

LYON GROUP

Seniors Living Development

663 to 667 Old Northern Road and 4 Franlee Road, South Dural

NOVEMBER 2017



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Seniors Living Development

663 to 667 Old Northern Road and 4 Franlee Road, South Dural

Lyon Group

WSP

Level 1, 1 King William Street

Adelaide SA 5000

GPO Box 398

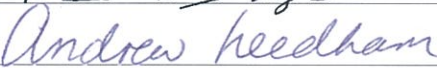
Adelaide SA 5001

Tel: +61 8 8405 4300

Fax: +61 8 8405 4301

wsp.com

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	NAME	DATE	SIGNATURE
Prepared by:	Amol Kingaonkar	29/11/2017	
Reviewed by:	Tom van Drempt	29/11/2017	
Approved by:	Andrew Leedham	29/11/2017	

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ABBREVIATIONS

vpd	Vehicles per day
vph	Vehicles per hour
AADT	Average Annual Daily Traffic
AM peak	Morning Peak hour during 7:00–9:30 am
PM peak	Afternoon peak hour during 4:00–6:00 pm
TMAP	Transport Management and Accessibility Plan

1 INTRODUCTION

The Lyon Group is proposing to develop a seniors living facility on lots Lot 2 DP550819, Lot 3 DP550819, Lot B DP158479, Lot 7 DP231126 and Lot 6 DP231126, from 663, 663A, 665, 667A DDD Old Northern Road and 4 Franlee Road, South Dural (the Study Site). WSP Australia has been commissioned by APP Corporation Pty Limited, on behalf of the Lyon Group to prepare a transport impact assessment (TIA) for the proposed development. These lots currently contain three residences and vacant land.

This report will be submitted to Hornsby Shire Council (Council) in support of a Site Compatibility Certificate (SCC) application.

1.1 SOUTH DURAL TRANSPORT MANAGEMENT AND ACCESSIBILITY PLAN

In October 2013, a planning proposal was submitted to Hornsby Shire Council on behalf of landowners to rezone 240 hectares of land in South Dural for urban residential development. This planning proposal resulted in a Gateway Determination on 12 March 2014. The Gateway Determination summarised the additional work required to precede the rezoning at South Dural.

On 12 September 2016, an application for the rezoning of the land was submitted. WSP prepared a Transport Management and Accessibility Plan in support of the planning proposal for the rezoning on behalf of the South Dural Resident and Ratepayers' Association, including the Folkestone-Lyon Joint Venture. This TMAP

- Assessed the traffic impact of the rezoning site on the surrounding road network.
- Sought to maximise the use of public transport, walking and cycling and reduce reliance on the private car.
- Identified a package of infrastructure and non-infrastructure measures to help manage the travel demand from the development and mitigate the impacts on the surrounding road network.

On 8 February 2017, Hornsby Shire Council halted its evaluation of the proposed rezoning until an infrastructure plan could be prepared that had the support of the NSW Government.

The rezoning proposed a mixture of land uses, mainly including low and medium density residential and open space. The proposed seniors living facility proposed for this application represents a lower-intensity land use from a traffic generation perspective than the land use assessed for the rezoning. The currently proposed development would reduce pressure on the surrounding road network by reducing the total number of trips. The peak period of traffic generation is also likely to occur after the typical AM peak period on the road network.

1.2 DEVELOPMENT LOCATION

The proposed Seniors Living development site is located to the south-east of Old Northern Road intersection with Franlee Road in South Dural, as shown in Figure 1.1. It is located in Hornsby Shire Council area adjacent to its boundary with The Hills Shire Council. It is approximately 34-kilometres north-west of Sydney CBD. The site is 360 metres from Round Corner in the north, and 5.5 km from the Castle Hill Town Centre in the south.



Figure 1.1 South Dural Senior Living Site Location

1.3 SCOPE OF THIS REPORT

This report is structured as follows:

- Section 2 provides an overview of existing transport conditions in the area around the development
- Section 3 details the proposed development
- Section 4 analyses the trip generation of the proposed development as well as the impact of the development on the surrounding road network and on public transport, pedestrians and cyclists
- Section 5 assesses the site access and parking within the site
- Section 6 presents the conclusions of the assessment and lists the recommendations.

2 EXISTING CONDITIONS

The Study Site is located with frontage access to the eastern side of Old Northern Road and southern side of Franlee Road. This section describes the existing transport conditions in order to quantify the potential impacts of the proposed development.

2.1 TRAVEL BEHAVIOUR

The travel behaviour of existing nearby residents varies widely, and the seniors living demographic will have different travel behaviour than other residents. However, mode share and travel direction are useful when considering the proposed development.

TRANSPORT MODE SHARE

The choice of travel mode varies depending on the range of transport services available, car availability, need for predictable arrival, the length of the journey and the reason for travelling. The Journey to Work mode share for trips originating in 2011 Traffic Zones 4558, 4529, 4312, 4546, 4311, 4557, 4310 (covering study site) during the AM peak are shown in Table 2.1. They indicate a typical dominance of trips made by car driver. However, with the opening of the North West Metro Line, improvements to the bus network and pedestrian and cycle infrastructure, this mode share is expected to change in the future.

Table 2.1 AM peak period mode split examples for journey to work trips by residents

TRANSPORT MODE	MODE SHARE
Vehicle driver	82%
Vehicle passenger	6%
Train	3%
Bus	6%
Walked only	1%
Other mode	1%
Mode not stated	1%
Total	100%

Source: Transport for NSW Transport Performance and Analytics, Journey to Work, 2011

DIRECTION OF TRAVEL

The trip distribution for journey to work trips (all modes) in the AM peak to and from the area are listed in Table 2.2. Trips within Baulkham Hills represent the largest share of all destinations/origins (more than one quarter). For trips by residents to work, areas within The Dural and Sydney Inner City are also important.

Table 2.2 Destination and origin council area for commute trips to/from seven Traffic Zones

DESTINATION LGA	% OF TRIPS FROM ZONE
Baulkham Hills	30%
Dural – Wisemans Ferry	17%
Sydney Inner City	7%
Parramatta	5%
Ryde – Hunters Hill	4%
Blacktown	3%

DESTINATION LGA	% OF TRIPS FROM ZONE
Hornsby	3%
Other areas	31%
Total	100%

Source: Transport for NSW Transport Performance and Analytics, 2011 Journey to Work (BTS, 2013), Traffic Zones 4558, 4529, 4312, 4546, 4311, 4557, 4310, all modes

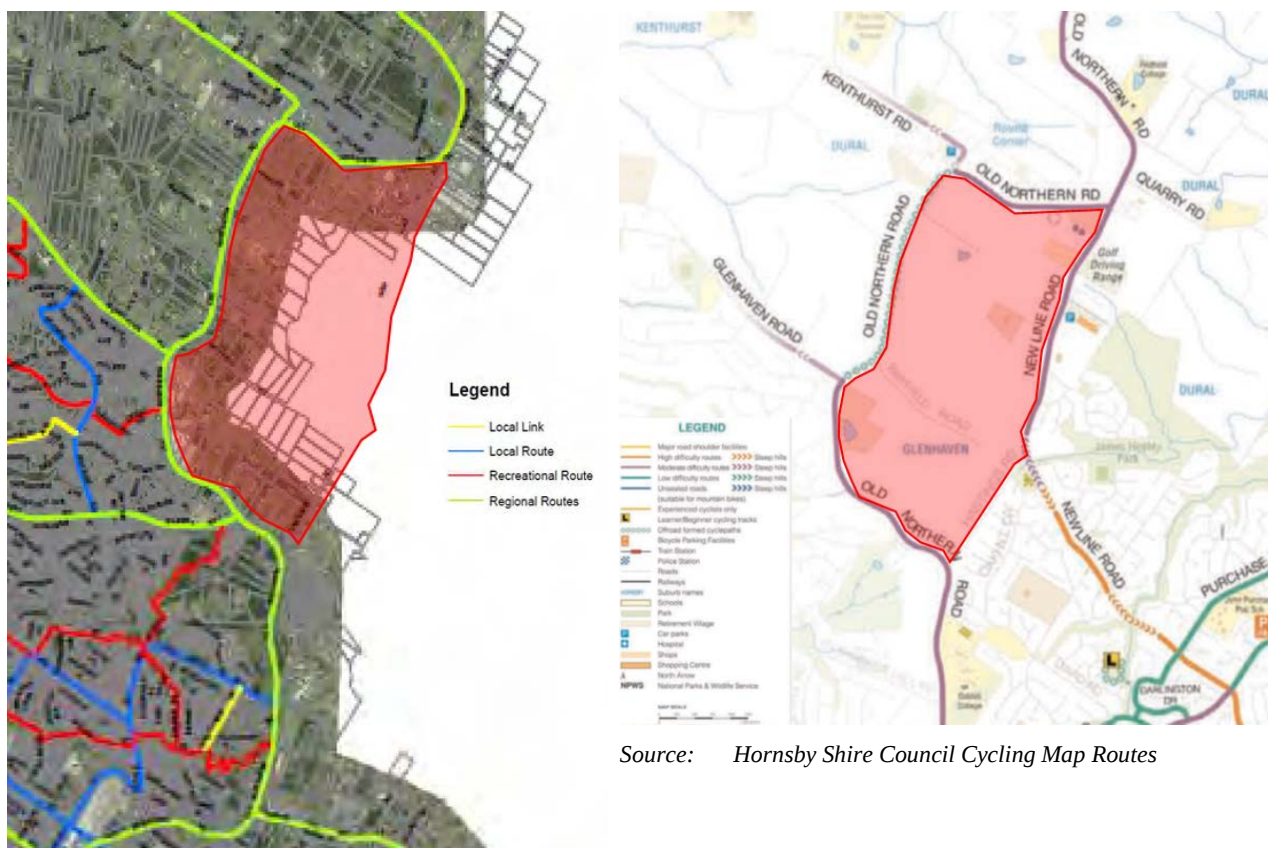
2.2 PEDESTRIANS

The semi-rural nature of the area surrounding the site, means that pedestrian demand is low. As a consequence, pedestrian facilities are currently limited. However, improvements in the pedestrian are planned to increase in the number of walking trips generated by the Site. Existing facilities include:

- Signalised pedestrian crossing at the intersection of Old Northern Road and Kenthurst Road; and
- Shared pedestrian and cycle path on the western and northern side of Old Northern Road.

2.3 CYCLES

An extract from the Hornsby Shire Council Cycling Map 2013 in Figure 2.1, shows the existing routes. The surrounding roads currently have no bike facilities.



