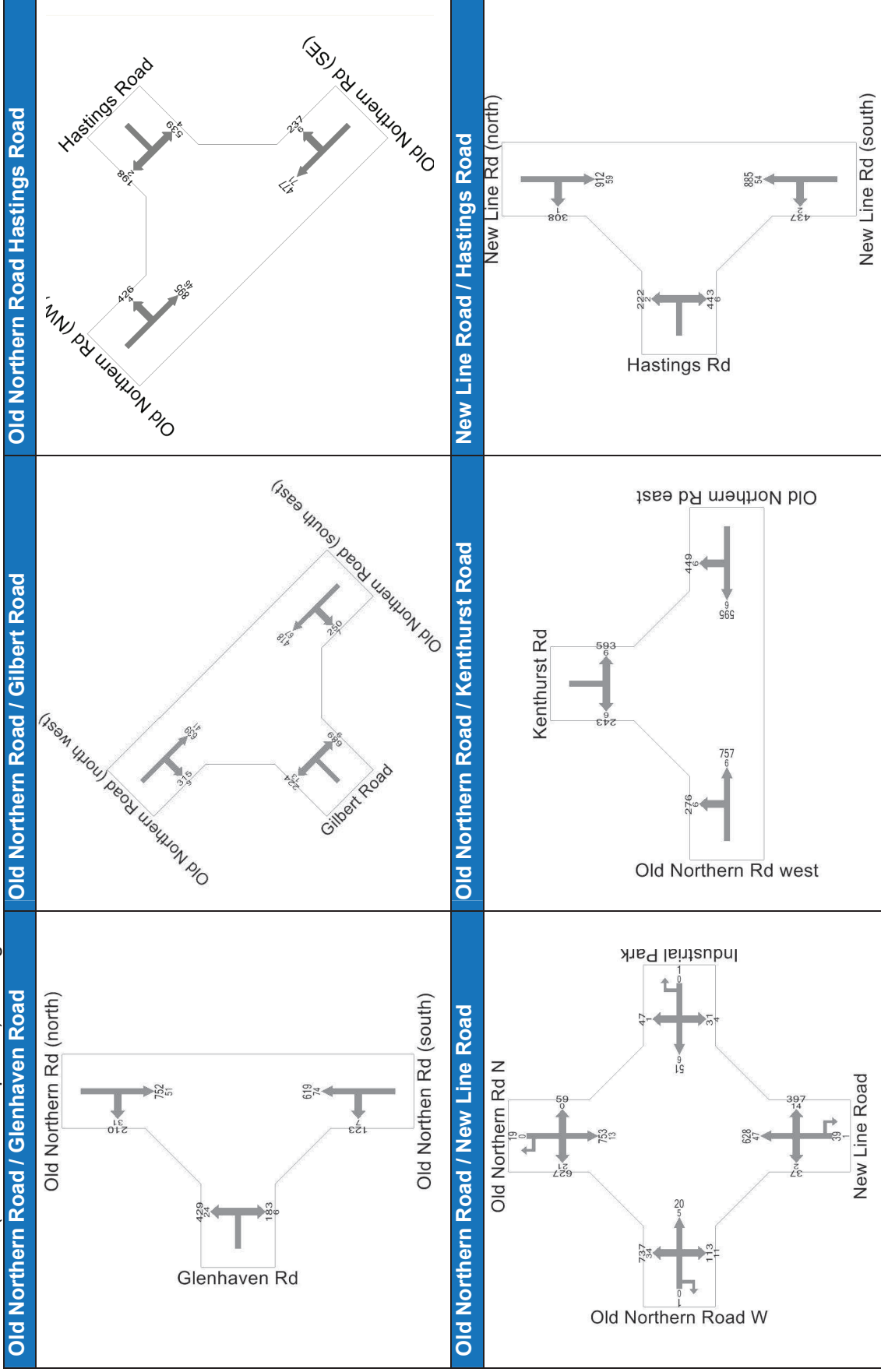


**DRAFT**

## Appendix C 2018 (without development) Traffic Flows and Intersection Layouts

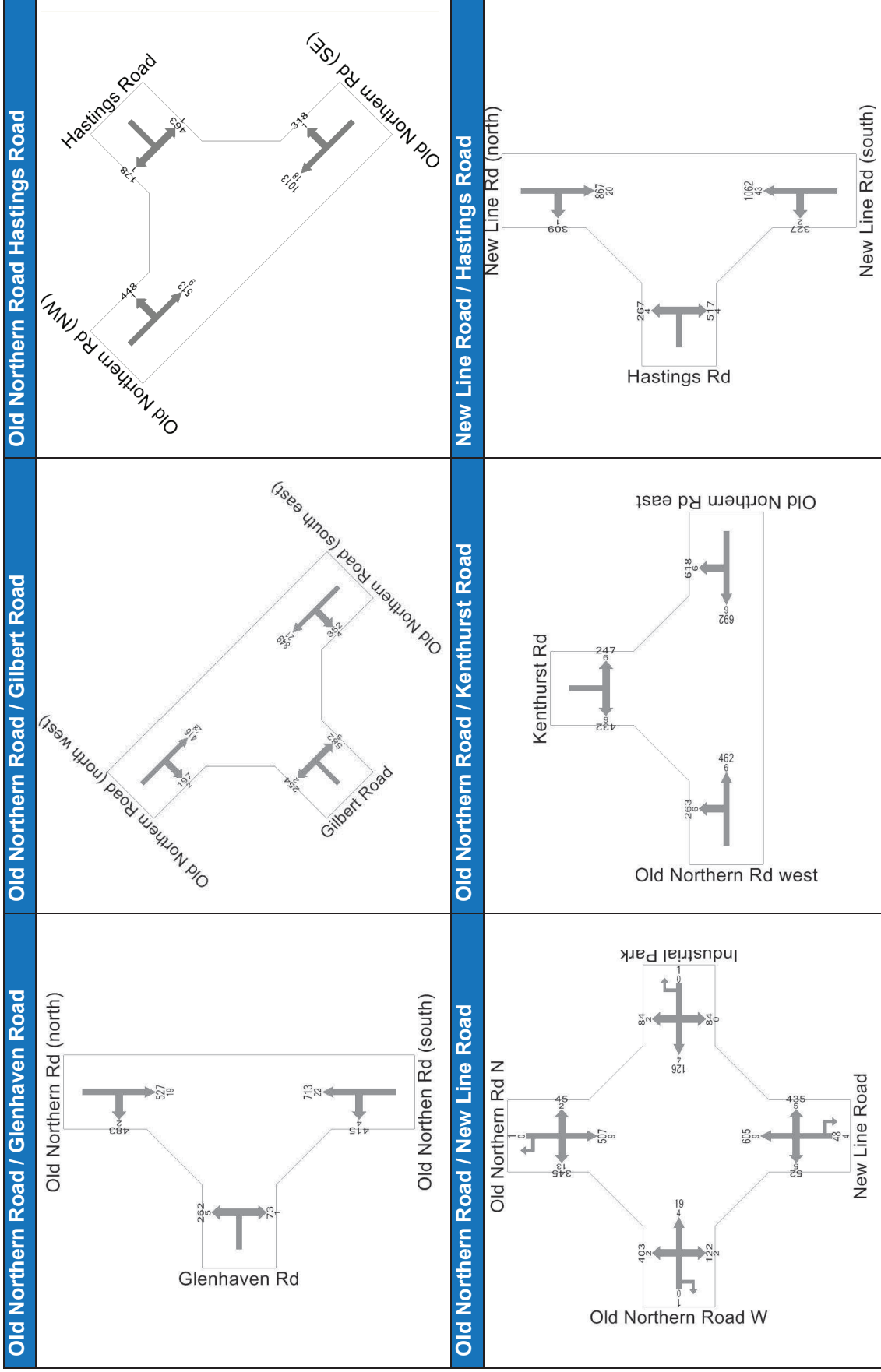
# DRAFT

## 2018 AM Peak (without development) Turning Flows



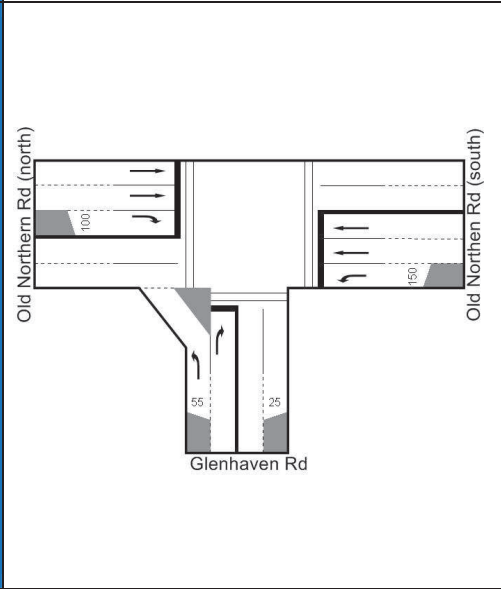
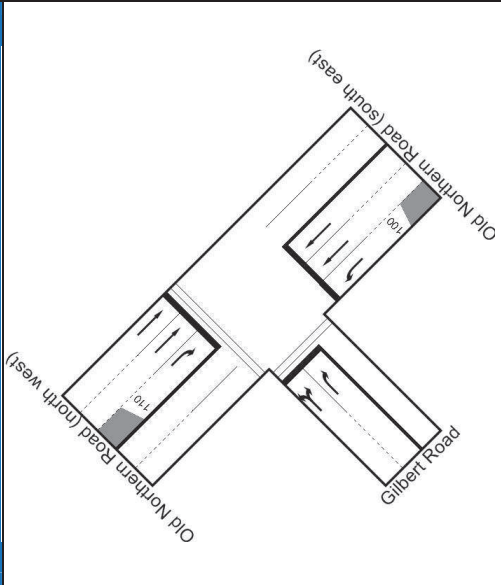
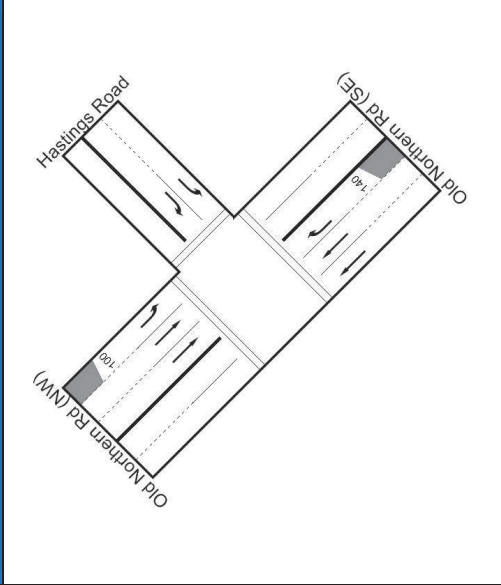
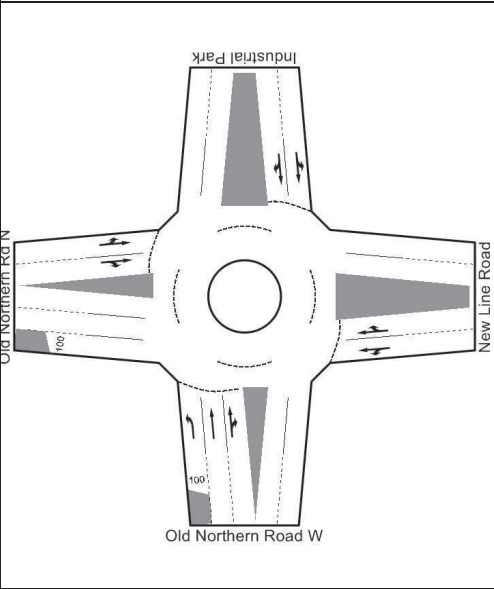
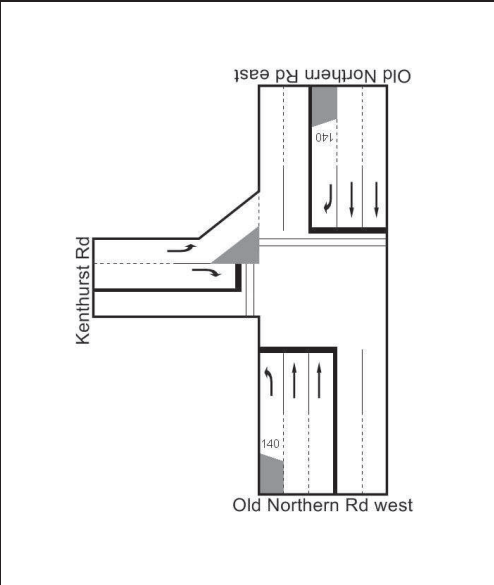
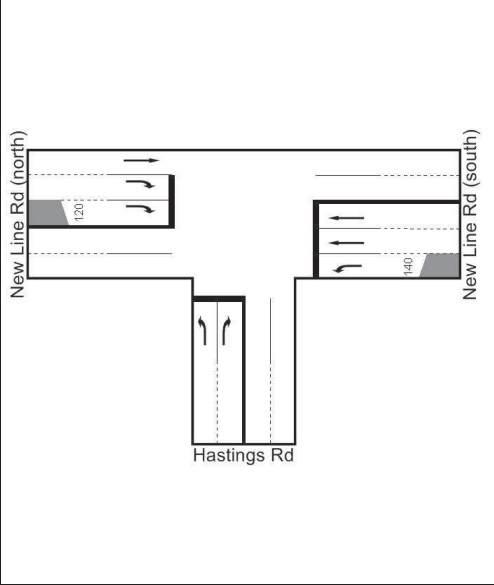
# DRAFT

## 2018 PM Peak (without development) Turning Flows



# DRAFT

2018 intersection layout (without development)

Old Northern Road / Glenhaven Road	Old Northern Road / Gilbert Road	Old Northern Road / Hastings Road
		
Old Northern Road / New Line Road	Old Northern Road / Kenthurst Road	New Line Road / Hastings Road
		