Source: Hornsby Shire Council Cycling Map Routes

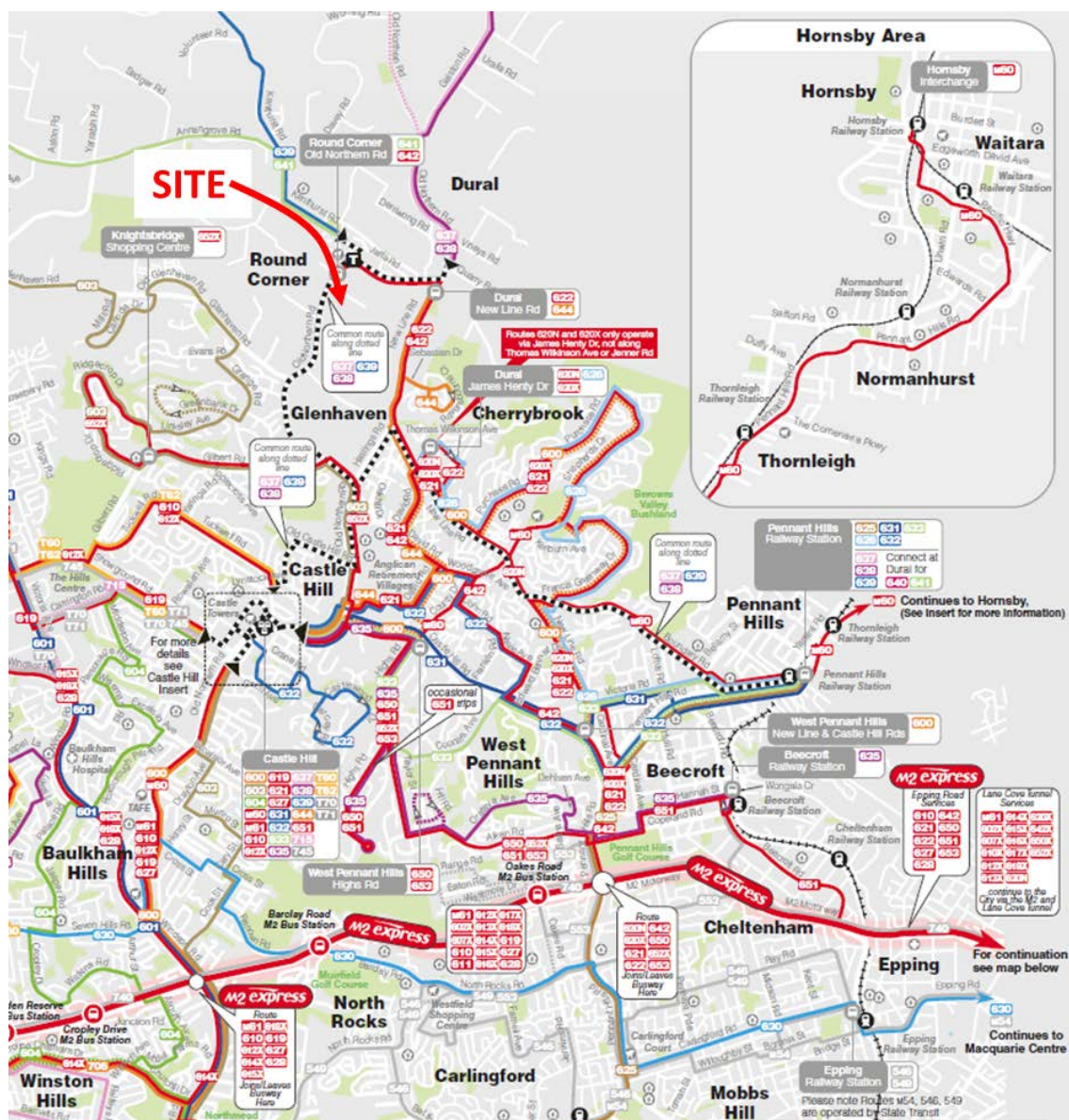
Source: The Hills Shire Council Bike Plan Review, 2009

Figure 2.1 Existing bike route on surrounding road network of the development site

2.4 BUS

The study site is within Region 4 of the Sydney bus network. The Region 4 bus network is shown in Figure 2.4. The development site is located in the less developed rural area, and it is served by three bus routes, 637, 638 and 639 on Old Northern Road. All of these bus routes are operated by Hills Bus Company.

Route 637 runs from Glenorie to Castle Hill via Galston, Round Corner and Rogans Hill, and its occasional peak hour services extend to Pennant Hills Station. Route 638 runs from Castle Hill towards Berrilee via Galston, Round Corner and New Line Road, and its occasional peak hour services operate to Castle Hill. Routes 639 runs from Castle Hill towards Pitt Town Road via Dural, Round Corner and Rogans Hill. These three bus routes all pass by the study site along Old Northern Road. Routes 638 and 639 provide direct connection between the study site and Pennant Hills Station.



Source: Region 4 Bus Network Map Effective 19 February 2017

Figure 2.2 South Dural bus network

Table 2.3 provides an overview of the bus service frequency and operating hours on the surrounding streets.

Table 2.3 Current bus services at surrounding roads of the development site

LINE	DIRECTION	AM PEAK FREQUENCY	PM PEAK FREQUENCY	DAILY SERVICES	FIRST/LAST BUS
637	Glenorie to Castle Hill	30 min	30 min	14	5:28 to 19:43
	Castle Hill to Glenorie	45 min	25 min	15	7:09 to 21:48
638	Berrilee to Castle Hill and Pennant Hills	40 min	35 min	8	6:16 to 17:44
	Castle Hill and Pennant Hills to Berrilee	40 min	60 min	7	7:44 to 18:18
639	Pitt Town Road to Pennant Hills and Castle Towers	30 min	60 min	6	6:20 to 17:07
	Pennant Hills and Castle Towers to Pitt Town Road	-	60 min	4	12:08 to 18:43

Source: TfNSW website, as of October 2017

2.5 RAIL

The closest active railway station to the study site is Pennant Hills Station on the T1 North Shore and Northern Line (shown on Figure 2.3). From the centre of the study site to Pennant Hills Station, the route distance is around 10 km and accessed less than 30 minutes via bus routes 637, 638 and 639. Trains on the T1 line operate between Central and Hornsby, with options to interchange at Epping Station to trains on the T1 Northern Line (via Strathfield) and the Central Coast and Newcastle Line.

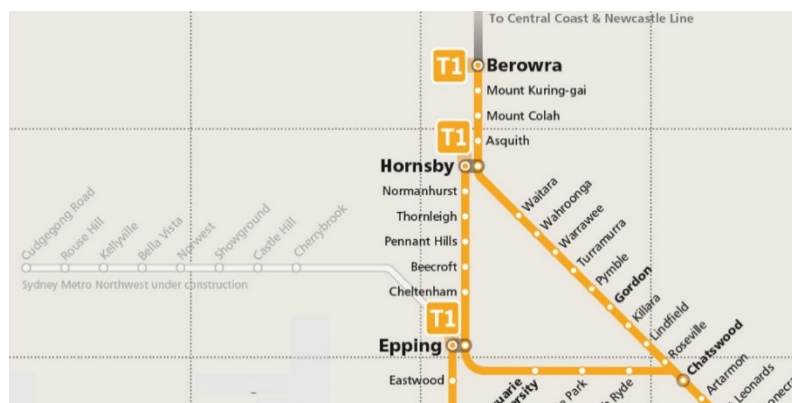


Figure 2.3 Pennant Hills connection to Sydney Trains suburban network

Table 2.4 provides an overview of the train service frequency and operating hours at Pennant Hills Station.

Table 2.4 Train services at Pennant Hills Station

LINE	DIRECTION	AM PEAK FREQUENCY	PM PEAK FREQUENCY	DAILY SERVICES	FIRST/LAST BUS
T1 North Shore and Northern Line	Hornsby to Central	15 min	15 min	73	4:48 to 23:33
	Central to Hornsby	15 min	15 min	71	5:54 to 00:36

Source: Sydney Trains timetable, effective from October 2013

2.6 ROAD NETWORK

The Study Site is circled by main roads including Old Northern Road, New Line Road and Hastings Road. The site is also connected to a wider road network via Old Northern Road, New Line Road, Kenthurst Road, Gilbert Road and Glenhaven Road. The latter three roads are all connected with Old Northern Road. A description of the roads in the study area and their characteristics are shown in Table 2.5.

Table 2.5 Description of key roads in the local network

ROAD NAME	CLASSIFICATION	CARRIAGEWAY	SPEED LIMIT	TRUCK LOAD RESTRICTION	ROLE IN NETWORK
Old Northern Road	Management hierarchy 4U	Undivided one lane in each direction	60 km/h	No restriction	Provides access to the south, west and north of the site
Kenthurst Road	Connector Road	Undivided, one lane each way	60 km/h	8 tonne limit	Connects the northwest of the development site to Kellyville

Notes: Old Northern Road and New Line Road information is from RMS (Last update January 2014). "Schedule of Classified Roads and State & Regional Roads" <http://www.rms.nsw.gov.au>. 2. Information of other roads is from Street Directory

DAILY TRAFFIC VOLUMES

Roads and Maritime Services collects traffic volume data at a number of locations on the arterial road network, including on Old Northern Road and New Line Road near the site. Table 2.6 shows the daily traffic volume and percentage of heavy vehicles at the Old Northern Road site, while Figure 2.4 shows the weekday hourly profile of traffic in each direction.

Table 2.6 2016 Average Daily Traffic volume on Old Northern Road, south of Malabar Road

DIRECTION	DAILY TRAFFIC VOLUME	PERCENTAGE OF HEAVY VEHICLES	
Northbound	9,496	6.82%	
Southbound	8,475	5.36%	
Combined	17,971	6.13%	

Source: Roads and Maritime Services Traffic volume viewer, 2016

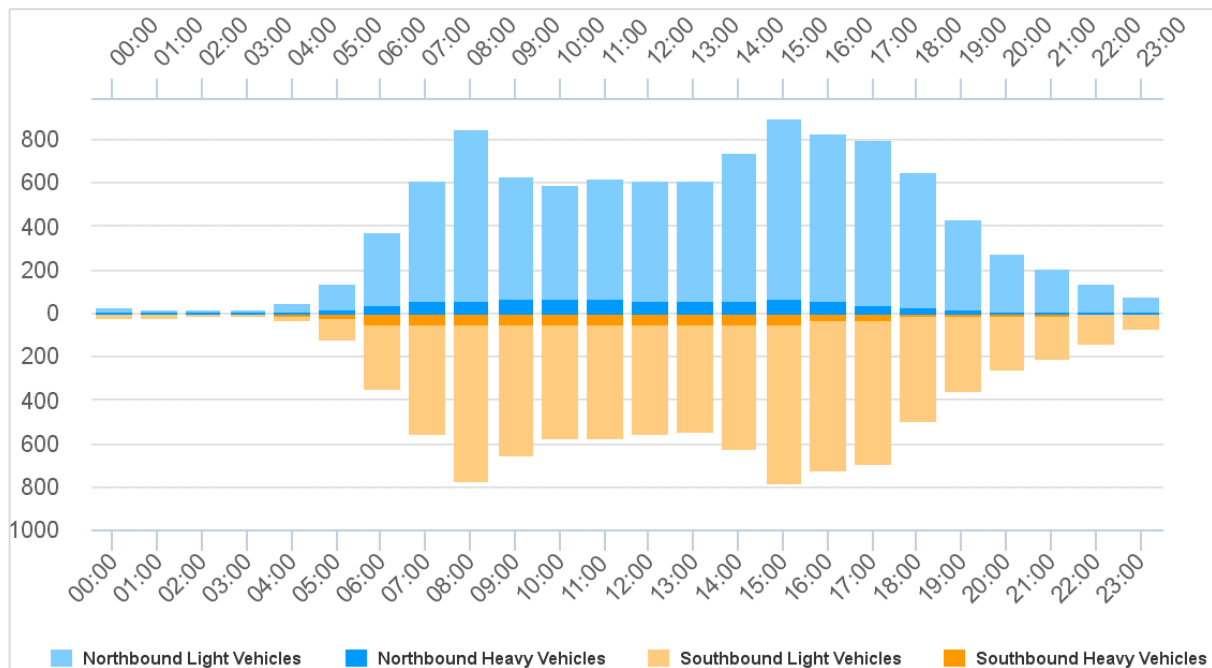


Figure 2.4 Hourly profile of traffic on Old Northern Road, south of Malabar Road

The hourly pattern shows a balanced peak in traffic in each direction in both the AM and PM peak periods. The PM peak is more protracted, while the AM peak is relatively short.

PEAK HOUR TRAFFIC VOLUMES

Traffic surveys undertaken as part of TMAP study on Wednesday 6 April 2016 between 6:30 am and 9:30 am during the AM peak and 3:00 pm to 7:00 pm during the PM peak at the intersections listed below were referenced for this assessment. The results of the surveys are included in Appendix A:

- Old Northern Road and Kenthurst Road
- Old Northern Road and New Line Road.

Figure 2.5 and Figure 2.6 show the intersection turning movement volumes in vehicle per hour (vph) during the analysed AM and PM peak hour respectively. These are considered representative of the existing volumes for the assessment of the existing conditions and model calibration.

TRAFFIC NETWORK OPERATION

The performance of each of the following intersections was assessed under existing conditions:

- Old Northern Road and Kenthurst Road
- Old Northern Road and Franlee Road.

The analysis was undertaken using the SIDRA Intersection software package. This package provides several parameters to determine the level of intersection performance. Explanations of the criteria used are provided in Appendix B.

Typically acceptable intersection performance is defined as follows:

- LoS D or better (the worst case scenario of vehicle delay was less than or equal to 56 seconds)
- Degree of Saturation (DoS) less than equal to 0.8 at priority controlled intersection, and 0.90 at a signalised controlled intersection
- 95th percentile back of queue does not interfere with other traffic movements.