**DRAFT**

## Appendix D 2018 (without development) SIDRA Results

# Movement Summary

## Glenhaven Road / Old Northern Road

### 2018 AM peak

Signalised - Fixed time

Cycle Time = 80 seconds

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>Old Northern Rd (south)</b>										
1	L	130	5.4	0.129	14.8	LOS B	22	0.43	0.73	42.8
2	T	693	10.7	0.608	25.6	LOS B	101	0.90	0.77	35.2
<b>Approach</b>		<b>823</b>	<b>9.8</b>	<b>0.608</b>	<b>23.9</b>	<b>LOS B</b>	<b>101</b>	<b>0.83</b>	<b>0.77</b>	<b>36.2</b>
<b>Old Northern Rd (north)</b>										
8	T	803	6.4	0.350	8.2	LOS A	69	0.53	0.46	49.0
9	R	241	12.9	0.630	40.0	LOS C	81	0.96	0.84	28.7
<b>Approach</b>		<b>1044</b>	<b>7.9</b>	<b>0.630</b>	<b>15.5</b>	<b>LOS B</b>	<b>81</b>	<b>0.63</b>	<b>0.55</b>	<b>42.1</b>
<b>Glenhaven Rd</b>										
10	L	453	5.3	0.365	8.4	LOS A	20	0.21	0.65	48.6
12	R	189	3.2	0.595	42.2	LOS C	63	0.97	0.81	27.8
<b>Approach</b>		<b>642</b>	<b>4.7</b>	<b>0.595</b>	<b>18.3</b>	<b>LOS B</b>	<b>63</b>	<b>0.44</b>	<b>0.70</b>	<b>39.9</b>
<b>All Vehicles</b>		<b>2509</b>	<b>7.7</b>	<b>0.630</b>	<b>19.0</b>	<b>LOS B</b>	<b>101</b>	<b>0.64</b>	<b>0.66</b>	<b>39.5</b>

### Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P1	53	32.4	LOS D	0	0.90	0.90
P5	53	32.4	LOS D	0	0.90	0.90
P7	53	23.3	LOS C	0	0.76	0.76
<b>All Peds</b>	<b>159</b>	<b>29.4</b>	<b>LOS C</b>	<b>0</b>	<b>0.85</b>	<b>0.85</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# Movement Summary

## Glenhaven Road / Old Northern Road

### 2018 PM peak

Signalised - Fixed time

Cycle Time = 90 seconds

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>Old Northern Rd (south)</b>										
1	L	419	1.0	0.497	24.5	LOS B	96	0.71	0.81	35.8
2	T	735	3.0	0.823	41.2	LOS C	130	1.00	0.98	28.2
<b>Approach</b>		<b>1154</b>	<b>2.3</b>	<b>0.823</b>	<b>35.1</b>	<b>LOS C</b>	<b>130</b>	<b>0.89</b>	<b>0.92</b>	<b>30.5</b>
<b>Old Northern Rd (north)</b>										
8	T	546	3.5	0.211	5.8	LOS A	43	0.40	0.34	51.8
9	R	485	0.4	0.836	41.1	LOS C	151	0.90	0.98	28.1
<b>Approach</b>		<b>1031</b>	<b>2.0</b>	<b>0.836</b>	<b>22.4</b>	<b>LOS B</b>	<b>151</b>	<b>0.64</b>	<b>0.64</b>	<b>37.1</b>
<b>Glenhaven Rd</b>										
10	L	267	1.9	0.210	8.1	LOS A	10	0.17	0.64	48.9
12	R	74	1.4	0.302	47.5	LOS D	30	0.94	0.76	26.0
<b>Approach</b>		<b>341</b>	<b>1.8</b>	<b>0.302</b>	<b>16.7</b>	<b>LOS B</b>	<b>30</b>	<b>0.33</b>	<b>0.67</b>	<b>41.1</b>
<b>All Vehicles</b>		<b>2526</b>	<b>2.1</b>	<b>0.836</b>	<b>27.4</b>	<b>LOS B</b>	<b>151</b>	<b>0.71</b>	<b>0.77</b>	<b>34.2</b>

### Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P1	53	39.2	LOS D	0	0.93	0.93
P5	53	39.2	LOS D	0	0.93	0.93
P7	53	31.2	LOS D	0	0.83	0.83
<b>All Peds</b>	<b>159</b>	<b>36.5</b>	<b>LOS C</b>	<b>0</b>	<b>0.90</b>	<b>0.90</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# Movement Summary

## Gilbert Road / Old Northern Road

### 2018 AM peak

Signalised - Fixed time

Cycle Time = 90 seconds

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>Old Northern Road (south east)</b>										
21	L	257	2.7	0.331	16.7	LOS B	47	0.48	0.76	41.2
22	T	485	13.8	0.717	39.6	LOS C	95	0.99	0.88	28.7
<b>Approach</b>		<b>742</b>	<b>10.0</b>	<b>0.717</b>	<b>31.6</b>	<b>LOS C</b>	<b>95</b>	<b>0.82</b>	<b>0.84</b>	<b>32.1</b>
<b>Old Northern Road (north west)</b>										
28	T	680	6.0	0.354	14.0	LOS A	77	0.64	0.55	43.3
29	R	324	2.8	0.696	42.3	LOS C	105	0.96	0.87	27.7
<b>Approach</b>		<b>1004</b>	<b>5.0</b>	<b>0.696</b>	<b>23.2</b>	<b>LOS B</b>	<b>105</b>	<b>0.74</b>	<b>0.65</b>	<b>36.7</b>
<b>Gilbert Road</b>										
30	L	237	5.5	0.698	33.1	LOS C	124	0.90	0.91	31.4
32	R	698	1.3	0.699	34.4	LOS C	129	0.91	0.88	30.8
<b>Approach</b>		<b>935</b>	<b>2.4</b>	<b>0.699</b>	<b>34.1</b>	<b>LOS C</b>	<b>129</b>	<b>0.91</b>	<b>0.89</b>	<b>31.0</b>
<b>All Vehicles</b>		<b>2681</b>	<b>5.4</b>	<b>0.717</b>	<b>29.3</b>	<b>LOS C</b>	<b>129</b>	<b>0.82</b>	<b>0.79</b>	<b>33.2</b>

### Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P13	50	26.4	LOS C	0	0.77	0.77
P15	50	34.7	LOS D	0	0.88	0.88
<b>All Peds</b>	<b>100</b>	<b>30.6</b>	<b>LOS C</b>	<b>0</b>	<b>0.82</b>	<b>0.82</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements



# Movement Summary

## Gilbert Road / Old Northern Road

### 2018 PM peak

Signalised - Fixed time

Cycle Time = 90 seconds

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>Old Northern Road (south east)</b>										
21	L	356	1.1	0.386	13.2	LOS A	50	0.38	0.74	44.1
22	T	870	2.4	0.680	28.1	LOS B	126	0.92	0.80	33.9
<b>Approach</b>		<b>1226</b>	<b>2.0</b>	<b>0.680</b>	<b>23.8</b>	<b>LOS B</b>	<b>126</b>	<b>0.77</b>	<b>0.79</b>	<b>36.3</b>
<b>Old Northern Road (north west)</b>										
28	T	444	6.3	0.213	10.7	LOS A	47	0.54	0.45	46.3
29	R	199	1.0	0.694	49.6	LOS D	74	1.00	0.86	25.4
<b>Approach</b>		<b>643</b>	<b>4.7</b>	<b>0.694</b>	<b>22.7</b>	<b>LOS B</b>	<b>74</b>	<b>0.68</b>	<b>0.58</b>	<b>36.9</b>
<b>Gilbert Road</b>										
30	L	256	0.8	0.700	36.3	LOS C	111	0.92	0.95	30.0
32	R	587	0.9	0.700	37.6	LOS C	120	0.93	0.89	29.5
<b>Approach</b>		<b>843</b>	<b>0.8</b>	<b>0.700</b>	<b>37.2</b>	<b>LOS C</b>	<b>120</b>	<b>0.93</b>	<b>0.91</b>	<b>29.7</b>
<b>All Vehicles</b>		<b>2712</b>	<b>2.3</b>	<b>0.700</b>	<b>27.7</b>	<b>LOS B</b>	<b>126</b>	<b>0.80</b>	<b>0.78</b>	<b>34.1</b>

### Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P13	50	29.6	LOS C	0	0.81	0.81
P15	50	25.7	LOS C	0	0.76	0.76
<b>All Peds</b>	<b>100</b>	<b>27.6</b>	<b>LOS B</b>	<b>0</b>	<b>0.78</b>	<b>0.78</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

# Movement Summary

## Hastings Road / Old Northern Road

### 2018 AM peak

Signalised - Fixed time

Cycle Time = 80 seconds

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>Old Northern Rd (SE)</b>										
22	T	548	13.0	0.244	7.1	LOS A	48	0.47	0.40	50.2
23	R	243	2.5	0.633	35.4	LOS C	72	0.97	0.91	30.4
<b>Approach</b>		<b>791</b>	<b>9.7</b>	<b>0.633</b>	<b>15.8</b>	<b>LOS B</b>	<b>72</b>	<b>0.62</b>	<b>0.56</b>	<b>41.9</b>
<b>Hastings Road</b>										
24	L	543	0.7	0.692	28.5	LOS C	129	0.87	0.86	33.6
26	R	200	1.0	0.667	44.3	LOS D	67	0.99	0.85	27.0
<b>Approach</b>		<b>743</b>	<b>0.8</b>	<b>0.692</b>	<b>32.8</b>	<b>LOS C</b>	<b>129</b>	<b>0.91</b>	<b>0.86</b>	<b>31.5</b>
<b>Old Northern Rd (NW)</b>										
27	L	430	0.9	0.701	31.8	LOS C	110	0.89	0.86	32.0
28	T	941	4.9	0.586	19.1	LOS B	112	0.82	0.72	39.4
<b>Approach</b>		<b>1371</b>	<b>3.6</b>	<b>0.701</b>	<b>23.1</b>	<b>LOS B</b>	<b>112</b>	<b>0.84</b>	<b>0.76</b>	<b>36.7</b>
<b>All Vehicles</b>		<b>2905</b>	<b>4.6</b>	<b>0.701</b>	<b>23.6</b>	<b>LOS B</b>	<b>129</b>	<b>0.80</b>	<b>0.73</b>	<b>36.4</b>

### Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P9	53	33.3	LOS D	0	0.91	0.91
P11	53	16.9	LOS B	0	0.65	0.65
P13	53	33.3	LOS D	0	0.91	0.91
<b>All Peds</b>	<b>159</b>	<b>27.8</b>	<b>LOS B</b>	<b>0</b>	<b>0.83</b>	<b>0.83</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# Movement Summary

## Hastings Road / Old Northern Road

### 2018 PM peak

Signalised - Fixed time

Cycle Time = 70 seconds

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>Old Northern Rd (SE)</b>										
22	T	1031	1.7	0.456	8.8	LOS A	82	0.61	0.54	48.3
23	R	319	0.3	0.822	42.2	LOS C	86	1.00	1.07	27.7
<b>Approach</b>		<b>1350</b>	<b>1.4</b>	<b>0.822</b>	<b>16.7</b>	<b>LOS B</b>	<b>86</b>	<b>0.70</b>	<b>0.66</b>	<b>41.1</b>
<b>Hastings Road</b>										
24	L	464	0.2	0.531	22.3	LOS B	90	0.75	0.83	37.1
26	R	179	0.6	0.564	38.2	LOS C	53	0.97	0.81	29.2
<b>Approach</b>		<b>643</b>	<b>0.3</b>	<b>0.564</b>	<b>26.7</b>	<b>LOS B</b>	<b>90</b>	<b>0.81</b>	<b>0.82</b>	<b>34.5</b>
<b>Old Northern Rd (NW)</b>										
27	L	449	0.2	0.848	41.3	LOS C	127	1.00	1.03	28.1
28	T	522	1.7	0.379	18.2	LOS B	60	0.79	0.66	40.0
<b>Approach</b>		<b>971</b>	<b>1.0</b>	<b>0.848</b>	<b>28.9</b>	<b>LOS C</b>	<b>127</b>	<b>0.89</b>	<b>0.83</b>	<b>33.4</b>
<b>All Vehicles</b>		<b>2964</b>	<b>1.0</b>	<b>0.848</b>	<b>22.9</b>	<b>LOS B</b>	<b>127</b>	<b>0.79</b>	<b>0.75</b>	<b>36.8</b>

### Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P9	53	29.3	LOS C	0	0.91	0.91
P11	53	18.6	LOS B	0	0.73	0.73
P13	53	29.3	LOS C	0	0.91	0.91
<b>All Peds</b>	<b>159</b>	<b>25.7</b>	<b>LOS B</b>	<b>0</b>	<b>0.85</b>	<b>0.85</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# Movement Summary

## Old Northern Rd / New Line Rd

### 2018 AM peak

Roundabout

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>New Line Road</b>										
1	L	39	5.1	0.684	16.0	LOS B	60	0.96	1.12	41.8
2	T	675	7.0	0.967	29.2	LOS C	248	0.98	1.51	33.5
3	R	451	3.3	0.968	54.0	LOS D	248	1.00	2.01	25.4
<b>Approach</b>		<b>1165</b>	<b>5.5</b>	<b>0.967</b>	<b>38.3</b>	<b>LOS C</b>	<b>248</b>	<b>0.99</b>	<b>1.69</b>	<b>29.9</b>
<b>Industrial Park</b>										
4	L	35	11.4	0.162	11.0	LOS A	9	0.86	0.93	46.4
5	T	57	10.5	0.162	9.9	LOS A	9	0.85	0.87	47.0
6	R	49	2.0	0.162	17.5	LOS B	8	0.83	0.95	41.7
<b>Approach</b>		<b>141</b>	<b>7.8</b>	<b>0.162</b>	<b>12.8</b>	<b>LOS A</b>	<b>9</b>	<b>0.85</b>	<b>0.91</b>	<b>44.8</b>
<b>Old Northern Rd N</b>										
7	L	59	0.0	0.831	15.6	LOS B	106	1.00	1.18	42.0
8	T	766	1.7	0.831	14.5	LOS A	106	1.00	1.18	43.1
9	R	667	3.1	0.831	22.9	LOS B	101	1.00	1.23	38.1
<b>Approach</b>		<b>1492</b>	<b>2.3</b>	<b>0.830</b>	<b>18.3</b>	<b>LOS B</b>	<b>106</b>	<b>1.00</b>	<b>1.20</b>	<b>40.6</b>
<b>Old Northern Road W</b>										
10	L	771	4.4	0.876	20.4	LOS B	113	1.00	1.36	38.5
11	T	25	20.0	0.044	8.5	LOS A	2	0.77	0.73	47.7
12	R	125	8.8	0.188	15.0	LOS B	11	0.81	0.91	43.3
<b>Approach</b>		<b>921</b>	<b>5.4</b>	<b>0.876</b>	<b>19.4</b>	<b>LOS B</b>	<b>113</b>	<b>0.97</b>	<b>1.28</b>	<b>39.4</b>
<b>All Vehicles</b>		<b>3719</b>	<b>4.3</b>	<b>0.968</b>	<b>24.6</b>	<b>LOS B</b>	<b>248</b>	<b>0.98</b>	<b>1.36</b>	<b>36.3</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