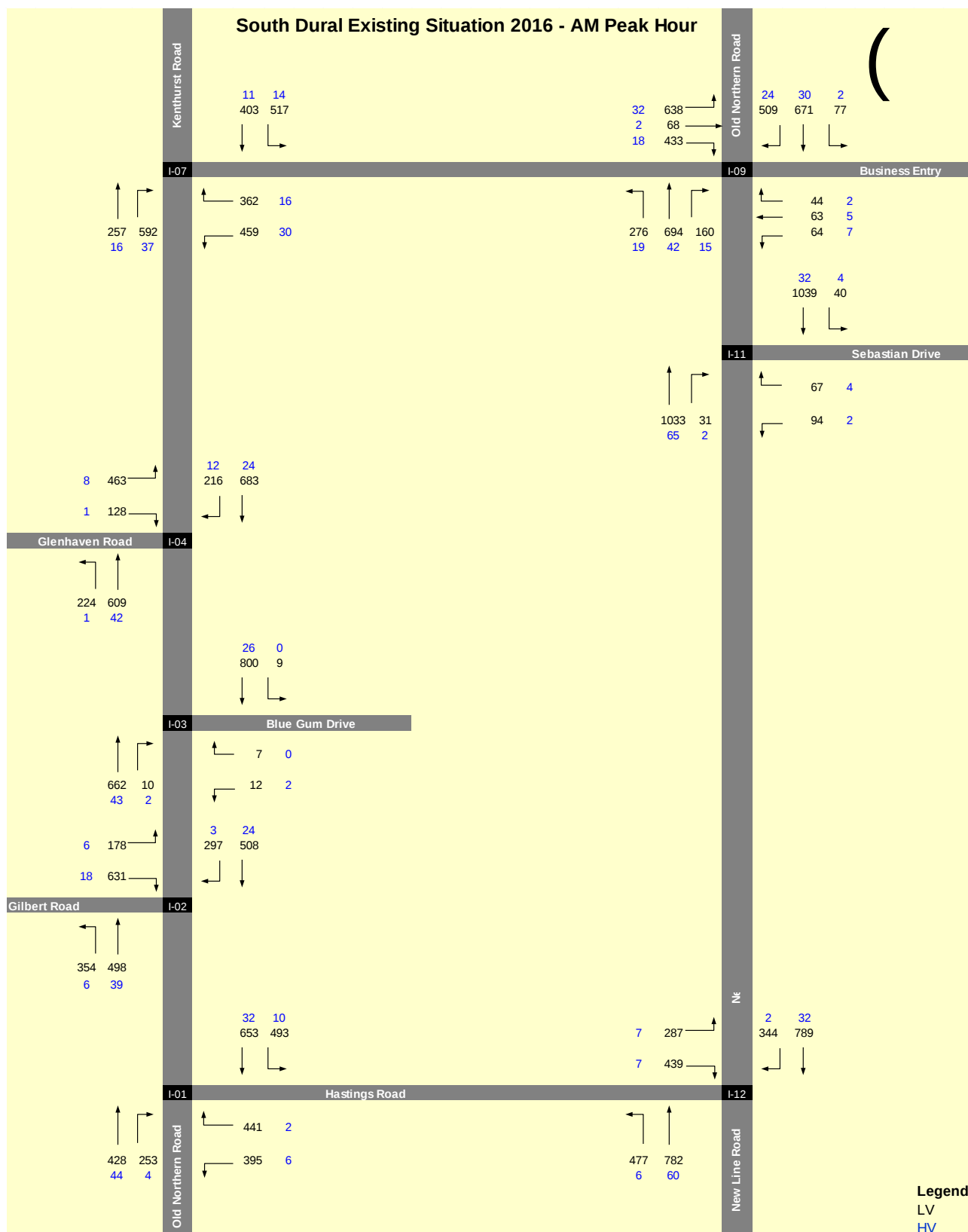


Figure 2.5 Existing AM peak hour (7:45 am to 8:45 am) intersection turning volumes – Year 2016

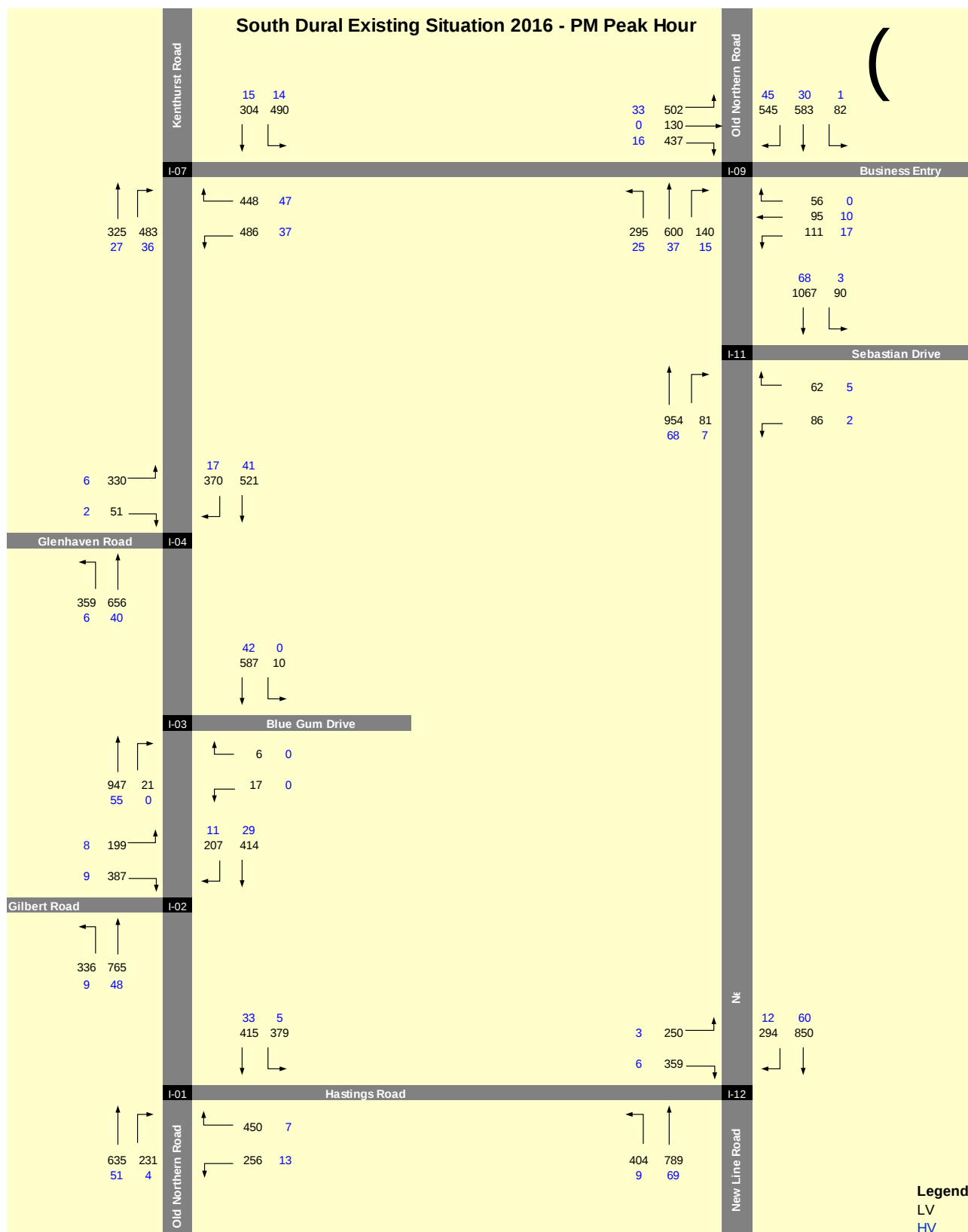


Figure 2.6 Existing PM peak hour (3:00 pm to 4:00 pm) intersection turning volumes – Year 2016

The performance of each of the key intersections was analysed for existing year 2016. The assessment of existing intersection performance was based on the existing surveyed traffic volumes for the AM and PM peak periods shown in Figure 2.5 and Figure 2.6. The results from the analysis are presented in Table 2.7. SIDRA model output containing more detail is provided in Appendix C.

Table 2.7 Summary of existing intersection performance – 2016 volumes

SITE ID	INTERSECTION	PEAK PERIOD	DEGREE OF SATURATION	AVERAGE DELAY (S)	LEVEL OF SERVICE	95 TH PERCENTILE QUEUE (M)
I-01	Old Northern Road and Kenthurst Road	AM	0.98	34	C	249
		PM	0.97	30	C	224
I-2	Old Northern Road and Franlee Road	AM	0.51	50	A	2
		PM	0.50	42	C	1

Both intersections are operating at an acceptable level of service.

3 PROPOSED DEVELOPMENT

The consolidated site has a total area of 116,279 m². The five land parcels are zoned as rural landscape (RU2) as part of the Hornsby Local Environmental Plan 2013.

3.1 DEVELOPMENT PROPOSAL

The proposed development site is anticipated to have a total of 62,178 m², including:

- 8,100 m² Residential Care Facility (RCF) with 130 beds;
- 45 free-standing seniors living houses (approximately 9,900 m²); and
- 44,178 m² apartments.

Based on similar facilities, it has been estimated that there would be 491 apartments within the space allocated. homes and 130 high-care residential aged care facilities, as outlined in Figure 3.1 and Table 3.1 outline the number and location of dwellings and beds.



Figure 3.1 Development Layout (for information only)

Table 3.1 Estimated development yields in Study Site

	AREA (M ²)	NUMBER OF DWELLINGS/BEDS
Apartment	44,178	491
House	9,900	45
RACF	8,100	130
Total (excludes green area to the east)	62,178	646

3.2 STREET LAYOUT

The proposed road layout is shown in Figure 3.1. It consists of:

- Two access T-intersections on Franlee Road
- Main loop street between these two accesses
- Minor streets connected to the main loop street
- Pedestrian access to Old Northern Road at Franlee Road and from a turning area in the south-west corner, but vehicle access only via the Old Northern Road/Franlee Road intersection.

The roads within the development would be designed based on the requirements of Hornsby Shire Council Development Design Specification 0041 Geometric Road Layout (July 2016), where applicable.

The street network has been designed to:

- Locate the first access intersections on Franlee Road a sufficient distance away from Old Northern Road to avoid westbound queuing from blocking the intersection. The distance of approximately 55 m is longer than the forecast queue length; and
- Avoid closely spaced staggered T-intersections within the development (minimum 40 m between centerlines).

The main loop street would be designed to facilitate two-way flow with some on-street parking (7.5 m carriageway).

The minor streets would be designed with a narrower carriageway to reduce speeds to assist with pedestrian safety (5.5 m carriageway).

3.3 ACCESS

Vehicle access into the Site will be via Franlee Road and the existing intersection with Old Northern Road. From Franlee Road, access would be via two T-intersections. Streets and driveways to apartments and RCF would be able to be accessed by service vehicles such as fire tankers, ambulances and bushfire tankers.

Pedestrian access would be via a new footpath on the southern side of Franlee Road and the eastern side of Old Northern Road. Streets within the development would have a footpath on one or both sides.

It is proposed that the intersection of Old Northern Road and Franlee Road would be upgraded to traffic signals, enabling a signalized pedestrian crossing to the shared footpath and cycleway and the northbound bus stop on the western side of Old Northern Road.

3.4 PARKING

Parking for houses and apartments within the development would be provided on the basis of the following rates from State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004.

Houses:¹

- Two spaces per three self contained houses plus one visitor space for every five houses.

¹ Ku-ring-gai Development Control Plan (2016)

Apartments:

- 0.5 car spaces for each bedroom where the development application is made by a person other than a social housing provider, or one car space for each five dwellings where the development application is made by, or is made by a person jointly with, a social housing provider.

RCF:

- One parking space for each 10 beds in the residential care facility, and
- Visitor spaces of 0.5 spaces per bedroom for the residential care facility;
- One parking space for each two persons to be employed in connection with the development and on duty at any one time, and
- One parking space suitable for an ambulance.

On-street visitor parking would generally be provided in 90 degree parking bays.

Parking would be designed in accordance with *Australian Standard AS2890.1-2004 Parking Facilities Part 1 Off-street car parking*. Loading facilities would be required for the RCF, designed to the requirements of *Australian Standard AS2890.2-2002 Parking Facilities Part 2: Off-street commercial vehicle facilities*.

4 TRANSPORT IMPACT ASSESSMENT

The residential development will result in an increase in trips over the existing land uses. This section estimates the amount of additional travel and assesses its impact on the transport network.