Following Queue

# - Density for continuous movement

# Movement Summary

## Old Northern Rd / New Line Rd

### 2018 PM peak

#### Roundabout

#### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>New Line Road</b>										
1	L	57	8.8	0.500	9.7	LOS A	30	0.72	0.86	47.3
2	T	614	1.5	0.703	8.8	LOS A	62	0.76	0.84	47.8
3	R	492	1.8	0.703	16.7	LOS B	62	0.83	0.98	42.3
<b>Approach</b>		<b>1163</b>	<b>2.0</b>	<b>0.703</b>	<b>12.2</b>	<b>LOS A</b>	<b>62</b>	<b>0.79</b>	<b>0.90</b>	<b>45.2</b>
<b>Industrial Park</b>										
4	L	84	0.0	0.203	8.1	LOS A	10	0.71	0.71	47.4
5	T	130	3.1	0.203	7.2	LOS A	10	0.71	0.65	48.2
6	R	87	2.3	0.203	14.6	LOS B	9	0.71	0.90	43.7
<b>Approach</b>		<b>301</b>	<b>2.0</b>	<b>0.203</b>	<b>9.6</b>	<b>LOS A</b>	<b>10</b>	<b>0.71</b>	<b>0.74</b>	<b>46.5</b>
<b>Old Northern Rd N</b>										
7	L	47	4.3	0.522	9.6	LOS A	37	0.80	0.86	46.9
8	T	516	1.7	0.521	8.4	LOS A	37	0.80	0.80	47.5
9	R	359	3.6	0.520	16.0	LOS B	36	0.80	0.94	42.8
<b>Approach</b>		<b>922</b>	<b>2.6</b>	<b>0.520</b>	<b>11.4</b>	<b>LOS A</b>	<b>37</b>	<b>0.80</b>	<b>0.86</b>	<b>45.5</b>
<b>Old Northern Road W</b>										
10	L	405	0.5	0.419	9.1	LOS A	27	0.86	0.80	46.4
11	T	23	17.4	0.035	8.1	LOS A	2	0.74	0.70	48.0
12	R	125	1.6	0.171	14.5	LOS B	9	0.77	0.88	43.5
<b>Approach</b>		<b>553</b>	<b>1.4</b>	<b>0.419</b>	<b>10.3</b>	<b>LOS A</b>	<b>27</b>	<b>0.84</b>	<b>0.82</b>	<b>45.7</b>
<b>All Vehicles</b>		<b>2939</b>	<b>2.1</b>	<b>0.703</b>	<b>11.3</b>	<b>LOS A</b>	<b>62</b>	<b>0.79</b>	<b>0.86</b>	<b>45.5</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

Following Queue

# - Density for continuous movement

# Movement Summary

## Kenthurst Rd / Old Northern Rd

### 2018 AM peak

Signalised - Fixed time

Cycle Time = 80 seconds

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>Old Northern Rd east</b>										
5	T	595	6.1	0.249	6.6	LOS A	48	0.46	0.40	50.7
6	R	449	6.0	0.807	40.6	LOS C	139	0.98	0.97	28.4
<b>Approach</b>		<b>1044</b>	<b>6.0</b>	<b>0.807</b>	<b>21.3</b>	<b>LOS B</b>	<b>139</b>	<b>0.68</b>	<b>0.64</b>	<b>37.9</b>
<b>Kenthurst Rd</b>										
7	L	593	6.1	0.568	13.6	LOS A	81	0.65	0.79	44.0
9	R	243	6.2	0.643	40.7	LOS C	79	0.97	0.84	28.4
<b>Approach</b>		<b>836</b>	<b>6.1</b>	<b>0.643</b>	<b>21.5</b>	<b>LOS B</b>	<b>81</b>	<b>0.74</b>	<b>0.80</b>	<b>38.0</b>
<b>Old Northern Rd west</b>										
10	L	276	6.2	0.315	19.3	LOS B	55	0.58	0.78	39.3
11	T	757	5.9	0.806	35.4	LOS C	122	1.00	0.97	30.4
<b>Approach</b>		<b>1033</b>	<b>6.0</b>	<b>0.806</b>	<b>31.1</b>	<b>LOS C</b>	<b>122</b>	<b>0.89</b>	<b>0.92</b>	<b>32.4</b>
<b>All Vehicles</b>		<b>2913</b>	<b>6.0</b>	<b>0.807</b>	<b>24.8</b>	<b>LOS B</b>	<b>139</b>	<b>0.77</b>	<b>0.79</b>	<b>35.8</b>

### Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P3	50	34.2	LOS D	0	0.93	0.93
P5	50	24.8	LOS C	0	0.79	0.79
<b>All Peds</b>	<b>100</b>	<b>29.5</b>	<b>LOS C</b>	<b>0</b>	<b>0.86</b>	<b>0.86</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

# Movement Summary

## Kenthurst Rd / Old Northern Rd

### 2018 PM peak

Signalised - Fixed time

Cycle Time = 90 seconds

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>Old Northern Rd east</b>										
5	T	692	6.1	0.307	9.4	LOS A	67	0.52	0.46	47.7
6	R	618	6.0	0.892	48.0	LOS D	227	1.00	1.07	25.9
<b>Approach</b>		<b>1310</b>	<b>6.0</b>	<b>0.892</b>	<b>27.6</b>	<b>LOS B</b>	<b>227</b>	<b>0.75</b>	<b>0.75</b>	<b>34.2</b>
<b>Kenthurst Rd</b>										
7	L	247	6.1	0.198	10.4	LOS A	24	0.37	0.69	47.0
9	R	432	6.0	0.910	60.1	LOS E	177	1.00	1.15	22.6
<b>Approach</b>		<b>679</b>	<b>6.0</b>	<b>0.910</b>	<b>42.0</b>	<b>LOS C</b>	<b>177</b>	<b>0.77</b>	<b>0.99</b>	<b>28.0</b>
<b>Old Northern Rd west</b>										
10	L	263	6.1	0.341	23.8	LOS B	64	0.65	0.79	36.3
11	T	462	6.1	0.852	48.9	LOS D	95	1.00	1.01	25.6
<b>Approach</b>		<b>725</b>	<b>6.1</b>	<b>0.852</b>	<b>39.8</b>	<b>LOS C</b>	<b>95</b>	<b>0.87</b>	<b>0.93</b>	<b>28.7</b>
<b>All Vehicles</b>		<b>2714</b>	<b>6.0</b>	<b>0.910</b>	<b>34.5</b>	<b>LOS C</b>	<b>227</b>	<b>0.79</b>	<b>0.86</b>	<b>30.9</b>

### Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P3	50	32.9	LOS D	0	0.86	0.86
P5	50	35.6	LOS D	0	0.89	0.89
<b>All Peds</b>	<b>100</b>	<b>34.2</b>	<b>LOS C</b>	<b>0</b>	<b>0.87</b>	<b>0.87</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

# Movement Summary

## Hastings Road / New Line Road

### 2018 AM peak

Signalised - Fixed time

Cycle Time = 80 seconds

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>New Line Rd (south)</b>										
1	L	439	0.5	0.374	12.0	LOS A	52	0.37	0.75	45.1
2	T	939	5.8	0.740	26.9	LOS B	132	0.94	0.86	34.5
<b>Approach</b>		<b>1378</b>	<b>4.1</b>	<b>0.740</b>	<b>22.2</b>	<b>LOS B</b>	<b>132</b>	<b>0.76</b>	<b>0.82</b>	<b>37.3</b>
<b>New Line Rd (north)</b>										
8	T	971	6.1	0.518	0.1	LOS D#	17#	0.00	0.00	59.8
9	R	309	0.3	0.741	49.5	LOS D	57	1.00	0.89	25.4
<b>Approach</b>		<b>1280</b>	<b>4.7</b>	<b>0.741</b>	<b>12.0</b>	<b>LOS A</b>	<b>57</b>	<b>0.24</b>	<b>0.21</b>	<b>45.1</b>
<b>Hastings Rd</b>										
10	L	224	0.9	0.237	19.8	LOS B	45	0.59	0.77	38.8
12	R	449	1.3	0.751	36.3	LOS C	125	0.95	0.91	30.0
<b>Approach</b>		<b>673</b>	<b>1.2</b>	<b>0.751</b>	<b>30.8</b>	<b>LOS C</b>	<b>125</b>	<b>0.83</b>	<b>0.86</b>	<b>32.5</b>
<b>All Vehicles</b>		<b>3331</b>	<b>3.7</b>	<b>0.751</b>	<b>20.0</b>	<b>LOS B</b>	<b>132</b>	<b>0.58</b>	<b>0.60</b>	<b>38.7</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

Following Queue

# - Density for continuous movement



SIDRA SOLUTIONS

Site: 2018 AM 2 lanes NLR

K:\60044833\_South\_Dural\4. Tech work area\4.3. Engineering\Traffic\SIDRA\with dev traffic\Hastings Rd\_New Line Rd\_v2\_with dev.aap

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# Movement Summary

## Hastings Road / New Line Road

2018 PM peak

Signalised - Fixed time

Cycle Time = 90 seconds

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>New Line Rd (south)</b>										
1	L	329	0.6	0.280	11.4	LOS A	38	0.30	0.73	45.7
2	T	1105	3.9	0.817	32.9	LOS C	177	0.97	0.95	31.5
<b>Approach</b>		<b>1434</b>	<b>3.1</b>	<b>0.817</b>	<b>28.0</b>	<b>LOS B</b>	<b>177</b>	<b>0.82</b>	<b>0.90</b>	<b>33.9</b>
<b>New Line Rd (north)</b>										
8	T	887	2.3	0.461	0.1	LOS C#	15#	0.00	0.00	59.9
9	R	310	0.3	0.836	58.7	LOS E	65	1.00	0.97	22.9
<b>Approach</b>		<b>1197</b>	<b>1.8</b>	<b>0.837</b>	<b>15.3</b>	<b>LOS B</b>	<b>65</b>	<b>0.26</b>	<b>0.25</b>	<b>42.2</b>
<b>Hastings Rd</b>										
10	L	271	1.5	0.288	21.7	LOS B	60	0.61	0.78	37.6
12	R	521	0.8	0.819	42.1	LOS C	166	0.98	0.97	27.8
<b>Approach</b>		<b>792</b>	<b>1.0</b>	<b>0.819</b>	<b>35.1</b>	<b>LOS C</b>	<b>166</b>	<b>0.85</b>	<b>0.90</b>	<b>30.5</b>
<b>All Vehicles</b>		<b>3423</b>	<b>2.2</b>	<b>0.836</b>	<b>25.2</b>	<b>LOS B</b>	<b>177</b>	<b>0.63</b>	<b>0.67</b>	<b>35.4</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

Following Queue

# - Density for continuous movement



Site: 2018 PM 2 lanes NLR

K:\60044833\_South\_Dural\4. Tech work area\4.3. Engineering\Traffic\SIDRA\with dev traffic\Hastings Rd\_New Line Rd\_v2\_with dev.aap

Processed Aug 26, 2008 12:42:41PM

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Produced by SIDRA Intersection 3.2.0.1455

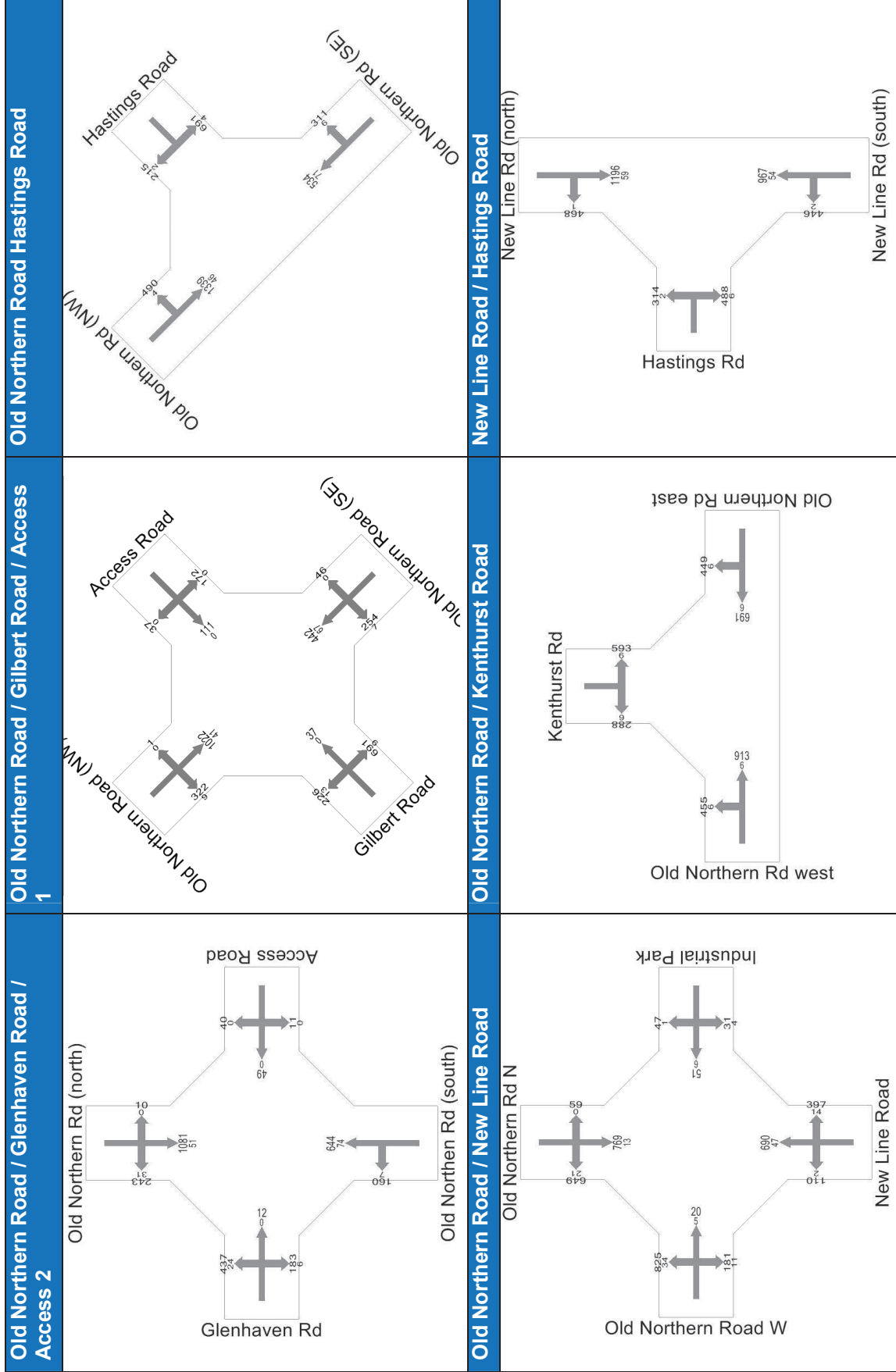
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## Appendix E 2018 (with development) Traffic Flows and Intersection Layouts