4.1 TRIP GENERATION

Roads and Maritime Services *Technical Direction TDT2013/04a Guide to Traffic Generating Developments Updated traffic surveys (Appendix C1 – Seniors Living)* was used as the basis of the trip generation estimate for the proposed development. Of the twelve sites surveyed in the Roads and Maritime document, Site SH3 (*Courtlands Village* in North Parramatta) was considered to most closely match the proposed development at South Dural. These figures were used to estimate vehicular trip generation during morning and afternoon peak hours. The Roads and Maritime trip generation rates used for estimating traffic from the proposed seniors living development are summarised in Table 4.1 below.

Table 4.1 Roads and Maritime Trip Generation rates

PARAMETER	RELEVANT VALUE (SITE SH3)
Total Units	276
No. of occupied Units	264
Daily Trip Rate (vpd)	1.44
Site Peak Hour Trip Rate (vpd)	0.23
PM Peak Hour Trip Rate (vpd)	0.05

As described in the Roads and Maritime Technical direction, the seniors living sites surveyed did not have morning peak hour coinciding with that of the wider road network. The seniors living sites were observed to have peak traffic generation after 9:00 am.

The forecasts presented below in Table 4.2 outline the expected vehicle movements during this sole peak period. There is a significantly greater number of vehicle movements in Site #1 during this period than in the peak period of the wider network.

Table 4.2 Trip generation forecasts for proposed development

	NO. OF OCCUPIED UNITS	SITE PEAK HOUR TRAFFIC (VPH)	ASSUMED AM PEAK HOUR TRAFFIC (VPH)*	PM PEAK HOUR TRAFFIC (VPH)	WEEKDAY DAILY TRAFFIC (VPD)
Apartment	470	108	54	24	677
House	44	10	5	2	63
RACF	125	29	15	6	180
Total	639	147	74	32	920

Notes * AM peak hour traffic = 50% of Site Peak Hour Traffic

Adopting a conservative approach, it was assumed that 50% of Site peak hour traffic will be generated during the morning peak hour of the network.

4.2 TRIP DISTRIBUTION

The trip directions listed in Table 2.2 were adjusted for trip purposes for other than commuting using the TfNSW Household Travel Survey (HTS). The adjusted trip directions for total trips are summarised in Table 4.3 below.

Table 4.3 Assumed trip directions based on HTS and JTW

DIRECTION	RESIDENTIAL HTS
West	5.0%
North-West	35.0%
North	7.5%
North-East	5.0%
East	5.0%
South-East	5.0%
South	30.0%
South-West	5.0%
Internal	2.5%
Total	100.0%

The Roads and Maritime Technical Direction did not provide any guidance regarding directional split of development traffic. The proposed Seniors Living development was assumed to have the directional split in Table 4.4.

Table 4.4 Directional Split for Development Generated Traffic

	ENTERING TRAFFIC	DEPARTING TRAFFIC	TOTAL
AM peak	20%	80%	100%
PM peak	80%	20%	100%

4.3 MODE CHOICE

The North West Metro Line (currently under construction) and the associated bus service changes are expected to provide good levels of access public transport services in the future. This combined with plans for improved pedestrian facilities to Round Corner and bus services/cycle paths to Castle Hill, is expected to result in lower levels of car usage than the existing semi-rural residences.

Given proximity of Round Corner Shopping Centre (approximately 400 m from the development), it is anticipated that a significant number of the trips from the development will be on foot (pedestrian trips) and on public transport (bus service). For those residents maintaining a licence and vehicle, visitors and staff, there will also be some private vehicular trips generated by the development.

Roads and Maritime survey data indicated that some of the seniors living developments had up to 10 weekly bus services resulting in up to 2 services on a day. In other words a morning service (to drop off) and an afternoon service (pick up). For this development, access to the public bus network is assumed to facilitate a similar level of bus use. Therefore, the traffic generation rates from the Roads and Maritime Technical Direction were considered appropriate.

4.4 TRIP ASSIGNMENT

The traffic volume estimated for the development was assigned to the road network assuming one access to Old Northern Road and the trip directions in Table 4.3. Traffic heading south-west, south and south-east was assumed to turn left out of Franlee Road. Similarly, traffic heading in other directions (north-west, north, north-east, east) was assumed to turn right out of Franlee Road.

Trips generated from the proposed development were assigned to key intersections within immediate vicinity of the development site. These key intersections include:

- Franlee Road/Old Northern Road
- Kenthurst Road/Old Northern Road.

Comparing these volumes to the observed volume of traffic on Old Northern Road, it was assessed that the morning and afternoon peak hour traffic from the development would contribute less than 0.5% of observed peak hour traffic on the road network. As such, other nearby intersections such as Glenhaven Road/Old Northern Road and New Line Road/Old Northern Road are unlikely to experience adverse impacts from the development.



Figure 4.1 Development Traffic Assignment

4.5 FINDINGS AND MITIGATION MEASURES

A preliminary analysis was undertaken using SIDRA 7.0 intersection software. Traffic survey data and forecast future base case traffic forecasts from previous South Dural TMAP study was used as basis data for this assessment.

4.5.1 FUTURE WITHOUT DEVELOPMENT

The South Dural TMAP report indicated that, by 2036 the majority of the road network surrounding the proposed development will require upgrading in one or both directions regardless of whether the development proceeds. The proposed development, representing 0.5% of through traffic on Old Northern Road is not expected to materially change the timing of these upgrades.

The South Dural TMAP assessment assumed upgrading of Old Northern Road and New Line Road to two lanes in each direction, which improves the performance of many intersections. However, this is not sufficient in some locations, where additional upgrades are required. Table 4.5 shows the performance of the intersection of Old Northern Road and Kenthurst Road with the road widening with and without upgrading.

Table 4.5 Summary of 2036 future without development intersection performance with road widening

SITE ID	INTERSECTION	PEAK PERIOD	DEGREE OF SATURATION	AVERAGE DELAY (S)	LEVEL OF SERVICE	95 TH PERCENTILE QUEUE (M)
I-01	Old Northern Road and Kenthurst Road	AM	1.26	123	F	819
		PM	1.06	58	E	441
I-01	Old Northern Road and Kenthurst Road (with upgrades due to background traffic growth)	AM	0.90	24	B	138
		PM	0.91	28	B	195

Source: South Dural TMAP report

The intersection of Old Northern Road and Kenthurst Road is likely to require upgrades by 2036 to meet the background traffic demand without the proposed development.

4.5.2 FUTURE WITH SENIORS LIVING DEVELOPMENT

SIDRA Modelling analysis was undertaken to assess impact of development generated traffic on the surrounding road network. The scenarios shown in Table 4.6 were assessed.

Table 4.6 SIDRA Modelling Scenarios

YEAR	WITHOUT SENIORS LIVING DEVELOPMENT (BASE CURRENT AND FUTURE BACKGROUND)		WITH SENIORS LIVING DEVELOPMENT, NO UPGRADES		WITH SENIORS LIVING DEVELOPMENT AND UPGRADES	
	AM PEAK	PM PEAK	AM PEAK	PM PEAK	AM PEAK	PM PEAK
2016	✓	✓	✓	✓	✓	✓
2026	✓	✓	✓	✓	✓	✓

The results of the SIDRA Intersection modelling are summarised in Table 4.7. The indicate that the intersection of Old Northern Road and Franlee Road can operate well with the installation of traffic signals.

Table 4.7 SIDRA Modelling Result Summary – 2026

SITE ID	INTERSECTION	PEAK PERIOD	DEGREE OF SATURATION	AVERAGE DELAY (S)	LEVEL OF SERVICE	95 TH PERCENTILE QUEUE (M)
I-01	Old Northern Road and Kenthurst Road (with upgrades due to background traffic growth)	AM	0.98	40	C	365
		PM	0.92	28	B	208
I-02	Old Northern Road and Franlee Road (upgraded to signal)	AM	0.81	13	A	110
		PM	0.94	23	B	156

The proposed layout of the intersection of Old Northern Road and Franlee Road is shown in Figure 4.2.

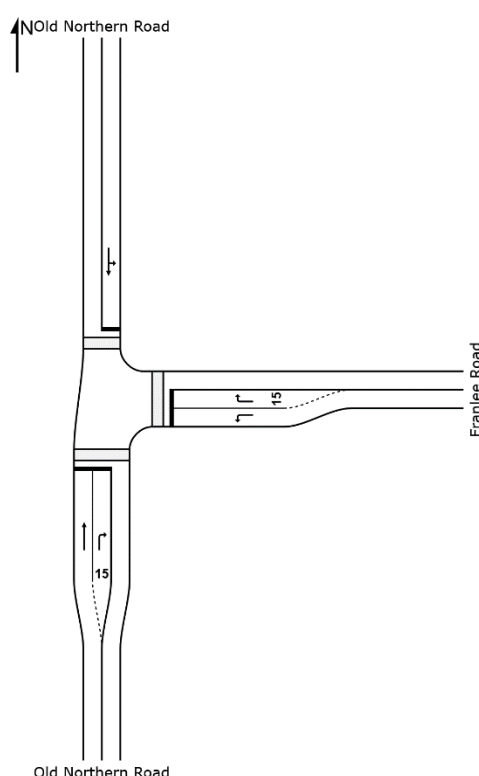


Figure 4.2 Proposed intersection layout before Old Northern Road upgrade

4.5.3 TRAFFIC SIGNAL WARRANT ANALYSIS

The upgrade of the Franlee Road intersection to traffic signals requires the approval of Roads and Maritime based on warrants. The Roads and Maritime Publication, *Traffic Signal Design (v1.4 published 17 January 2011)* was used as the basis for an assessment of whether this intersection meets the warrants asses. This publication states that a signalised intersection may be considered if one of the four warrants are met. Signal warrant (b) Continuous traffic requires:

For each of four one-hour periods of an average day,

- (i) *The major road flow exceeds 900 vehicles/hour in each direction; and*
- (ii) *The minor road flow exceeds 100 vehicles in one direction; and*
- (iii) *The speed of traffic on the major road or limited sight distance from the minor road causes undue delay or hazard to the minor road vehicles; and*

(iv) There is no other nearby traffic signal site easily accessible to the minor road vehicles

Franlee Road is a no-through road with a cul-de-sac at its eastern end. The proposed development will have two access points off Franlee Road however, no other nearby traffic signal will be accessible for residents and visitors to the proposed development.

Observed traffic volumes on Old Northern Road as part of TMAP assessment were:

- 900 vehicles in both direction south of Kenthurst Road intersection during AM peak
- Traffic volume on Old Northern Road exceeded 900 per hour for three hour during starting 7:45 am
- Applying a 2% background traffic growth rate, in 2021 a four hour period in the morning starting at 7:30 am was estimated to have 900 vehicles in at-least one direction along Old Northern Road passing through Franlee Road intersection.

While the proposed development traffic using Franlee Road is unlikely to exceed 100 vehicles during morning peak period, it is estimated using the results of the SIDRA Modelling that delays to traffic exiting Franlee Road will exceed 55seconds resulting in a LOS E by year 2021. It is therefore recommended that signalisation of the intersection be considered by the latter of 2021 or to suit the timeframe of the opening of the development.

The traffic signals are also proposed to assist the senior residents to safely cross Old Northern Road to access the northbound bus stop and the footpath on the western side. Given the speed and volume of traffic on Old Northern Road, and the potential for mobility impairment for the residents, there would be safety concerns for other options such as a pedestrian refuge.

Given the type of development (seniors living), lack of alternative access (Franlee Road – no through road), the signalisation of the intersection of Old Northern Road with Franlee Road is recommended based on special considerations as well as the traffic signal warrants.

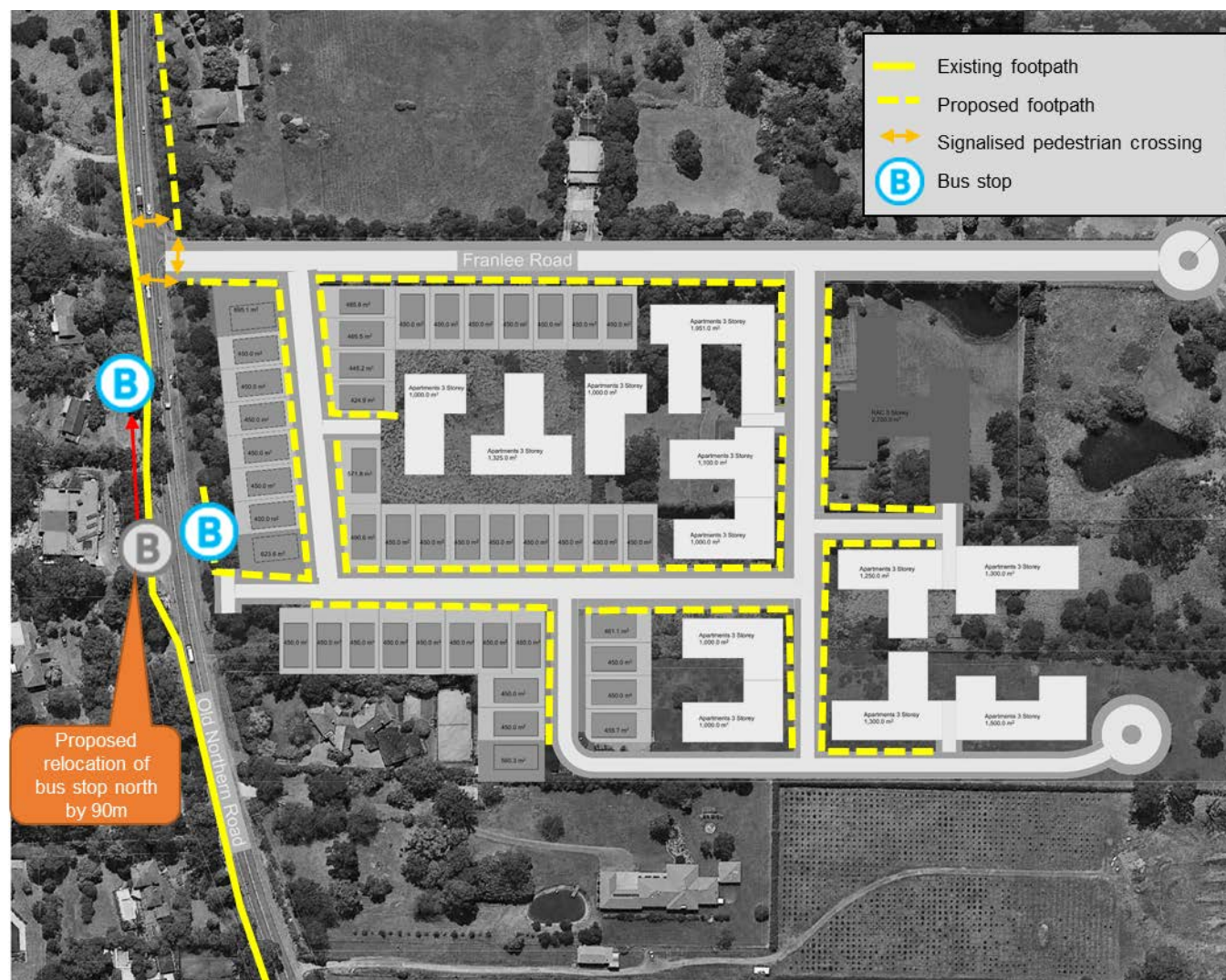
5 PEDESTRIAN AND PUBLIC TRANSPORT ACCESS

Access to the Study Site is consistent with the principles of the TMAP. On-site parking is proposed for residents and visitors. This section outlines the parking and assesses arrangements of the proposed development.

5.1 PEDESTRIANS

The pedestrian network includes footpaths to connect residences to each other and the network along Old Northern Road. Improvements to the network on Old Northern Road are also proposed to connect the Study Site to the Round Corner Shopping Centre. These improvements include:

- A footpath along the eastern side of Old Northern Road to the signalised intersection with Kenthurst Road (subject to confirmation of gradients).
- Signalised pedestrian crossings at the intersection of Old Northern Road and Franlee Road for traffic and pedestrian safety.



Base Image Source: APP and Calder Flower Architects, 2017

Figure 5.1 Proposed pedestrian and public transport network

5.2 BUSES

Bus stops exist on both sides of Old Northern Road served by bus routes 637, 638 and 639. These bus routes operate along Old Northern Road near the site on their way between Castle Hill and Glenorie, Galston, Round Corner, Rogans Hill, Pennant Hills Station (occasional), Berrilee and Dural. To improve the accessibility of the site to these services, and to improve pedestrian safety, the following changes are recommended.

- Southbound stop (ID 215821) located near Site, consisting of a bus stop sign attached to a pole. Proposed to be connected to the Site footpath network with an upgrade of facilities to include a concrete pad for embarking/disembarking low floor accessible buses and a shelter.
- Northbound stop (ID 215812) has concrete pad and shelter. However, to move it closer to the new traffic signals at Franlee Road, it is proposed to move the stop north by 90 metres. This would reduce the risk that a passenger/pedestrian will attempt to cross Old Northern Road away from the signalized crossing.

These changes are also shown on Figure 5.1.

The proposed bus stop relocation is subject to agreement with Transport for NSW and The Hills Shire Council. The location has been proposed to avoid moving it too close to the next stop at Round Corner. The location of the southbound stop is suitable provided direct footpath access can be provided to the Site.

6 CONCLUSIONS

WSP has undertaken a traffic assessment to support a Site Compatibility Certificate application for the proposed seniors living development within the South Dural precinct. The study has concluded that existing transport infrastructure will be able to cater the development traffic in short term – until year 2021. However, improved transport facilities will be required to facilitate access to the proposed development for vehicles and pedestrians. These include:

- The proposed upgrading of the intersection of Old Northern Road and Franlee Road to traffic signals to match the timeframe of the opening of the development or by 2021 (the latter of).
- The relocation of the northbound bus stop (ID 215812) to move it closer to the newly signalised intersection with Franlee Road and the installation of a concrete pad for embarking/disembarking low floor accessible buses and a shelter at the southbound stop (ID 215821).
- A new footpath on the eastern side of Old Northern Road from Franlee Road to the intersection with Kenthurst Road.

In addition, it is recommended that the development have:

- Parking rates based on the requirements of State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004.
- Parking spaces designed to comply with the requirements of:
 - Australian Standard AS2890.1-2004 Parking Facilities Part 1 Off-street car parking; and
 - Australian Standard AS2890.6-2009 Parking Facilities Part 6 Off-street car parking for people with disabilities.
- Streets within the proposed development site shall be designed to comply with the requirements of:
 - Hornsby Shire Council DCP
 - Hornsby Shire Council Civil Works Specification (AUS-SPEC)
 - Austroads Road Design Guide
 - Australian Standard AS2890.5: On-street parking.
- All internal streets and intersections designed to permit NSW Fire Brigade aerial appliances, Hornsby Shire Council's nominated garbage truck and ambulances.