# DRAFT

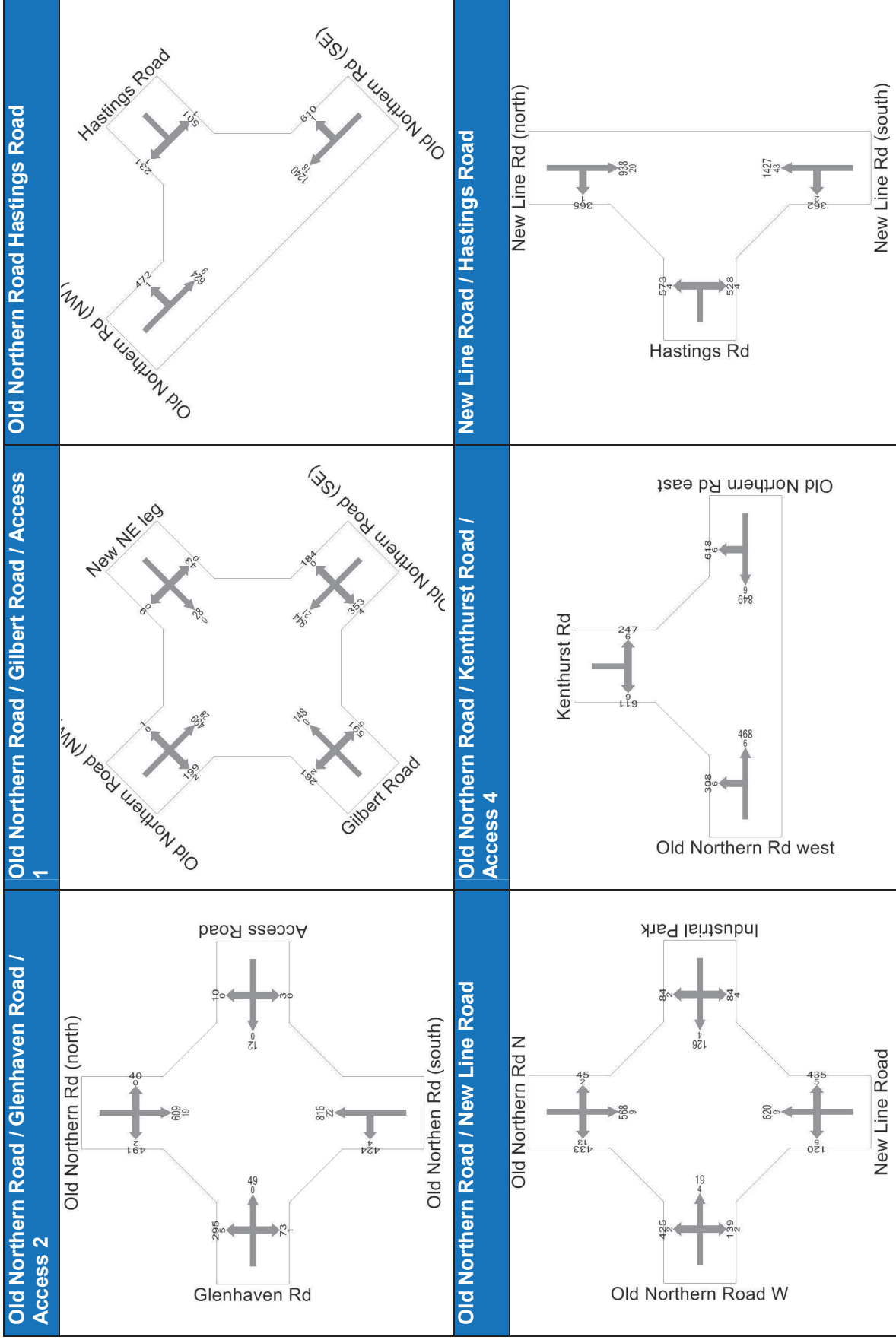
## 2018 AM Peak (with development) Turning Flows

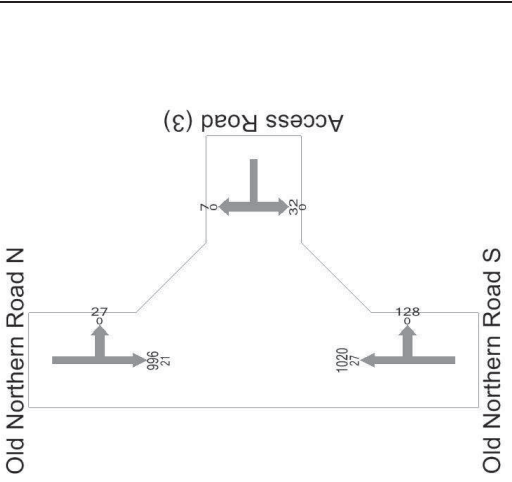
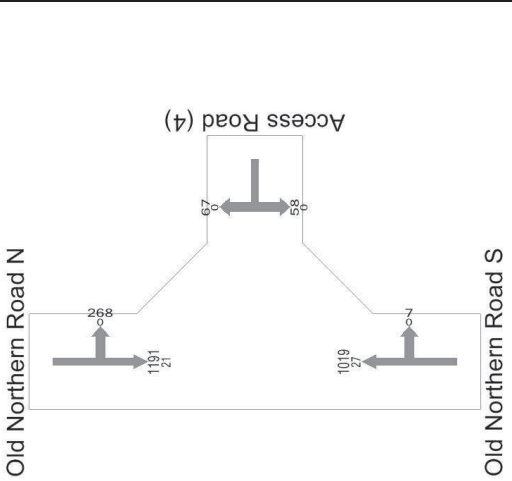
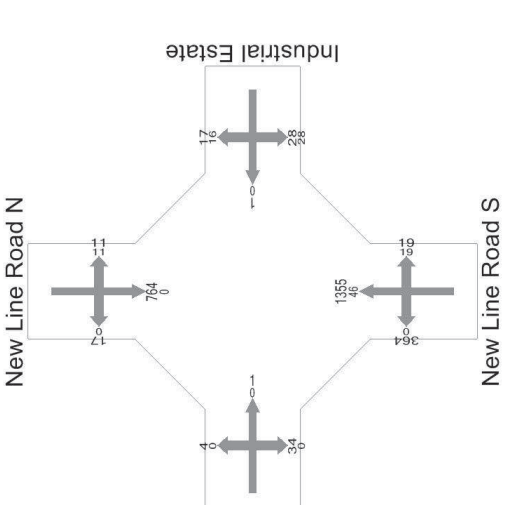
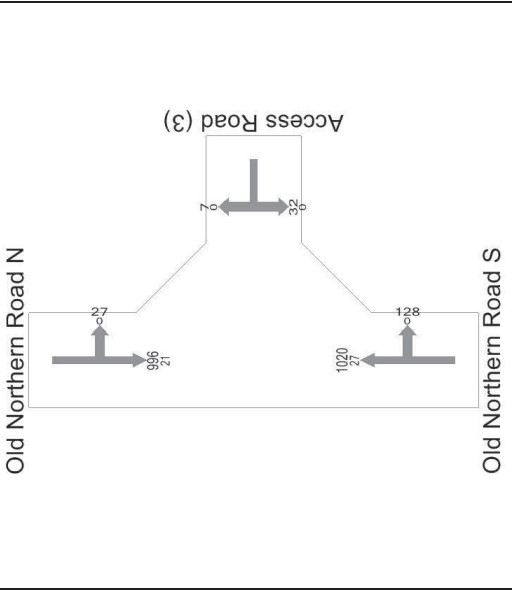


Old Northern Road / Access 3	Old Northern Road / Access 4	New Line Road / Access to Bunnings / Access 5
<p>Old Northern Road N</p> <p>Access Road (3)</p> <p>Old Northern Road S</p>	<p>Old Northern Road N</p> <p>Access Road (4)</p> <p>Old Northern Road S</p>	<p>New Line Road N</p> <p>Access Road (5)</p> <p>New Line Road S</p>
New Line Road / Sebastian Drive / Access 6		
<p>New Line Road N</p> <p>Access Road (6)</p> <p>Sebastian Drive</p> <p>New Line Road S</p>		

# DRAFT

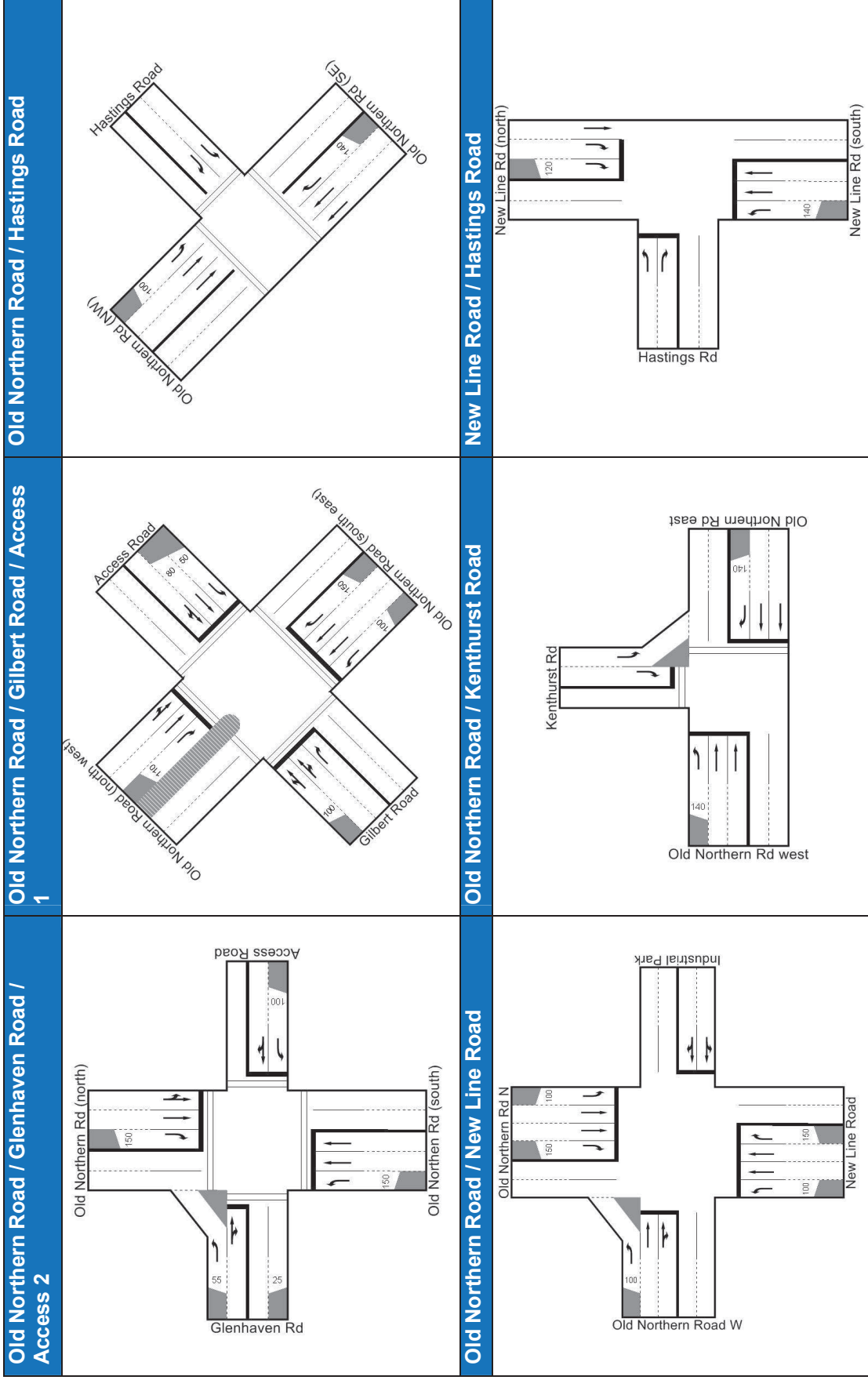
## 2018 PM Peak (with development) Turning Flows