APPENDIX A

TRAFFIC SURVEYS



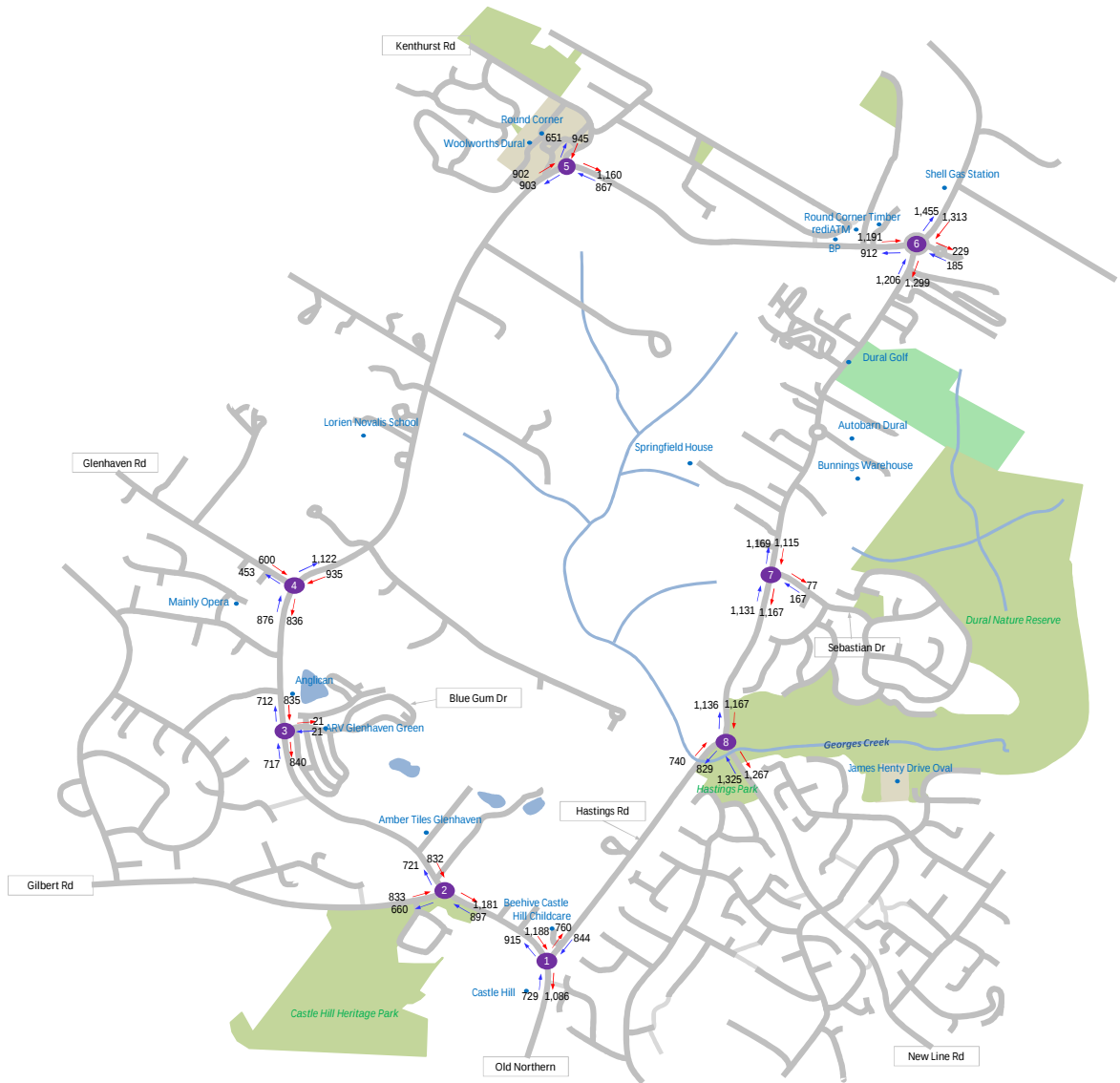
South Dural - Traffic Flows



Search By Time and Classification

AM / PM	Start Time	End Time	Classification
AM	7:45	8:45	All Vehicles

1 Site No.



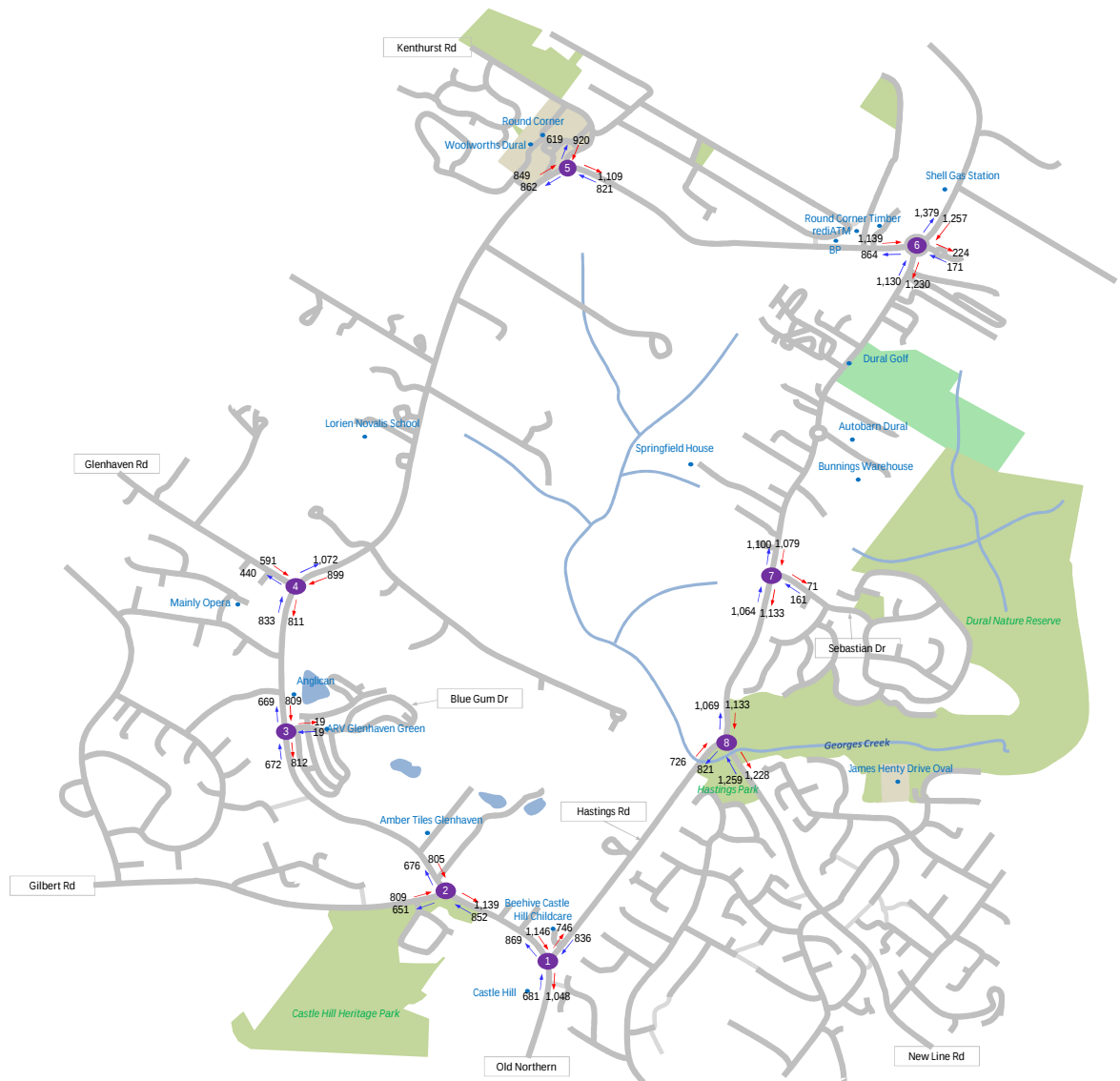
South Dural - Traffic Flows



Search By Time and Classification

AM / PM	Start Time	End Time	Classification
AM	7:45	8:45	Cars

1 Site No.



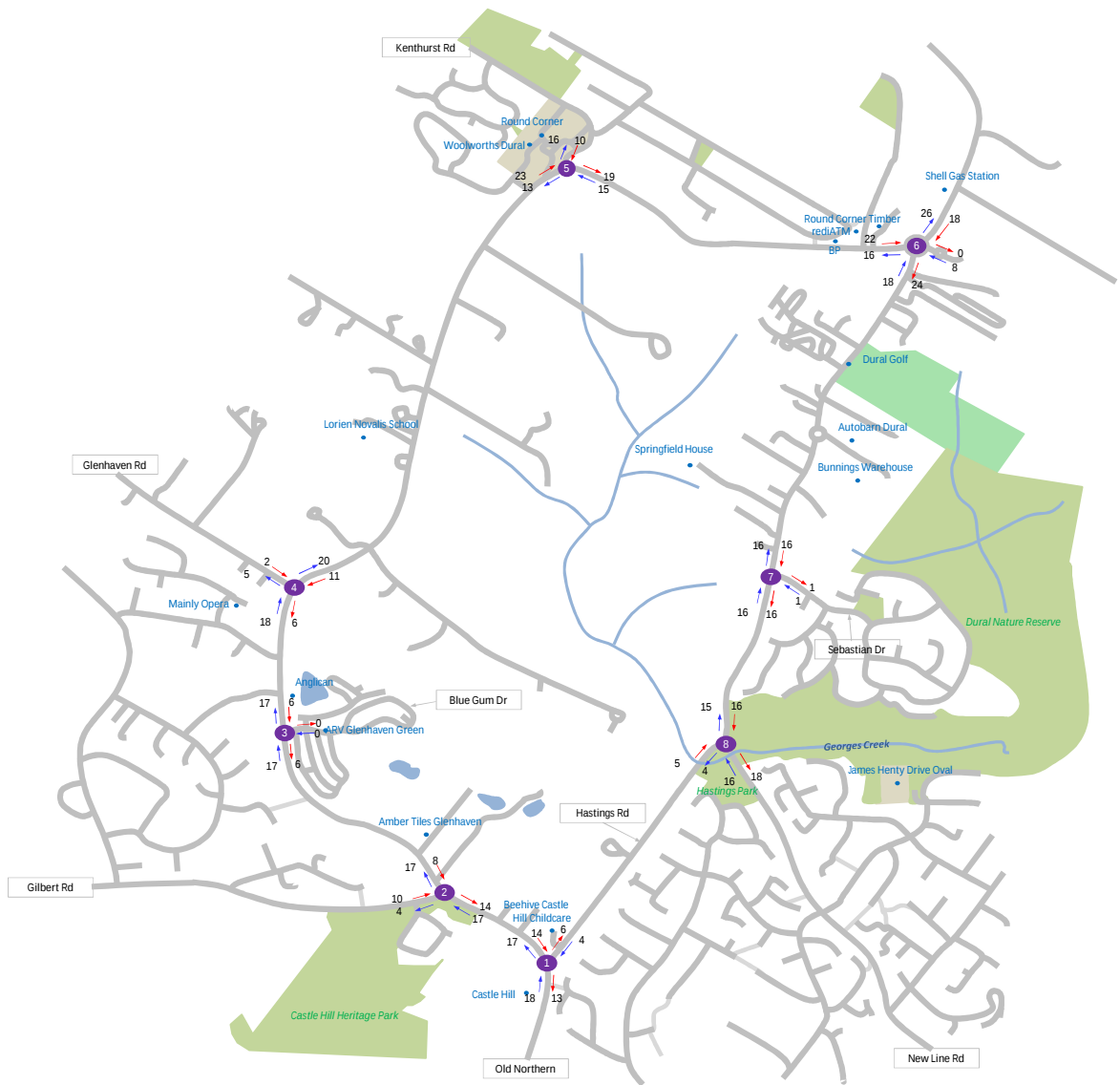
South Dural - Traffic Flows



Search By Time and Classification

AM / PM	Start Time	End Time	Classification
AM	7:45	8:45	Buses

1 Site No.



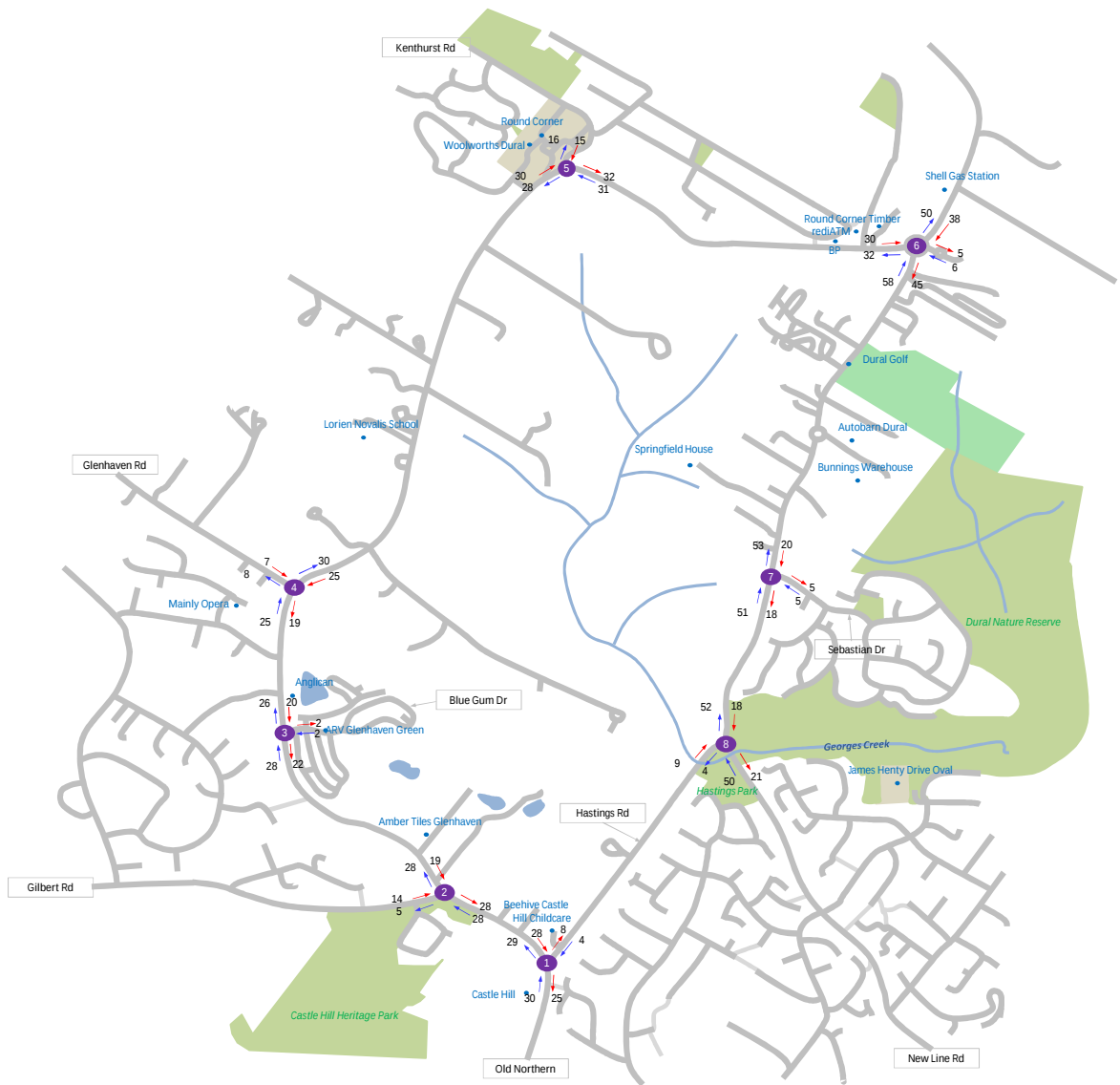
South Dural - Traffic Flows



Search By Time and Classification

AM / PM	Start Time	End Time	Classification
AM	7:45	8:45	Trucks

1 Site No.



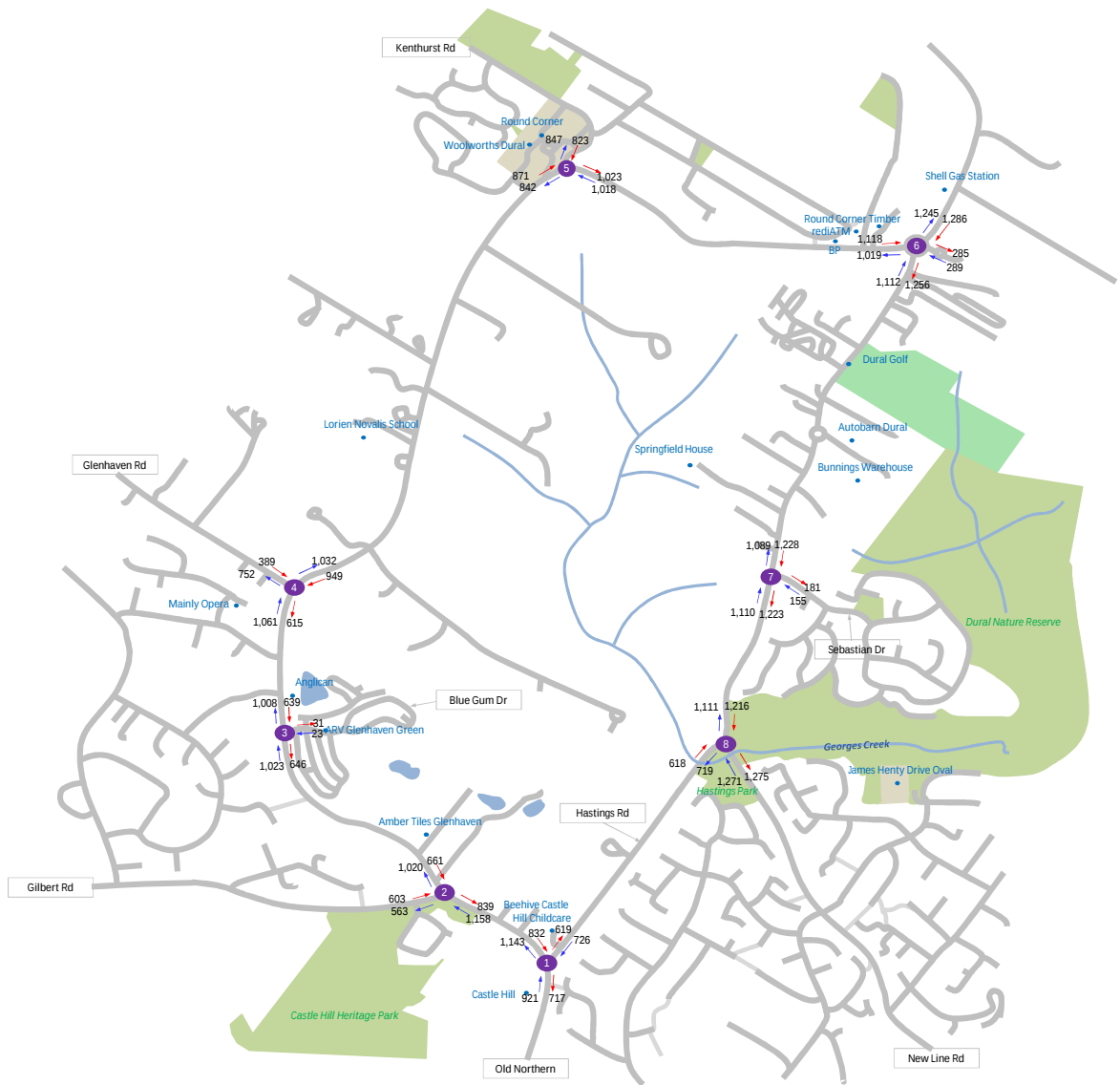