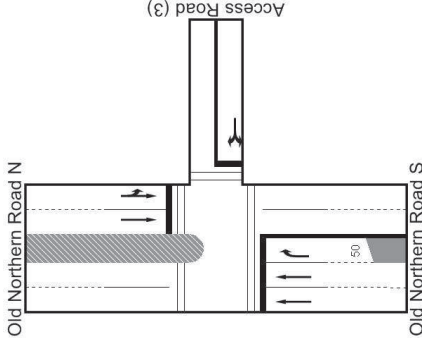
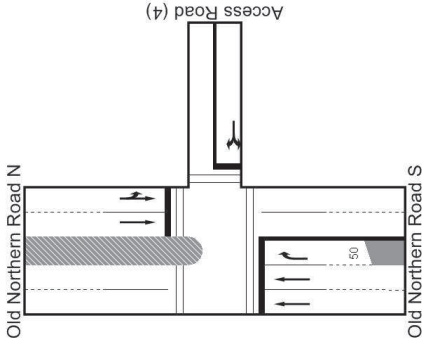
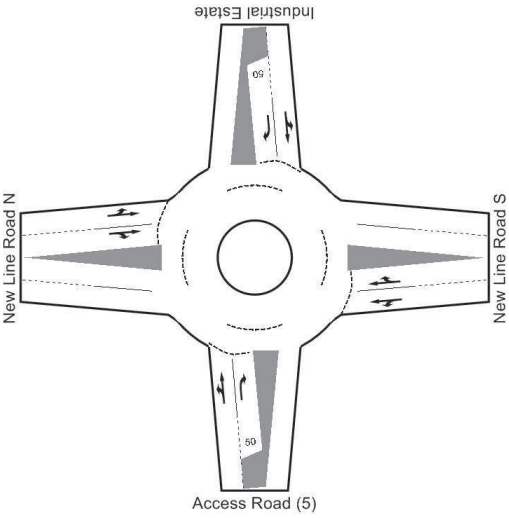
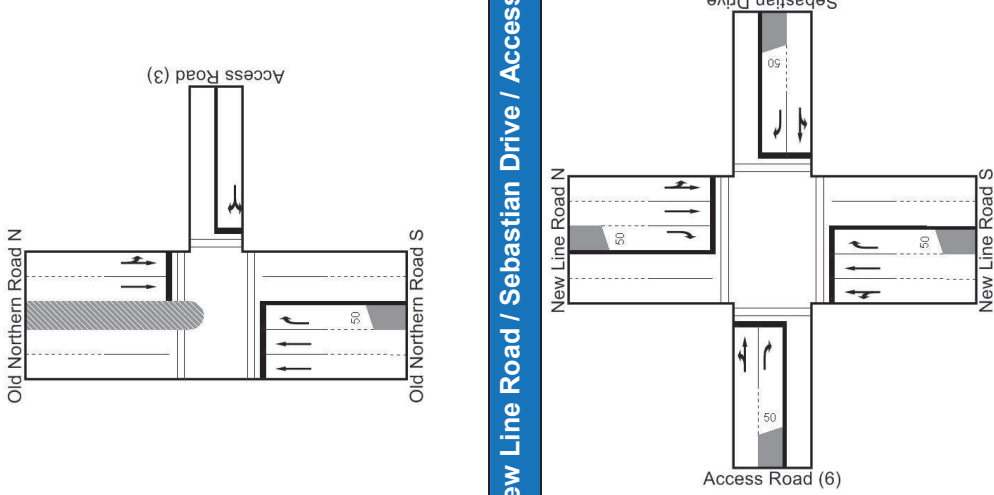


<p><b>Old Northern Road / Access 3</b></p>	 <p>Old Northern Road N</p> <p>Access Road (3)</p> <p>Old Northern Road S</p>	<p><b>Old Northern Road / Access 4</b></p>	 <p>Old Northern Road N</p> <p>Access Road (4)</p> <p>Old Northern Road S</p>	<p><b>New Line Road / Access to Bunnings / Access 5</b></p>	 <p>New Line Road N</p> <p>Access Road (5)</p> <p>Industrial Estate</p> <p>New Line Road S</p>
<p><b>New Line Road / Sebastian Drive / Access 6</b></p>	 <p>New Line Road N</p> <p>Sebastian Drive</p> <p>Access Road (6)</p> <p>New Line Road S</p>				

# DRAFT

2018 intersection layout (with development)



<p><b>Old Northern Road / Access 3</b></p>	 <p>Old Northern Road N</p> <p>Access Road (3)</p> <p>Old Northern Road S</p>	<p><b>Old Northern Road / Access 4</b></p>	 <p>Old Northern Road N</p> <p>Access Road (4)</p> <p>Old Northern Road S</p>	<p><b>New Line Road / Access to Bunnings / Access 5</b></p>	 <p>New Line Road N</p> <p>Industrial Estate</p> <p>Access Road (5)</p> <p>New Line Road S</p>
<p><b>New Line Road / Sebastian Drive / Access 6</b></p>	 <p>New Line Road N</p> <p>Sebastian Drive</p> <p>Access Road (6)</p> <p>New Line Road S</p>				



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## Appendix F 2018 (with development) SIDRA Results

# Movement Summary

## Glenhaven Road / Old Northern Road

### 2018 AM peak with development

Signalised - Fixed time

Cycle Time = 110 seconds

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>Old Northern Rd (south)</b>										
1	L	167	4.2	0.249	21.4	LOS B	33	0.73	0.78	37.8
2	T	718	10.3	0.772	43.9	LOS D	150	0.99	0.91	27.2
<b>Approach</b>		<b>885</b>	<b>9.2</b>	<b>0.772</b>	<b>39.7</b>	<b>LOS C</b>	<b>150</b>	<b>0.94</b>	<b>0.88</b>	<b>28.7</b>
<b>Access Road</b>										
4	L	11	0.0	0.054	56.3	LOS D	6	0.92	0.68	23.5
5	T	49	0.0	0.302	45.3	LOS D	41	0.93	0.73	26.7
6	R	40	0.0	0.302	53.4	LOS D	41	0.93	0.77	24.3
<b>Approach</b>		<b>100</b>	<b>0.0</b>	<b>0.302</b>	<b>49.8</b>	<b>LOS D</b>	<b>41</b>	<b>0.93</b>	<b>0.74</b>	<b>25.3</b>
<b>Old Northern Rd (north)</b>										
7	L	10	0.0	0.573	43.6	LOS D	272	0.74	0.85	27.2
8	T	1132	4.5	0.582	27.4	LOS B	272	0.74	0.67	34.2
9	R	274	11.3	0.763	56.2	LOS D	122	1.00	0.91	23.6
<b>Approach</b>		<b>1416</b>	<b>5.8</b>	<b>0.763</b>	<b>33.1</b>	<b>LOS C</b>	<b>272</b>	<b>0.79</b>	<b>0.72</b>	<b>31.5</b>
<b>Glenhaven Rd</b>										
10	L	461	5.2	0.773	17.1	LOS B	86	0.45	0.76	41.1
11	T	12	0.0	0.673	48.4	LOS D	87	0.99	0.84	25.7
12	R	189	3.2	0.673	56.6	LOS E	87	0.99	0.84	23.5
<b>Approach</b>		<b>662</b>	<b>4.5</b>	<b>0.773</b>	<b>29.0</b>	<b>LOS C</b>	<b>87</b>	<b>0.62</b>	<b>0.79</b>	<b>33.6</b>
<b>All Vehicles</b>		<b>3063</b>	<b>6.3</b>	<b>0.773</b>	<b>34.6</b>	<b>LOS C</b>	<b>272</b>	<b>0.80</b>	<b>0.78</b>	<b>30.8</b>

### Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P1	50	49.2	LOS E	0	0.95	0.95
P3	50	35.2	LOS D	0	0.80	0.80
P5	50	48.2	LOS E	0	0.94	0.94
P7	50	35.2	LOS D	0	0.80	0.80

# Movement Summary

## Glenhaven Road / Old Northern Road

### 2018 PM peak with development

Signalised - Fixed time

Cycle Time = 130 seconds

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>Old Northern Rd (south)</b>										
1	L	428	0.9	0.670	29.1	LOS C	110	0.91	0.85	33.3
2	T	838	2.6	0.861	58.1	LOS E	202	1.00	1.00	23.1
<b>Approach</b>		<b>1266</b>	<b>2.1</b>	<b>0.861</b>	<b>48.3</b>	<b>LOS D</b>	<b>202</b>	<b>0.97</b>	<b>0.95</b>	<b>25.8</b>
<b>Access Road</b>										
4	L	3	0.0	0.018	66.4	LOS E	2	0.93	0.64	21.2
5	T	12	0.0	0.088	53.9	LOS D	13	0.91	0.66	24.2
6	R	10	0.0	0.088	62.1	LOS E	13	0.91	0.71	22.1
<b>Approach</b>		<b>25</b>	<b>0.0</b>	<b>0.088</b>	<b>58.7</b>	<b>LOS E</b>	<b>13</b>	<b>0.91</b>	<b>0.68</b>	<b>22.9</b>
<b>Old Northern Rd (north)</b>										
7	L	40	0.0	0.291	24.5	LOS B	81	0.52	0.79	35.8
8	T	628	3.0	0.291	14.7	LOS B	84	0.52	0.46	42.8
9	R	493	0.4	0.887	67.0	LOS E	240	1.00	1.04	21.1
<b>Approach</b>		<b>1161</b>	<b>1.8</b>	<b>0.887</b>	<b>37.2</b>	<b>LOS C</b>	<b>240</b>	<b>0.72</b>	<b>0.72</b>	<b>29.6</b>
<b>Glenhaven Rd</b>										
10	L	300	1.7	0.553	13.2	LOS A	52	0.39	0.70	44.2
11	T	49	0.0	0.500	57.9	LOS E	64	0.98	0.78	23.2
12	R	74	1.4	0.500	66.0	LOS E	64	0.98	0.79	21.3
<b>Approach</b>		<b>423</b>	<b>1.4</b>	<b>0.552</b>	<b>27.6</b>	<b>LOS B</b>	<b>64</b>	<b>0.56</b>	<b>0.73</b>	<b>34.2</b>
<b>All Vehicles</b>		<b>2875</b>	<b>1.8</b>	<b>0.887</b>	<b>40.9</b>	<b>LOS C</b>	<b>240</b>	<b>0.81</b>	<b>0.82</b>	<b>28.3</b>

### Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P1	10	59.1	LOS E	0	0.95	0.95
P3	10	40.8	LOS E	0	0.79	0.79
P5	10	59.1	LOS E	0	0.95	0.95
P7	10	40.8	LOS E	0	0.79	0.79

# Movement Summary

## Gilbert Road / Old Northern Road

### 2018 AM peak with development

Signalised - Fixed time

Cycle Time = 110 seconds

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>Old Northern Road (SE)</b>										
21	L	261	2.7	0.481	29.3	LOS C	76	0.69	0.79	33.2
22	T	509	13.2	0.866	58.5	LOS E	128	1.00	1.03	23.0
23	R	46	0.0	0.639	71.0	LOS F	27	1.00	0.76	20.3
<b>Approach</b>		<b>816</b>	<b>9.1</b>	<b>0.866</b>	<b>49.9</b>	<b>LOS D</b>	<b>128</b>	<b>0.90</b>	<b>0.94</b>	<b>25.3</b>
<b>Access Road</b>										
24	L	172	0.0	0.800	62.9	LOS E	79	1.00	0.93	21.9
25	T	111	0.0	0.211	41.7	LOS C	33	0.89	0.69	28.0
26	R	37	0.0	0.211	49.8	LOS D	33	0.89	0.76	25.3
<b>Approach</b>		<b>320</b>	<b>0.0</b>	<b>0.800</b>	<b>54.0</b>	<b>LOS D</b>	<b>79</b>	<b>0.95</b>	<b>0.83</b>	<b>24.1</b>
<b>Old Northern Road (NW)</b>										
27	L	1	0.0	0.809	34.4	LOS C	165	0.85	0.86	30.8
28	T	1063	3.9	0.655	26.5	LOS B	166	0.85	0.76	34.7
29	R	331	2.7	0.869	63.8	LOS E	147	1.00	1.03	21.8
<b>Approach</b>		<b>1395</b>	<b>3.6</b>	<b>0.869</b>	<b>35.4</b>	<b>LOS C</b>	<b>166</b>	<b>0.89</b>	<b>0.82</b>	<b>30.4</b>
<b>Gilbert Road</b>										
30	L	239	5.4	0.547	27.7	LOS B	70	0.89	0.82	34.1
31	T	37	0.0	0.548	19.3	LOS B	70	0.89	0.75	39.2
32	R	700	1.3	0.837	58.6	LOS E	146	1.00	0.98	23.0
<b>Approach</b>		<b>976</b>	<b>2.3</b>	<b>0.837</b>	<b>49.6</b>	<b>LOS D</b>	<b>146</b>	<b>0.97</b>	<b>0.93</b>	<b>25.4</b>
<b>All Vehicles</b>		<b>3507</b>	<b>4.2</b>	<b>0.869</b>	<b>44.4</b>	<b>LOS D</b>	<b>166</b>	<b>0.92</b>	<b>0.88</b>	<b>27.0</b>

### Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P9	50	49.2	LOS E	0	0.95	0.95
P11	50	48.2	LOS E	0	0.94	0.94
P13	50	41.9	LOS E	0	0.87	0.87

# Movement Summary

## Gilbert Road / Old Northern Road

### 2018 PM peak with development

Signalised - Fixed time

Cycle Time = 130 seconds

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>Old Northern Road (SE)</b>										
21	L	357	1.1	0.451	19.5	LOS B	64	0.67	0.80	39.0
22	T	965	2.2	0.815	48.2	LOS D	211	0.99	0.93	25.8
23	R	184	0.0	0.758	70.8	LOS F	94	1.00	0.89	20.4
<b>Approach</b>		<b>1506</b>	<b>1.7</b>	<b>0.816</b>	<b>44.2</b>	<b>LOS D</b>	<b>211</b>	<b>0.92</b>	<b>0.89</b>	<b>27.1</b>
<b>New NE leg</b>										
24	L	43	0.0	0.128	29.5	LOS C	13	0.80	0.73	33.1
25	T	28	0.0	0.062	50.6	LOS D	11	0.88	0.63	25.1
26	R	9	0.0	0.062	58.7	LOS E	11	0.88	0.71	23.0
<b>Approach</b>		<b>80</b>	<b>0.0</b>	<b>0.128</b>	<b>40.2</b>	<b>LOS C</b>	<b>13</b>	<b>0.84</b>	<b>0.69</b>	<b>28.5</b>
<b>Old Northern Road (NW)</b>										
27	L	1	0.0	0.426	46.3	LOS D	107	0.85	0.82	26.3
28	T	527	5.3	0.455	38.5	LOS C	108	0.85	0.73	29.2
29	R	201	1.0	0.834	75.0	LOS F	106	1.00	0.96	19.6
<b>Approach</b>		<b>729</b>	<b>4.1</b>	<b>0.834</b>	<b>48.6</b>	<b>LOS D</b>	<b>108</b>	<b>0.89</b>	<b>0.79</b>	<b>25.7</b>
<b>Gilbert Road</b>										
30	L	263	0.8	0.829	61.9	LOS E	146	0.96	0.96	22.2
31	T	148	0.0	0.828	56.2	LOS D	162	0.98	0.95	23.6
32	R	596	0.8	0.828	65.8	LOS E	162	1.00	0.96	21.4
<b>Approach</b>		<b>1007</b>	<b>0.7</b>	<b>0.829</b>	<b>63.3</b>	<b>LOS E</b>	<b>162</b>	<b>0.99</b>	<b>0.96</b>	<b>21.9</b>
<b>All Vehicles</b>		<b>3322</b>	<b>1.9</b>	<b>0.834</b>	<b>50.8</b>	<b>LOS D</b>	<b>211</b>	<b>0.93</b>	<b>0.88</b>	<b>25.0</b>

### Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P9	50	59.1	LOS E	0	0.95	0.95
P11	50	39.2	LOS D	0	0.78	0.78
P13	50	48.2	LOS E	0	0.86	0.86

# Movement Summary

## Hastings Road / Old Northern Road

### 2018 AM peak with development

Signalised - Fixed time

Cycle Time = 100 seconds

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>Old Northern Rd (SE)</b>										
22	T	605	11.7	0.242	6.1	LOS A	54	0.40	0.35	51.4
23	R	317	1.9	0.824	55.2	LOS D	124	1.00	0.97	23.8
<b>Approach</b>		<b>922</b>	<b>8.4</b>	<b>0.824</b>	<b>23.0</b>	<b>LOS B</b>	<b>124</b>	<b>0.61</b>	<b>0.56</b>	<b>36.8</b>
<b>Hastings Road</b>										
24	L	695	0.6	0.916	56.9	LOS E	289	1.00	1.14	23.4
26	R	217	0.9	0.840	61.1	LOS E	93	1.00	0.98	22.4
<b>Approach</b>		<b>912</b>	<b>0.7</b>	<b>0.917</b>	<b>57.9</b>	<b>LOS E</b>	<b>289</b>	<b>1.00</b>	<b>1.11</b>	<b>23.1</b>
<b>Old Northern Rd (NW)</b>										
27	L	494	0.8	0.926	44.4	LOS D	166	0.92	0.94	27.0
28	T	1385	3.3	0.864	36.2	LOS C	251	0.98	1.00	30.1
<b>Approach</b>		<b>1879</b>	<b>2.7</b>	<b>0.926</b>	<b>38.4</b>	<b>LOS C</b>	<b>251</b>	<b>0.97</b>	<b>0.99</b>	<b>29.2</b>
<b>All Vehicles</b>		<b>3713</b>	<b>3.6</b>	<b>0.926</b>	<b>39.3</b>	<b>LOS C</b>	<b>289</b>	<b>0.88</b>	<b>0.91</b>	<b>28.8</b>

### Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P9	53	42.3	LOS E	0	0.92	0.92
P11	53	20.5	LOS C	0	0.64	0.64
P13	53	42.3	LOS E	0	0.92	0.92
<b>All Peds</b>	<b>159</b>	<b>35.0</b>	<b>LOS C</b>	<b>0</b>	<b>0.83</b>	<b>0.83</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# Movement Summary

## Hastings Road / Old Northern Road

### 2018 PM peak with development

Signalised - Fixed time

Cycle Time = 100 seconds

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>Old Northern Rd (SE)</b>										
22	T	1258	1.4	0.465	7.1	LOS A	105	0.48	0.43	50.2
23	R	611	0.2	0.998	51.9	LOS D	227	1.00	0.96	24.7
<b>Approach</b>		<b>1869</b>	<b>1.0</b>	<b>0.998</b>	<b>21.7</b>	<b>LOS B</b>	<b>227</b>	<b>0.65</b>	<b>0.61</b>	<b>37.6</b>
<b>Hastings Road</b>										
24	L	502	0.2	0.475	21.7	LOS B	109	0.63	0.81	37.5
26	R	232	0.4	0.964	87.5	LOS F	119	1.00	1.28	17.6
<b>Approach</b>		<b>734</b>	<b>0.3</b>	<b>0.964</b>	<b>42.5</b>	<b>LOS C</b>	<b>119</b>	<b>0.75</b>	<b>0.96</b>	<b>27.6</b>
<b>Old Northern Rd (NW)</b>										
27	L	473	0.2	0.981	48.5	LOS D	166	1.00	0.87	25.7
28	T	633	1.4	0.528	30.8	LOS C	101	0.88	0.75	32.5
<b>Approach</b>		<b>1106</b>	<b>0.9</b>	<b>0.981</b>	<b>38.3</b>	<b>LOS C</b>	<b>166</b>	<b>0.93</b>	<b>0.80</b>	<b>29.2</b>
<b>All Vehicles</b>		<b>3709</b>	<b>0.8</b>	<b>0.998</b>	<b>30.8</b>	<b>LOS C</b>	<b>227</b>	<b>0.75</b>	<b>0.74</b>	<b>32.5</b>

### Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P9	53	43.2	LOS E	0	0.93	0.93
P11	53	28.1	LOS C	0	0.75	0.75
P13	53	43.2	LOS E	0	0.93	0.93
<b>All Peds</b>	<b>159</b>	<b>38.2</b>	<b>LOS C</b>	<b>0</b>	<b>0.87</b>	<b>0.87</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# Movement Summary

## Old Northern Rd / New Line Rd

### 2018 AM peak with development

Signalised - Fixed time

Cycle Time = 100 seconds

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>New Line Road</b>										
1	L	112	1.8	0.184	25.1	LOS B	30	0.76	0.76	35.5
2	T	737	6.4	0.905	56.5	LOS D	163	1.00	1.12	23.5
3	R	411	3.4	0.576	34.7	LOS C	122	0.85	0.84	30.8
<b>Approach</b>		<b>1260</b>	<b>5.0</b>	<b>0.905</b>	<b>46.6</b>	<b>LOS D</b>	<b>163</b>	<b>0.93</b>	<b>0.99</b>	<b>26.3</b>
<b>Industrial Park</b>										
4	L	35	11.4	0.553	37.5	LOS C	28	1.00	0.76	29.7
5	T	57	10.5	0.552	35.2	LOS C	32	1.00	0.76	30.5
6	R	48	2.1	0.552	61.0	LOS E	32	1.00	0.76	22.5
<b>Approach</b>		<b>140</b>	<b>7.9</b>	<b>0.552</b>	<b>44.6</b>	<b>LOS D</b>	<b>32</b>	<b>1.00</b>	<b>0.76</b>	<b>27.0</b>
<b>Old Northern Rd N</b>										
7	L	59	0.0	0.113	32.9	LOS C	20	0.72	0.74	31.5
8	T	782	1.7	0.932	62.9	LOS E	175	1.00	1.19	22.0
9	R	670	3.1	0.937	45.5	LOS D	242	1.00	0.96	26.8
<b>Approach</b>		<b>1511</b>	<b>2.3</b>	<b>0.937</b>	<b>54.0</b>	<b>LOS D</b>	<b>242</b>	<b>0.99</b>	<b>1.07</b>	<b>24.2</b>
<b>Old Northern Road W</b>										
10	L	859	4.0	0.950	18.5	LOS B	166	0.65	0.83	40.0
11	T	25	20.0	0.127	44.7	LOS D	14	0.93	0.67	26.9
12	R	192	5.7	0.945	78.9	LOS F	100	1.00	1.20	19.1
<b>Approach</b>		<b>1076</b>	<b>4.6</b>	<b>0.950</b>	<b>29.9</b>	<b>LOS C</b>	<b>166</b>	<b>0.72</b>	<b>0.89</b>	<b>33.2</b>
<b>All Vehicles</b>		<b>3987</b>	<b>4.0</b>	<b>0.950</b>	<b>44.8</b>	<b>LOS D</b>	<b>242</b>	<b>0.90</b>	<b>0.99</b>	<b>27.0</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

Following Queue

# - Density for continuous movement



# Movement Summary

## Old Northern Rd / New Line Rd

### 2018 AM peak with development

#### Roundabout

#### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>New Line Road</b>										
1	L	112	1.8	0.789	20.2	LOS B	81	1.00	1.23	38.6
2	T	737	6.4	1.105	124.3	LOS F	905	1.00	3.44	13.7
3	R	451	3.3	1.105	226.5	LOS F	905	1.00	5.46	8.9
<b>Approach</b>		<b>1300</b>	<b>4.9</b>	<b>1.105</b>	<b>150.8</b>	<b>LOS F</b>	<b>905</b>	<b>1.00</b>	<b>3.95</b>	<b>12.0</b>
<b>Industrial Park</b>										
4	L	35	11.4	0.174	11.7	LOS A	10	0.88	0.94	45.7
5	T	57	10.5	0.174	10.6	LOS A	10	0.87	0.92	46.8
6	R	49	2.0	0.174	18.3	LOS B	8	0.85	0.96	41.1
<b>Approach</b>		<b>141</b>	<b>7.8</b>	<b>0.174</b>	<b>13.5</b>	<b>LOS A</b>	<b>10</b>	<b>0.87</b>	<b>0.94</b>	<b>44.3</b>
<b>Old Northern Rd N</b>										
7	L	59	0.0	0.843	16.9	LOS B	114	1.00	1.23	41.0
8	T	782	1.7	0.848	15.7	LOS B	114	1.00	1.23	42.1
9	R	689	3.0	0.849	24.3	LOS B	109	1.00	1.28	37.2
<b>Approach</b>		<b>1530</b>	<b>2.2</b>	<b>0.849</b>	<b>19.6</b>	<b>LOS B</b>	<b>114</b>	<b>1.00</b>	<b>1.25</b>	<b>39.6</b>
<b>Old Northern Road W</b>										
10	L	859	4.0	0.983	51.5	LOS D	261	1.00	2.24	24.9
11	T	25	20.0	0.044	8.6	LOS A	2	0.78	0.74	47.7
12	R	193	5.7	0.282	15.0	LOS B	16	0.85	0.92	43.2
<b>Approach</b>		<b>1077</b>	<b>4.6</b>	<b>0.983</b>	<b>43.9</b>	<b>LOS D</b>	<b>261</b>	<b>0.97</b>	<b>1.97</b>	<b>27.4</b>
<b>All Vehicles</b>		<b>4048</b>	<b>3.9</b>	<b>1.105</b>	<b>68.0</b>	<b>LOS E</b>	<b>905</b>	<b>0.99</b>	<b>2.30</b>	<b>21.4</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

Following Queue

# - Density for continuous movement

# Movement Summary

## Old Northern Rd / New Line Rd

### 2018 PM peak with development

Signalised - Fixed time

Cycle Time = 70 seconds

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>New Line Road</b>										
1	L	125	4.0	0.180	24.4	LOS B	30	0.71	0.77	36.0
2	T	629	1.4	0.846	36.8	LOS C	96	1.00	1.02	29.8
3	R	440	1.1	0.807	37.9	LOS C	119	0.99	0.97	29.4
<b>Approach</b>		<b>1194</b>	<b>1.6</b>	<b>0.846</b>	<b>35.9</b>	<b>LOS C</b>	<b>119</b>	<b>0.97</b>	<b>0.98</b>	<b>30.2</b>
<b>Industrial Park</b>										
4	L	88	4.5	0.795	46.2	LOS D	59	1.00	0.94	26.4
5	T	130	3.1	0.795	38.5	LOS C	59	1.00	0.93	29.2
6	R	86	2.3	0.795	47.4	LOS D	47	1.00	0.92	26.2
<b>Approach</b>		<b>304</b>	<b>3.3</b>	<b>0.795</b>	<b>43.2</b>	<b>LOS D</b>	<b>59</b>	<b>1.00</b>	<b>0.93</b>	<b>27.5</b>
<b>Old Northern Rd N</b>										
7	L	47	4.3	0.093	19.7	LOS B	9	0.78	0.73	39.0
8	T	577	1.6	0.777	33.2	LOS C	85	1.00	0.93	31.4
9	R	446	2.9	0.828	39.4	LOS C	126	1.00	1.00	28.9
<b>Approach</b>		<b>1070</b>	<b>2.2</b>	<b>0.828</b>	<b>35.2</b>	<b>LOS C</b>	<b>126</b>	<b>0.99</b>	<b>0.95</b>	<b>30.5</b>
<b>Old Northern Road W</b>										
10	L	427	0.5	0.394	11.5	LOS A	47	0.49	0.73	45.6
11	T	23	17.4	0.127	32.7	LOS C	9	0.94	0.67	31.6
12	R	141	1.4	0.740	45.1	LOS D	48	1.00	0.89	26.9
<b>Approach</b>		<b>591</b>	<b>1.4</b>	<b>0.740</b>	<b>20.4</b>	<b>LOS B</b>	<b>48</b>	<b>0.63</b>	<b>0.76</b>	<b>38.6</b>
<b>All Vehicles</b>		<b>3159</b>	<b>1.9</b>	<b>0.846</b>	<b>33.5</b>	<b>LOS C</b>	<b>126</b>	<b>0.91</b>	<b>0.93</b>	<b>31.3</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

Following Queue

# - Density for continuous movement

# Movement Summary

## Old Northern Rd / New Line Rd

### 2018 PM peak with development

#### Roundabout

#### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>New Line Road</b>										
1	L	125	4.0	0.584	11.3	LOS A	40	0.81	0.97	45.9
2	T	629	1.4	0.819	11.9	LOS A	97	0.89	1.06	45.4
3	R	492	1.8	0.819	21.0	LOS B	97	0.97	1.18	39.3
<b>Approach</b>		<b>1246</b>	<b>1.8</b>	<b>0.819</b>	<b>15.4</b>	<b>LOS B</b>	<b>97</b>	<b>0.91</b>	<b>1.10</b>	<b>42.7</b>
<b>Industrial Park</b>										
4	L	84	0.0	0.233	8.6	LOS A	12	0.78	0.76	47.0
5	T	130	3.1	0.233	7.8	LOS A	12	0.77	0.70	47.7
6	R	87	2.3	0.233	15.3	LOS B	11	0.77	0.93	43.3
<b>Approach</b>		<b>301</b>	<b>2.0</b>	<b>0.233</b>	<b>10.2</b>	<b>LOS A</b>	<b>12</b>	<b>0.77</b>	<b>0.78</b>	<b>46.1</b>
<b>Old Northern Rd N</b>										
7	L	47	4.3	0.627	11.1	LOS A	53	0.88	0.96	46.1
8	T	577	1.6	0.625	9.9	LOS A	53	0.88	0.95	47.0
9	R	447	2.9	0.625	17.6	LOS B	50	0.87	1.03	41.5
<b>Approach</b>		<b>1071</b>	<b>2.2</b>	<b>0.625</b>	<b>13.2</b>	<b>LOS A</b>	<b>53</b>	<b>0.87</b>	<b>0.98</b>	<b>44.4</b>
<b>Old Northern Road W</b>										
10	L	427	0.5	0.481	10.0	LOS A	34	0.92	0.91	46.0
11	T	23	17.4	0.038	8.3	LOS A	2	0.77	0.72	47.7
12	R	142	1.4	0.213	14.9	LOS B	11	0.82	0.91	43.3
<b>Approach</b>		<b>592</b>	<b>1.4</b>	<b>0.481</b>	<b>11.1</b>	<b>LOS A</b>	<b>34</b>	<b>0.89</b>	<b>0.90</b>	<b>45.4</b>
<b>All Vehicles</b>		<b>3210</b>	<b>1.9</b>	<b>0.819</b>	<b>13.4</b>	<b>LOS A</b>	<b>97</b>	<b>0.88</b>	<b>0.99</b>	<b>44.0</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