South Dural - Traffic Flows



Search By Time and Classification

AM / PM	Start Time	End Time	Classification
PM	15:00	16:00	All Vehicles

1 Site No.



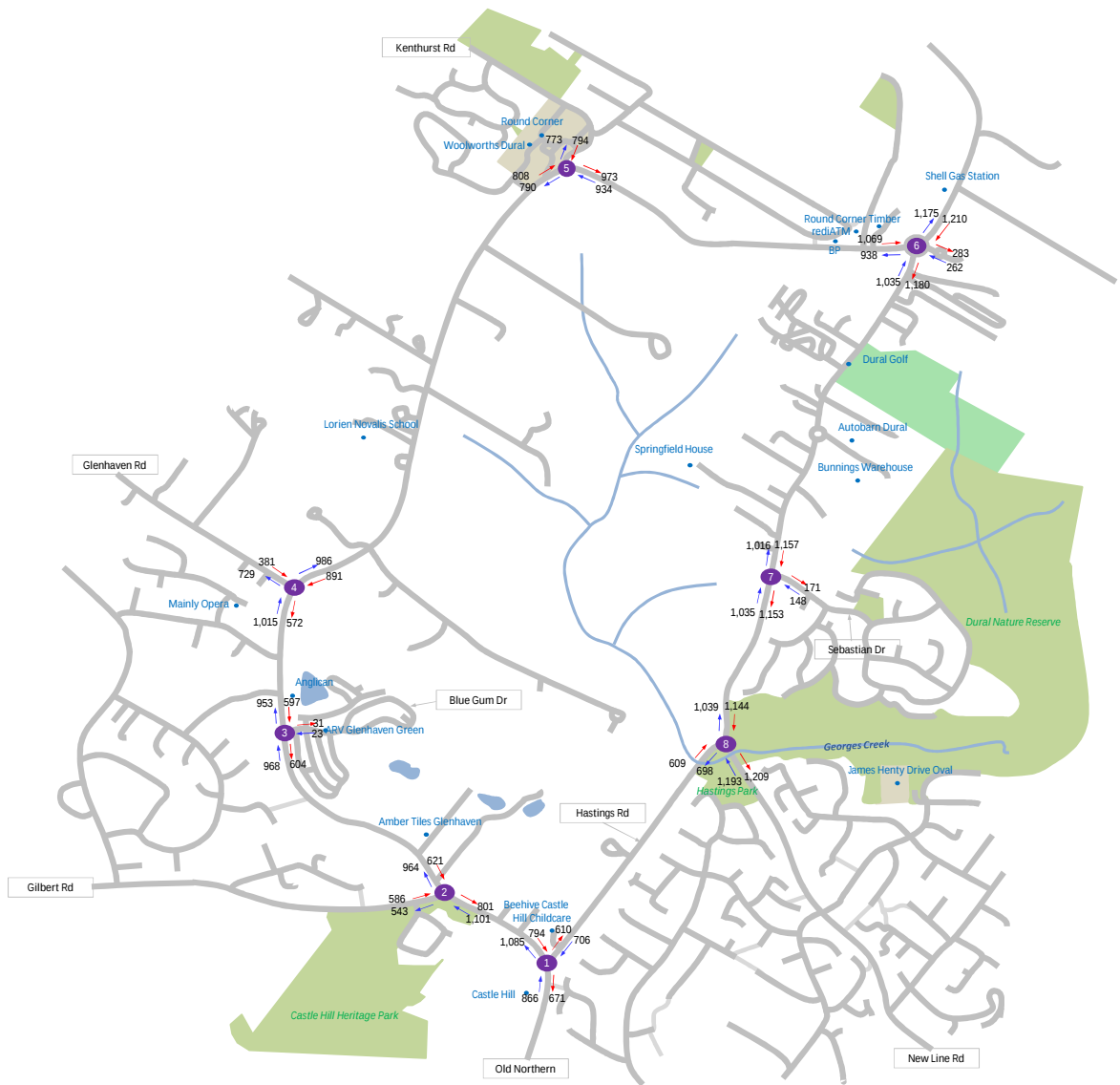
South Dural - Traffic Flows



Search By Time and Classification

AM / PM	Start Time	End Time	Classification
PM	15:00	16:00	Cars

1 Site No.



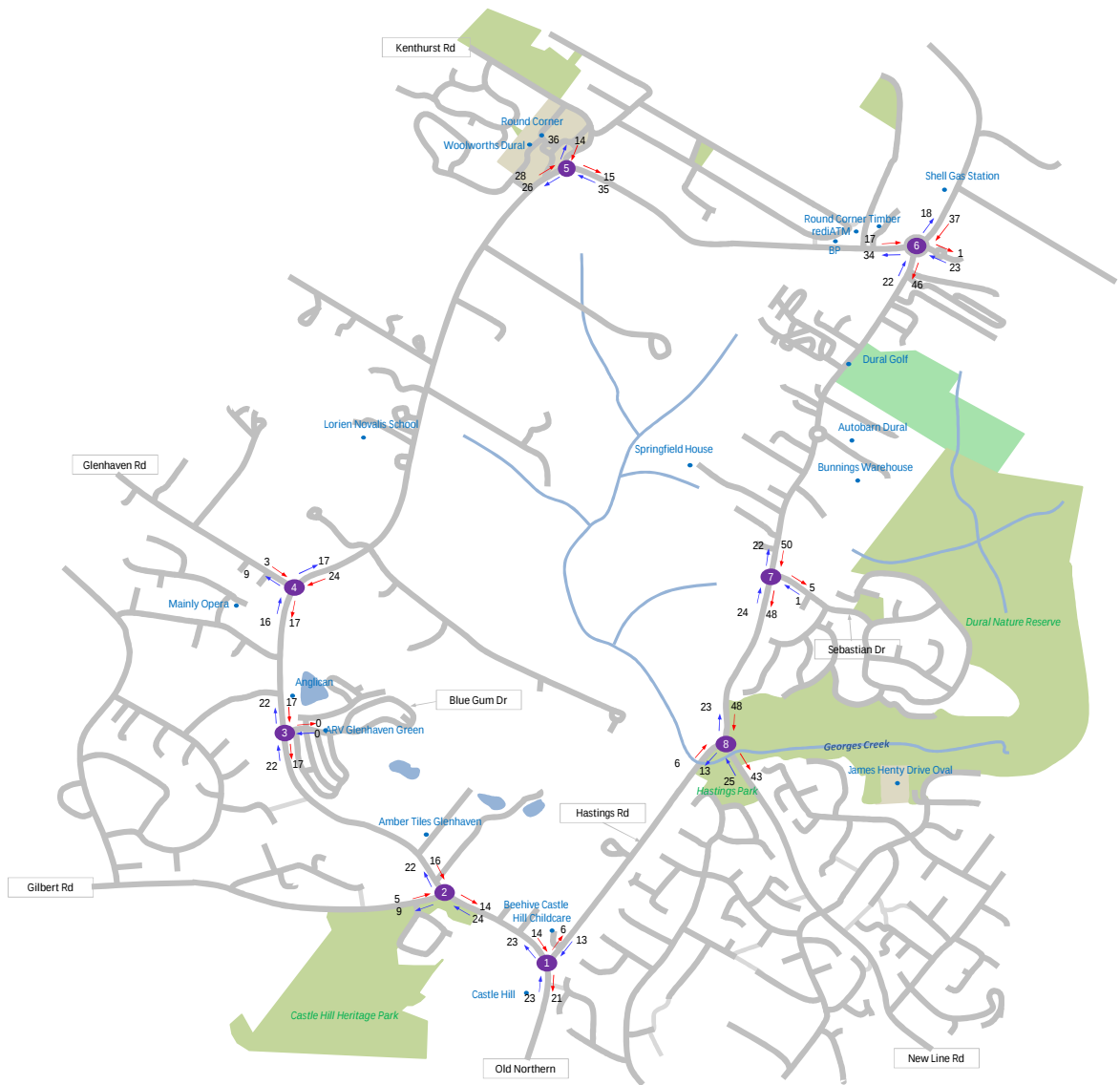
South Dural - Traffic Flows



Search By Time and Classification

AM / PM	Start Time	End Time	Classification
PM	15:00	16:00	Buses

1 Site No.



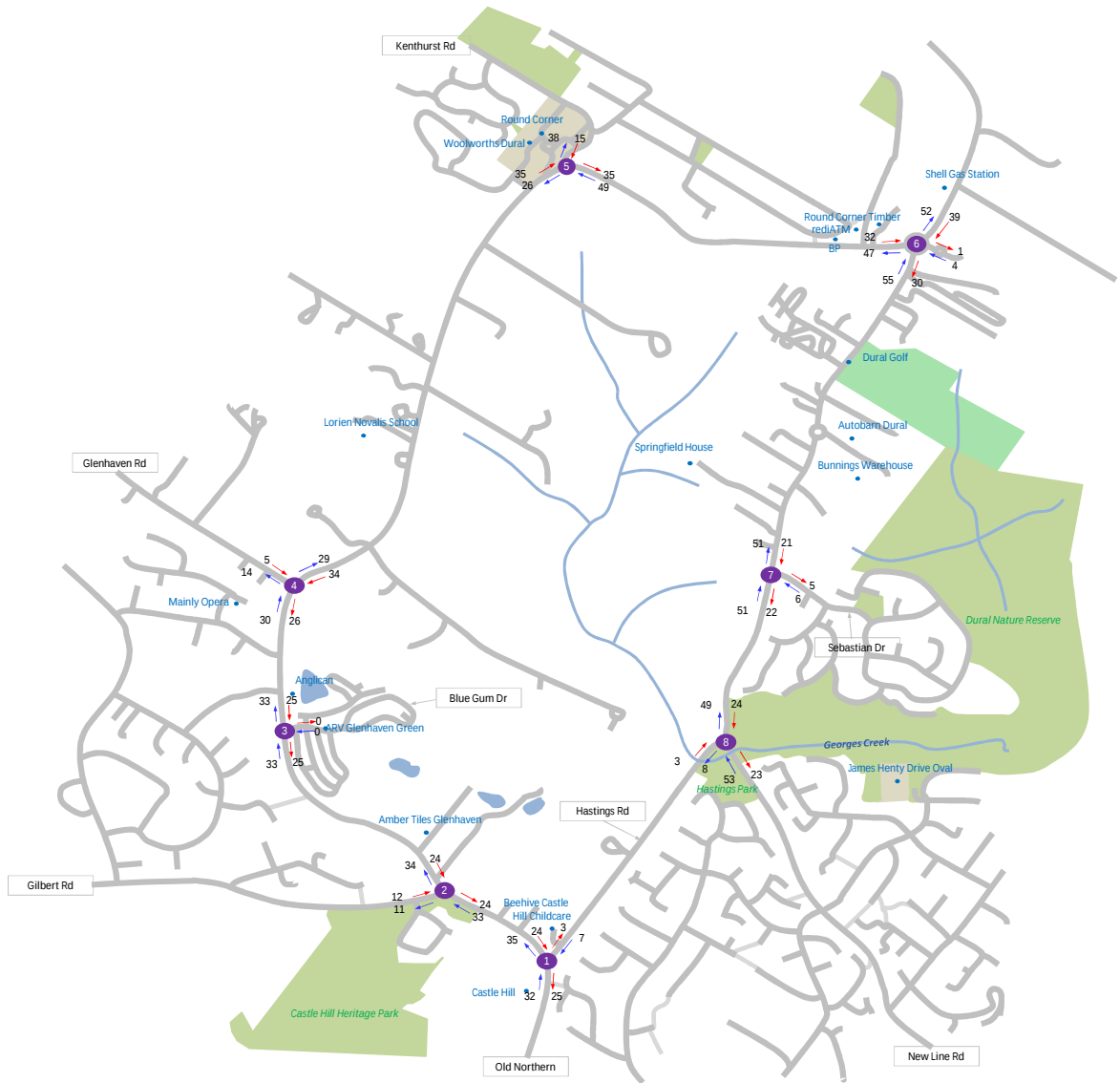
South Dural - Traffic Flows



Search By Time and Classification

AM / PM	Start Time	End Time	Classification
PM	15:00	16:00	Trucks

1 Site No.



APPENDIX B

INTERSECTION PERFORMANCE CRITERIA



B1 INTERSECTION PERFORMANCE CRITERIA

LEVEL OF SERVICE (LOS)