Following Queue

# - Density for continuous movement

# Movement Summary

## Kenthurst Rd / Old Northern Rd

### 2018 AM peak with development

Signalised - Fixed time

Cycle Time = 90 seconds

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>Old Northern Rd east</b>										
5	T	691	5.9	0.276	6.5	LOS A	57	0.44	0.38	50.9
6	R	449	6.0	0.840	47.5	LOS D	160	1.00	1.01	26.1
<b>Approach</b>		<b>1140</b>	<b>6.0</b>	<b>0.841</b>	<b>22.6</b>	<b>LOS B</b>	<b>160</b>	<b>0.66</b>	<b>0.63</b>	<b>37.0</b>
<b>Kenthurst Rd</b>										
7	L	593	6.1	0.543	14.4	LOS A	98	0.59	0.77	43.1
9	R	288	5.9	0.808	51.1	LOS D	109	1.00	0.96	25.0
<b>Approach</b>		<b>881</b>	<b>6.0</b>	<b>0.808</b>	<b>26.4</b>	<b>LOS B</b>	<b>109</b>	<b>0.72</b>	<b>0.83</b>	<b>34.9</b>
<b>Old Northern Rd west</b>										
10	L	455	5.9	0.532	20.5	LOS B	96	0.62	0.80	38.5
11	T	913	6.0	0.811	36.1	LOS C	155	0.99	0.96	30.1
<b>Approach</b>		<b>1368</b>	<b>6.0</b>	<b>0.811</b>	<b>30.9</b>	<b>LOS C</b>	<b>155</b>	<b>0.87</b>	<b>0.90</b>	<b>32.4</b>
<b>All Vehicles</b>		<b>3389</b>	<b>6.0</b>	<b>0.840</b>	<b>27.0</b>	<b>LOS B</b>	<b>160</b>	<b>0.76</b>	<b>0.79</b>	<b>34.5</b>

### Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P3	50	38.3	LOS D	0	0.92	0.92
P5	50	24.2	LOS C	0	0.73	0.73
<b>All Peds</b>	<b>100</b>	<b>31.2</b>	<b>LOS C</b>	<b>0</b>	<b>0.83</b>	<b>0.83</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

# Movement Summary

## Kenthurst Rd / Old Northern Rd

### 2018 PM peak with development

Signalised - Fixed time

Cycle Time = 150 seconds

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>Old Northern Rd east</b>										
5	T	849	5.3	0.453	19.9	LOS B	153	0.63	0.56	38.8
6	R	618	7.3	1.000#	53.4	LOS D	227	1.00	0.89	24.3
<b>Approach</b>		<b>1467</b>	<b>6.0</b>	<b>1.000</b>	<b>31.6</b>	<b>LOS C</b>	<b>227</b>	<b>0.76</b>	<b>0.68</b>	<b>32.1</b>
<b>Kenthurst Rd</b>										
7	L	247	6.1	0.172	10.2	LOS A	34	0.25	0.66	47.0
9	R	611	6.1	0.971	106.1	LOS F	449	1.00	1.30	15.3
<b>Approach</b>		<b>858</b>	<b>6.1</b>	<b>0.971</b>	<b>78.5</b>	<b>LOS F</b>	<b>449</b>	<b>0.78</b>	<b>1.11</b>	<b>19.1</b>
<b>Old Northern Rd west</b>										
10	L	308	5.8	0.514	30.4	LOS C	104	0.62	0.79	32.7
11	T	468	6.0	0.984	120.1	LOS F	178	1.00	1.29	14.0
<b>Approach</b>		<b>776</b>	<b>5.9</b>	<b>0.984</b>	<b>84.5</b>	<b>LOS F</b>	<b>178</b>	<b>0.85</b>	<b>1.09</b>	<b>18.1</b>
<b>All Vehicles</b>		<b>3101</b>	<b>6.0</b>	<b>1.000</b>	<b>57.8</b>	<b>LOS E</b>	<b>449</b>	<b>0.79</b>	<b>0.90</b>	<b>23.2</b>

### Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P3	50	38.9	LOS D	0	0.72	0.72
P5	50	59.9	LOS E	0	0.89	0.89
<b>All Peds</b>	<b>100</b>	<b>49.4</b>	<b>LOS D</b>	<b>0</b>	<b>0.81</b>	<b>0.81</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

# Movement Summary

## Hastings Road / New Line Road

### 2018 AM peak with development

Signalised - Fixed time

Cycle Time = 80 seconds

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>New Line Rd (south)</b>										
1	L	448	0.4	0.402	13.3	LOS A	60	0.42	0.76	44.0
2	T	1021	5.3	0.867	37.4	LOS C	169	1.00	1.06	29.6
<b>Approach</b>		<b>1469</b>	<b>3.8</b>	<b>0.867</b>	<b>30.0</b>	<b>LOS C</b>	<b>169</b>	<b>0.82</b>	<b>0.97</b>	<b>32.9</b>
<b>New Line Rd (north)</b>										
8	T	1255	4.7	0.663	0.2	LOS D#	22#	0.00	0.00	59.7
9	R	469	0.2	0.843	51.5	LOS D	84	1.00	1.00	24.8
<b>Approach</b>		<b>1724</b>	<b>3.5</b>	<b>0.843</b>	<b>14.2</b>	<b>LOS A</b>	<b>84</b>	<b>0.27</b>	<b>0.27</b>	<b>43.2</b>
<b>Hastings Rd</b>										
10	L	316	0.6	0.318	19.3	LOS B	60	0.60	0.78	39.2
12	R	494	1.2	0.859	44.7	LOS D	156	1.00	1.04	26.9
<b>Approach</b>		<b>810</b>	<b>1.0</b>	<b>0.859</b>	<b>34.8</b>	<b>LOS C</b>	<b>156</b>	<b>0.84</b>	<b>0.94</b>	<b>30.7</b>
<b>All Vehicles</b>		<b>4003</b>	<b>3.1</b>	<b>0.867</b>	<b>24.2</b>	<b>LOS B</b>	<b>169</b>	<b>0.59</b>	<b>0.66</b>	<b>36.0</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

Following Queue

# - Density for continuous movement



Site: 2018 AM 2 lanes NLR + dev

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\Hastings Rd\_New Line Rd\_v2\_with dev.aap

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# Movement Summary

## Hastings Road / New Line Road

### 2018 PM peak with development

Signalised - Fixed time

Cycle Time = 120 seconds

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>New Line Rd (south)</b>										
1	L	364	0.5	0.330	11.6	LOS A	49	0.28	0.73	45.5
2	T	1470	2.9	0.904	48.3	LOS D	338	1.00	1.07	25.8
<b>Approach</b>		<b>1834</b>	<b>2.5</b>	<b>0.904</b>	<b>41.0</b>	<b>LOS C</b>	<b>338</b>	<b>0.86</b>	<b>1.00</b>	<b>28.2</b>
<b>New Line Rd (north)</b>										
8	T	958	2.1	0.498	0.1	LOS D#	16#	0.00	0.00	59.8
9	R	366	0.3	0.911	81.4	LOS F	99	1.00	1.08	18.5
<b>Approach</b>		<b>1324</b>	<b>1.6</b>	<b>0.911</b>	<b>22.6</b>	<b>LOS B</b>	<b>99</b>	<b>0.28</b>	<b>0.30</b>	<b>37.0</b>
<b>Hastings Rd</b>										
10	L	577	0.7	0.657	33.8	LOS C	181	0.82	0.86	31.0
12	R	532	0.8	0.910	67.4	LOS E	255	1.00	1.10	21.0
<b>Approach</b>		<b>1109</b>	<b>0.7</b>	<b>0.909</b>	<b>49.9</b>	<b>LOS D</b>	<b>255</b>	<b>0.91</b>	<b>0.98</b>	<b>25.3</b>
<b>All Vehicles</b>		<b>4267</b>	<b>1.7</b>	<b>0.911</b>	<b>37.6</b>	<b>LOS C</b>	<b>338</b>	<b>0.69</b>	<b>0.78</b>	<b>29.5</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

Following Queue

# - Density for continuous movement



Site: 2018 PM 2 lanes NLR + dev

K:\60044833\_South\_Dural\4. Tech work area\4.3. Engineering\Traffic\SIDRA\with dev traffic\revised analysis 120109

\Hastings Rd\_New Line Rd\_v2\_with dev.aap

Processed Jan 13, 2009 11:28:28AM

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# Movement Summary

## Access 3

### 2018 AM peak with development

Signalised - Fixed time

Cycle Time = 90 seconds

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>Old Northern Road S</b>										
2	T	1285	7.6	0.527	8.7	LOS A	119	0.57	0.51	48.4
3	R	32	0.0	0.163	22.3	LOS B	9	0.57	0.75	37.1
<b>Approach</b>		<b>1317</b>	<b>7.4</b>	<b>0.528</b>	<b>9.0</b>	<b>LOS A</b>	<b>119</b>	<b>0.57</b>	<b>0.52</b>	<b>48.1</b>
<b>Access Road (3)</b>										
4	L	128	0.0	0.536	47.3	LOS D	57	0.97	0.80	26.0
6	R	27	0.0	0.536	47.4	LOS D	57	0.97	0.80	26.0
<b>Approach</b>		<b>155</b>	<b>0.0</b>	<b>0.537</b>	<b>47.3</b>	<b>LOS D</b>	<b>57</b>	<b>0.97</b>	<b>0.80</b>	<b>26.0</b>
<b>Old Northern Road N</b>										
7	L	7	0.0	0.486	16.5	LOS B	105	0.54	0.79	41.3
8	T	1164	7.0	0.479	8.3	LOS A	105	0.54	0.49	48.9
<b>Approach</b>		<b>1171</b>	<b>7.0</b>	<b>0.479</b>	<b>8.3</b>	<b>LOS A</b>	<b>105</b>	<b>0.54</b>	<b>0.49</b>	<b>48.8</b>
<b>All Vehicles</b>		<b>2643</b>	<b>6.8</b>	<b>0.536</b>	<b>11.0</b>	<b>LOS A</b>	<b>119</b>	<b>0.58</b>	<b>0.52</b>	<b>46.1</b>

### Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P1	53	37.4	LOS D	0	0.91	0.91
P3	53	6.4	LOS A	0	0.38	0.38
P5	53	34.7	LOS D	0	0.88	0.88
<b>All Peds</b>	<b>159</b>	<b>26.1</b>	<b>LOS B</b>	<b>0</b>	<b>0.72</b>	<b>0.72</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS



# Movement Summary

## Access 3

### 2018 PM peak with development

Signalised - Fixed time

Cycle Time = 100 seconds

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>Old Northern Road S</b>										
2	T	1047	2.6	0.384	6.1	LOS A	83	0.43	0.38	51.4
3	R	128	0.0	0.530	53.8	LOS D	54	0.98	0.79	24.1
<b>Approach</b>		<b>1175</b>	<b>2.3</b>	<b>0.530</b>	<b>11.3</b>	<b>LOS A</b>	<b>83</b>	<b>0.49</b>	<b>0.43</b>	<b>45.8</b>
<b>Access Road (3)</b>										
4	L	32	0.0	0.104	42.8	LOS D	16	0.84	0.74	27.5
6	R	7	0.0	0.105	42.9	LOS D	16	0.84	0.74	27.4
<b>Approach</b>		<b>39</b>	<b>0.0</b>	<b>0.104</b>	<b>42.8</b>	<b>LOS D</b>	<b>16</b>	<b>0.84</b>	<b>0.74</b>	<b>27.5</b>
<b>Old Northern Road N</b>										
7	L	27	0.0	0.522	25.1	LOS B	125	0.71	0.83	35.5
8	T	1017	2.1	0.524	16.9	LOS B	126	0.71	0.63	41.0
<b>Approach</b>		<b>1044</b>	<b>2.0</b>	<b>0.524</b>	<b>17.1</b>	<b>LOS B</b>	<b>126</b>	<b>0.71</b>	<b>0.64</b>	<b>40.8</b>
<b>All Vehicles</b>		<b>2258</b>	<b>2.1</b>	<b>0.530</b>	<b>14.5</b>	<b>LOS B</b>	<b>126</b>	<b>0.60</b>	<b>0.53</b>	<b>42.9</b>

### Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P1	53	44.2	LOS E	0	0.94	0.94
P3	53	13.0	LOS B	0	0.51	0.51
P5	53	41.4	LOS E	0	0.91	0.91
<b>All Peds</b>	<b>159</b>	<b>32.9</b>	<b>LOS C</b>	<b>0</b>	<b>0.79</b>	<b>0.79</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# Movement Summary

## Old Northern Road / Access 4

### 2018 AM peak with development

Signalised - Fixed time

Cycle Time = 80 seconds

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>Old Northern Road S</b>										
2	T	1311	7.5	0.783	22.5	LOS B	176	0.91	0.87	37.1
3	R	2	0.0	0.014	36.2	LOS C	1	0.81	0.66	30.0
<b>Approach</b>		<b>1313</b>	<b>7.5</b>	<b>0.783</b>	<b>22.5</b>	<b>LOS B</b>	<b>176</b>	<b>0.91</b>	<b>0.87</b>	<b>37.1</b>
<b>Access Road (4)</b>										
4	L	234	0.0	0.801	38.3	LOS C	143	0.97	0.96	29.2
6	R	268	0.0	0.801	38.4	LOS C	143	0.97	0.96	29.1
<b>Approach</b>		<b>502</b>	<b>0.0</b>	<b>0.801</b>	<b>38.3</b>	<b>LOS C</b>	<b>143</b>	<b>0.97</b>	<b>0.96</b>	<b>29.1</b>
<b>Old Northern Road N</b>										
7	L	124	0.0	0.656	27.4	LOS B	126	0.85	0.85	34.2
8	T	937	8.8	0.656	18.9	LOS B	133	0.84	0.74	39.5
<b>Approach</b>		<b>1061</b>	<b>7.7</b>	<b>0.656</b>	<b>19.9</b>	<b>LOS B</b>	<b>133</b>	<b>0.84</b>	<b>0.76</b>	<b>38.8</b>
<b>All Vehicles</b>		<b>2876</b>	<b>6.3</b>	<b>0.801</b>	<b>24.3</b>	<b>LOS B</b>	<b>176</b>	<b>0.90</b>	<b>0.84</b>	<b>36.0</b>

### Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P1	53	21.8	LOS C	0	0.74	0.74
P3	53	13.8	LOS B	0	0.59	0.59
P5	53	19.6	LOS B	0	0.70	0.70
<b>All Peds</b>	<b>159</b>	<b>18.4</b>	<b>LOS B</b>	<b>0</b>	<b>0.67</b>	<b>0.67</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# Movement Summary

## Old Northern Road / Access 4

### 2018 PM peak with development

Signalised - Fixed time

Cycle Time = 120 seconds

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>Old Northern Road S</b>										
2	T	1046	2.6	0.360	5.1	LOS A	83	0.36	0.32	52.7
3	R	7	0.0	0.075	69.7	LOS E	4	0.98	0.66	20.5
<b>Approach</b>		<b>1053</b>	<b>2.6</b>	<b>0.360</b>	<b>5.5</b>	<b>LOS A</b>	<b>83</b>	<b>0.36</b>	<b>0.32</b>	<b>52.1</b>
<b>Access Road (4)</b>										
4	L	58	0.0	0.591	64.3	LOS E	62	1.00	0.80	21.6
6	R	67	0.0	0.591	64.4	LOS E	62	1.00	0.80	21.6
<b>Approach</b>		<b>125</b>	<b>0.0</b>	<b>0.591</b>	<b>64.3</b>	<b>LOS E</b>	<b>62</b>	<b>1.00</b>	<b>0.80</b>	<b>21.6</b>
<b>Old Northern Road N</b>										
7	L	268	0.0	0.597	21.4	LOS B	173	0.63	0.82	37.7
8	T	1212	1.7	0.597	12.6	LOS A	176	0.62	0.57	44.6
<b>Approach</b>		<b>1480</b>	<b>1.4</b>	<b>0.597</b>	<b>14.2</b>	<b>LOS A</b>	<b>176</b>	<b>0.62</b>	<b>0.61</b>	<b>43.2</b>
<b>All Vehicles</b>		<b>2658</b>	<b>1.8</b>	<b>0.597</b>	<b>13.1</b>	<b>LOS A</b>	<b>176</b>	<b>0.54</b>	<b>0.51</b>	<b>44.1</b>

### Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P1	53	54.1	LOS E	0	0.95	0.95
P3	53	8.1	LOS A	0	0.37	0.37
P5	53	51.3	LOS E	0	0.93	0.93
<b>All Peds</b>	<b>159</b>	<b>37.9</b>	<b>LOS C</b>	<b>0</b>	<b>0.75</b>	<b>0.75</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# Movement Summary

## New Line Road / Access 5

### 2018 AM peak with development

Roundabout

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>New Line Road S</b>										
1	L	34	0.0	0.540	6.6	LOS A	48	0.15	0.51	50.0
2	T	1321	29.0	0.539	6.3	LOS A	48	0.16	0.44	51.2
3	R	28	28.6	0.538	12.1	LOS A	48	0.16	0.64	45.9
<b>Approach</b>		<b>1383</b>	<b>28.3</b>	<b>0.539</b>	<b>6.4</b>	<b>LOS A</b>	<b>48</b>	<b>0.16</b>	<b>0.44</b>	<b>51.0</b>
<b>Industrial Estate</b>										
4	L	19	21.1	0.029	10.3	LOS A	1	0.62	0.74	47.4
5	T	1	0.0	0.029	8.6	LOS A	1	0.62	0.68	48.1
6	R	11	9.1	0.018	15.1	LOS B	1	0.62	0.78	43.4
<b>Approach</b>		<b>31</b>	<b>16.1</b>	<b>0.029</b>	<b>11.9</b>	<b>LOS A</b>	<b>1</b>	<b>0.62</b>	<b>0.75</b>	<b>45.9</b>
<b>New Line Road N</b>										
7	L	17	17.6	0.395	7.8	LOS A	22	0.40	0.59	48.5
8	T	971	0.0	0.392	6.2	LOS A	22	0.41	0.53	49.4
9	R	4	0.0	0.400	12.0	LOS A	22	0.41	0.68	44.9
<b>Approach</b>		<b>992</b>	<b>0.3</b>	<b>0.392</b>	<b>6.2</b>	<b>LOS A</b>	<b>22</b>	<b>0.41</b>	<b>0.53</b>	<b>49.4</b>
<b>Access Road (5)</b>										
10	L	17	0.0	0.037	12.5	LOS A	1	0.67	0.83	44.6
11	T	1	0.0	0.037	11.4	LOS A	1	0.67	0.80	45.7
12	R	137	0.0	0.178	15.4	LOS B	7	0.70	0.91	42.9
<b>Approach</b>		<b>155</b>	<b>0.0</b>	<b>0.178</b>	<b>15.0</b>	<b>LOS B</b>	<b>7</b>	<b>0.69</b>	<b>0.90</b>	<b>43.1</b>
<b>All Vehicles</b>		<b>2561</b>	<b>15.6</b>	<b>0.540</b>	<b>6.9</b>	<b>LOS A</b>	<b>48</b>	<b>0.29</b>	<b>0.51</b>	<b>49.7</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

Following Queue

# - Density for continuous movement

# Movement Summary

## New Line Road / Access 5

### 2018 PM peak with development

Roundabout

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>New Line Road S</b>										
1	L	364	0.0	0.757	7.0	LOS A	99	0.36	0.48	48.8
2	T	1355	46.0	0.756	7.3	LOS A	99	0.40	0.45	49.5
3	R	19	21.1	0.760	12.5	LOS A	110	0.42	0.58	44.8
<b>Approach</b>		<b>1738</b>	<b>36.1</b>	<b>0.756</b>	<b>7.3</b>	<b>LOS A</b>	<b>110</b>	<b>0.39</b>	<b>0.46</b>	<b>49.3</b>
<b>Industrial Estate</b>										
4	L	28	28.6	0.039	10.1	LOS A	2	0.52	0.71	47.9
5	T	1	0.0	0.040	8.0	LOS A	2	0.52	0.64	48.7
6	R	17	17.6	0.026	14.6	LOS B	1	0.53	0.77	43.9
<b>Approach</b>		<b>46</b>	<b>23.9</b>	<b>0.039</b>	<b>11.7</b>	<b>LOS A</b>	<b>2</b>	<b>0.53</b>	<b>0.73</b>	<b>46.3</b>
<b>New Line Road N</b>										
7	L	11	9.1	0.275	7.0	LOS A	14	0.19	0.52	49.8
8	T	764	0.0	0.275	5.6	LOS A	14	0.20	0.46	50.9
9	R	17	0.0	0.274	11.4	LOS A	14	0.20	0.65	45.7
<b>Approach</b>		<b>792</b>	<b>0.1</b>	<b>0.275</b>	<b>5.7</b>	<b>LOS A</b>	<b>14</b>	<b>0.20</b>	<b>0.46</b>	<b>50.7</b>
<b>Access Road (5)</b>										
10	L	4	0.0	0.013	14.0	LOS A	0	0.76	0.79	43.3
11	T	1	0.0	0.013	13.0	LOS A	0	0.76	0.77	44.3
12	R	34	0.0	0.059	16.7	LOS B	3	0.79	0.88	41.9
<b>Approach</b>		<b>39</b>	<b>0.0</b>	<b>0.059</b>	<b>16.3</b>	<b>LOS B</b>	<b>3</b>	<b>0.78</b>	<b>0.87</b>	<b>42.0</b>
<b>All Vehicles</b>		<b>2615</b>	<b>24.4</b>	<b>0.760</b>	<b>7.0</b>	<b>LOS A</b>	<b>110</b>	<b>0.34</b>	<b>0.47</b>	<b>49.5</b>

Symbols which may appear in this table:

Following Degree of Saturation

# x = 1.00 for Short Lane with resulting Excess Flow

\* x = 1.00 due to minimum capacity

Following LOS

# - Based on density for continuous movements

Following Queue

# - Density for continuous movement

# Movement Summary

## New Line Road / Access 6

### 2018 AM peak with development

Signalised - Fixed time

Cycle Time = 60 seconds

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>New Line Road S</b>										
1	L	59	0.0	0.734	22.1	LOS B	127	0.85	0.89	37.3
2	T	1316	4.3	0.735	13.9	LOS A	130	0.85	0.79	43.4
3	R	29	0.0	0.147	26.1	LOS B	7	0.76	0.74	34.9
<b>Approach</b>		<b>1404</b>	<b>4.1</b>	<b>0.735</b>	<b>14.5</b>	<b>LOS A</b>	<b>130</b>	<b>0.85</b>	<b>0.79</b>	<b>42.9</b>
<b>Sebastian Drive</b>										
4	L	116	0.0	0.290	29.3	LOS C	29	0.86	0.78	33.2
5	T	1	0.0	0.303	21.1	LOS B	29	0.86	0.69	37.9
6	R	68	0.0	0.160	29.3	LOS C	17	0.85	0.75	33.2
<b>Approach</b>		<b>185</b>	<b>0.0</b>	<b>0.290</b>	<b>29.3</b>	<b>LOS C</b>	<b>29</b>	<b>0.86</b>	<b>0.77</b>	<b>33.2</b>
<b>New Line Road N</b>										
7	L	17	0.0	0.583	19.7	LOS B	93	0.76	0.83	38.9
8	T	1103	1.7	0.584	11.5	LOS A	94	0.76	0.67	45.6
9	R	7	0.0	0.044	29.7	LOS C	2	0.82	0.69	33.0
<b>Approach</b>		<b>1127</b>	<b>1.7</b>	<b>0.584</b>	<b>11.8</b>	<b>LOS A</b>	<b>94</b>	<b>0.76</b>	<b>0.67</b>	<b>45.3</b>
<b>Access Road (6)</b>										
10	L	28	0.0	0.072	28.0	LOS B	7	0.81	0.72	33.9
11	T	1	0.0	0.071	19.8	LOS B	7	0.81	0.59	38.9
12	R	235	0.0	0.692	35.3	LOS C	61	0.99	0.88	30.4
<b>Approach</b>		<b>264</b>	<b>0.0</b>	<b>0.692</b>	<b>34.5</b>	<b>LOS C</b>	<b>61</b>	<b>0.97</b>	<b>0.86</b>	<b>30.8</b>
<b>All Vehicles</b>		<b>2980</b>	<b>2.6</b>	<b>0.735</b>	<b>16.2</b>	<b>LOS B</b>	<b>130</b>	<b>0.82</b>	<b>0.75</b>	<b>41.5</b>

### Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P1	50	23.4	LOS C	0	0.88	0.88
P3	50	10.8	LOS B	0	0.60	0.60
P5	50	23.4	LOS C	0	0.88	0.88

# Movement Summary

## New Line Road / Access 6

### 2018 PM peak with development

Signalised - Fixed time

Cycle Time = 90 seconds

### Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
<b>New Line Road S</b>										
1	L	235	0.0	0.776	19.2	LOS B	207	0.75	0.86	39.2
2	T	1741	2.6	0.775	10.7	LOS A	212	0.74	0.69	46.3
3	R	116	0.0	0.395	19.5	LOS B	28	0.56	0.77	39.0
<b>Approach</b>		<b>2092</b>	<b>2.2</b>	<b>0.775</b>	<b>12.2</b>	<b>LOS A</b>	<b>212</b>	<b>0.73</b>	<b>0.71</b>	<b>45.0</b>
<b>Sebastian Drive</b>										
4	L	29	0.0	0.120	45.3	LOS D	12	0.90	0.73	26.7
5	T	1	0.0	0.120	37.1	LOS C	12	0.90	0.66	29.7
6	R	17	0.0	0.064	45.5	LOS D	7	0.90	0.70	26.6
<b>Approach</b>		<b>47</b>	<b>0.0</b>	<b>0.120</b>	<b>45.2</b>	<b>LOS D</b>	<b>12</b>	<b>0.90</b>	<b>0.71</b>	<b>26.7</b>
<b>New Line Road N</b>										
7	L	68	0.0	0.320	14.9	LOS B	65	0.45	0.76	42.5
8	T	741	5.3	0.321	6.5	LOS A	65	0.45	0.39	50.9
9	R	28	0.0	0.287	36.4	LOS C	11	0.79	0.77	30.0
<b>Approach</b>		<b>837</b>	<b>4.7</b>	<b>0.321</b>	<b>8.2</b>	<b>LOS A</b>	<b>66</b>	<b>0.46</b>	<b>0.44</b>	<b>49.0</b>
<b>Access Road (6)</b>										
10	L	7	0.0	0.031	44.3	LOS D	3	0.88	0.67	27.0
11	T	1	0.0	0.031	36.1	LOS C	3	0.88	0.60	30.1
12	R	59	0.0	0.230	46.9	LOS D	24	0.93	0.75	26.2
<b>Approach</b>		<b>67</b>	<b>0.0</b>	<b>0.230</b>	<b>46.5</b>	<b>LOS D</b>	<b>24</b>	<b>0.93</b>	<b>0.74</b>	<b>26.3</b>
<b>All Vehicles</b>		<b>3043</b>	<b>2.8</b>	<b>0.776</b>	<b>12.3</b>	<b>LOS A</b>	<b>212</b>	<b>0.67</b>	<b>0.64</b>	<b>44.8</b>

### Pedestrian Movements

Mov ID	Dem Flow (ped/h)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate
P1	50	39.2	LOS D	0	0.93	0.93
P3	50	6.8	LOS A	0	0.39	0.39
P5	50	39.2	LOS D	0	0.93	0.93