Level of Service (Los) is a basic performance parameter used to describe the operation of an intersection. Levels of service range from A (indicating good intersection operation) to F (indicating over-saturated conditions with long delays and queues). At signalised intersections, the LoS criteria are related to average intersection delay (seconds per vehicle). At priority controlled (give-way and stop controlled) and roundabout intersections, the LoS is based on the modelled delay (seconds per vehicle) for the most delayed movement.

Table B.1 Level of Service criteria for intersections

LEVEL OF SERVICE	AVERAGE DELAY (SEC/VEH)	TRAFFIC SIGNALS, ROUNDABOUT	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 would cause excessive delays. Roundabouts require other control mode.	At capacity; requires other control mode
F	Greater than 71	Unsatisfactory with excessive queuing	Unsatisfactory with excessive queuing; requires other control mode

Source: Roads and Maritime Services Guide to Traffic Generating Developments, 2002

DEGREE OF SATURATION (DOS)

The Degree of Saturation (DoS) is the ratio of demand flow to capacity, and therefore has no unit. As it approaches 1.0, extensive queues and delays could be expected. For a satisfactory situation, DoS should be less than the nominated practical degree of saturation, usually 0.9. The intersection DoS is based on the movement with the highest value.

AVERAGE VEHICLE DELAY

This is the difference between interrupted and uninterrupted travel times through the intersection and is measured in seconds per vehicle. At signalised intersections and roundabouts, the average intersection delay is usually reported. At priority controlled intersections, the average delay for the most delayed movement is usually reported.

QUEUE LENGTH

Queue length is measured in metres reflecting the number of vehicles waiting at the stop line and is usually quoted as the 95th percentile back of queue, which is the value below which 95% of all observed queue lengths fall. It reflects the number of vehicles per traffic lane at the start of the green period, when traffic starts moving again after a red signal. The intersection queue length is usually taken from the movement with the longest queue length.

APPENDIX C

SIDRA MODEL RESULTS



MOVEMENT SUMMARY

Site: 1 [I07-Old Northern Rd/Kenthurst Rd AM]

Old Northern Rd/Kenthurst Rd - 2016

Signals - Fixed Time Coordinated Cycle Time = 139 seconds (User-Given Phase Times)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Old Northern Rd											
5	T1	515	6.1	0.454	15.8	LOS B	18.6	137.3	0.59	0.53	47.6
6	R2	398	4.2	0.980	109.1	LOS F	34.3	249.0	1.00	1.26	21.3
Approach		913	5.3	0.980	56.5	LOS D	34.3	249.0	0.77	0.85	30.9
North: Kenthurst Rd											
7	L2	559	2.6	0.538	17.1	LOS B	19.4	139.1	0.60	0.76	46.3
9	R2	436	2.7	0.767	52.5	LOS D	27.0	193.3	0.97	0.88	31.6
Approach		995	2.6	0.767	32.6	LOS C	27.0	193.3	0.76	0.81	38.5
West: Old Northern Rd											
10	L2	287	5.9	0.265	30.3	LOS C	13.6	99.9	0.60	0.72	39.7
11	T1	662	5.9	0.747	19.7	LOS B	24.9	183.2	0.67	0.63	45.0
Approach		949	5.9	0.747	22.9	LOS B	24.9	183.2	0.65	0.65	43.3
All Vehicles		2857	4.6	0.980	37.0	LOS C	34.3	249.0	0.73	0.77	37.0

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

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

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

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

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

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

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped	
P2	East Full Crossing	0	36.7	LOS D	0.0	0.0	0.73	0.73	
P3	North Full Crossing	1	25.4	LOS C	0.0	0.0	0.60	0.60	
All Pedestrians		1	29.5	LOS C			0.65	0.65	

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

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

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

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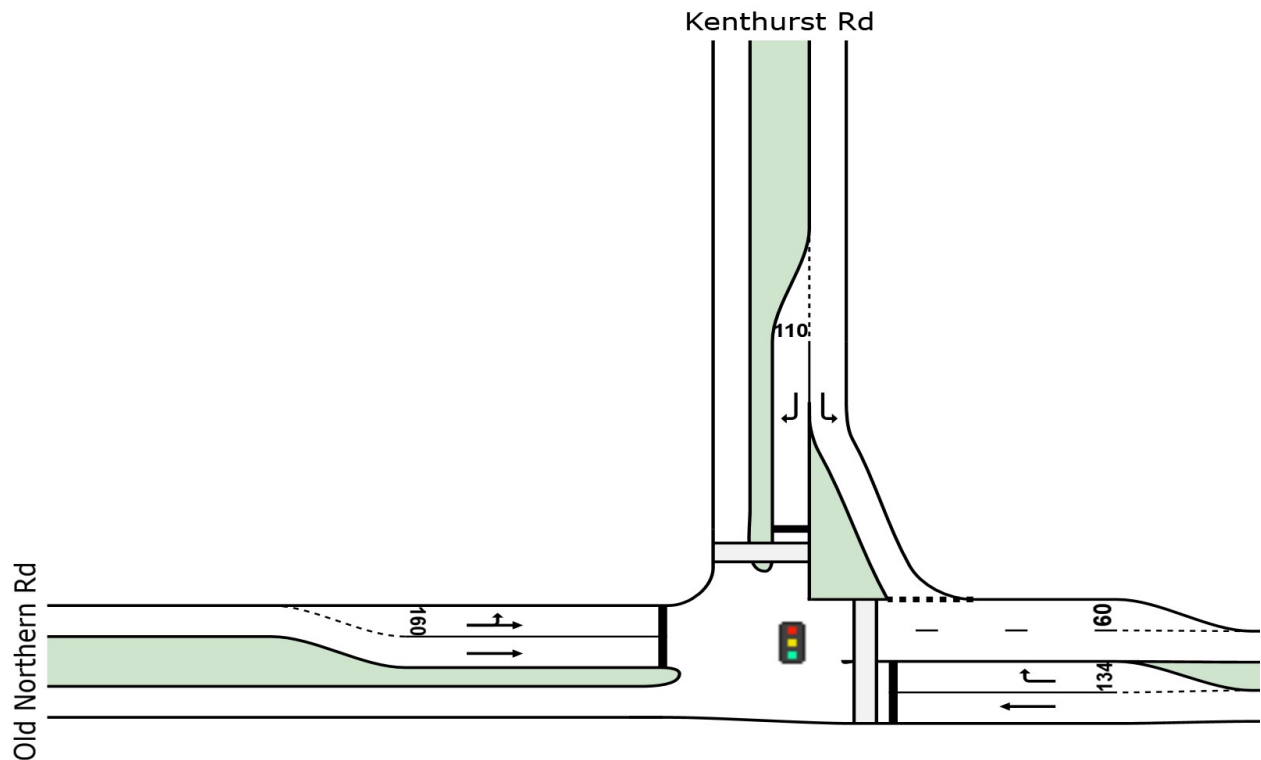
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Project: U:\Projects\PS106684__South_Dural_Senior\4_WIP\Docs\SIDRA\SouthDural_2016BaseTvd_AK.sip7

SITE LAYOUT

 **Site: 1 [I07-Old Northern Rd/Kenthurst Rd AM]**

Old Northern Rd/Kenthurst Rd - 2016
Signals - Fixed Time Coordinated



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QUEUE DISTANCE (%ILE)

Largest 95% Back of Queue Distance for any lane used by movement (metres)

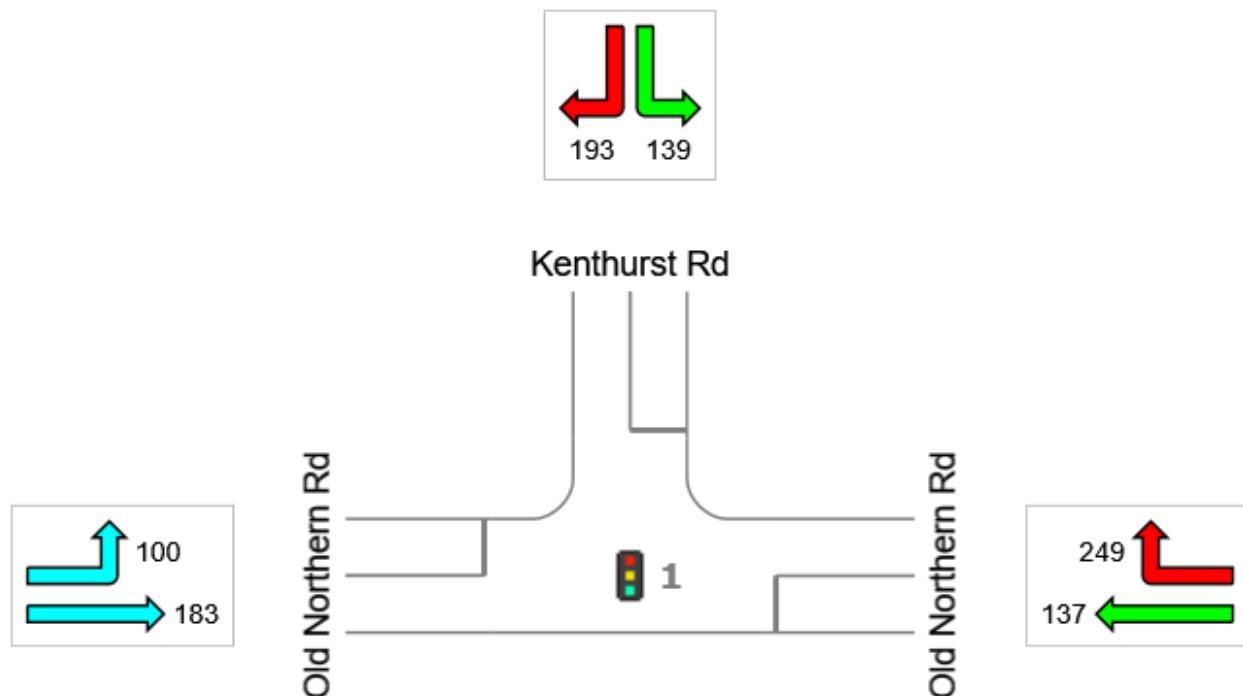
 **Site: 1 [I07-Old Northern Rd/Kenthurst Rd AM]**

Old Northern Rd/Kenthurst Rd - 2016

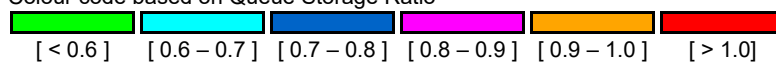
Signals - Fixed Time Coordinated Cycle Time = 139 seconds (User-Given Phase Times)

All Movement Classes

	East	North	West	Intersection
Vehicle Queue (%ile)	249	193	183	249



Colour code based on Queue Storage Ratio



LANE LEVEL OF SERVICE

Lane Level of Service

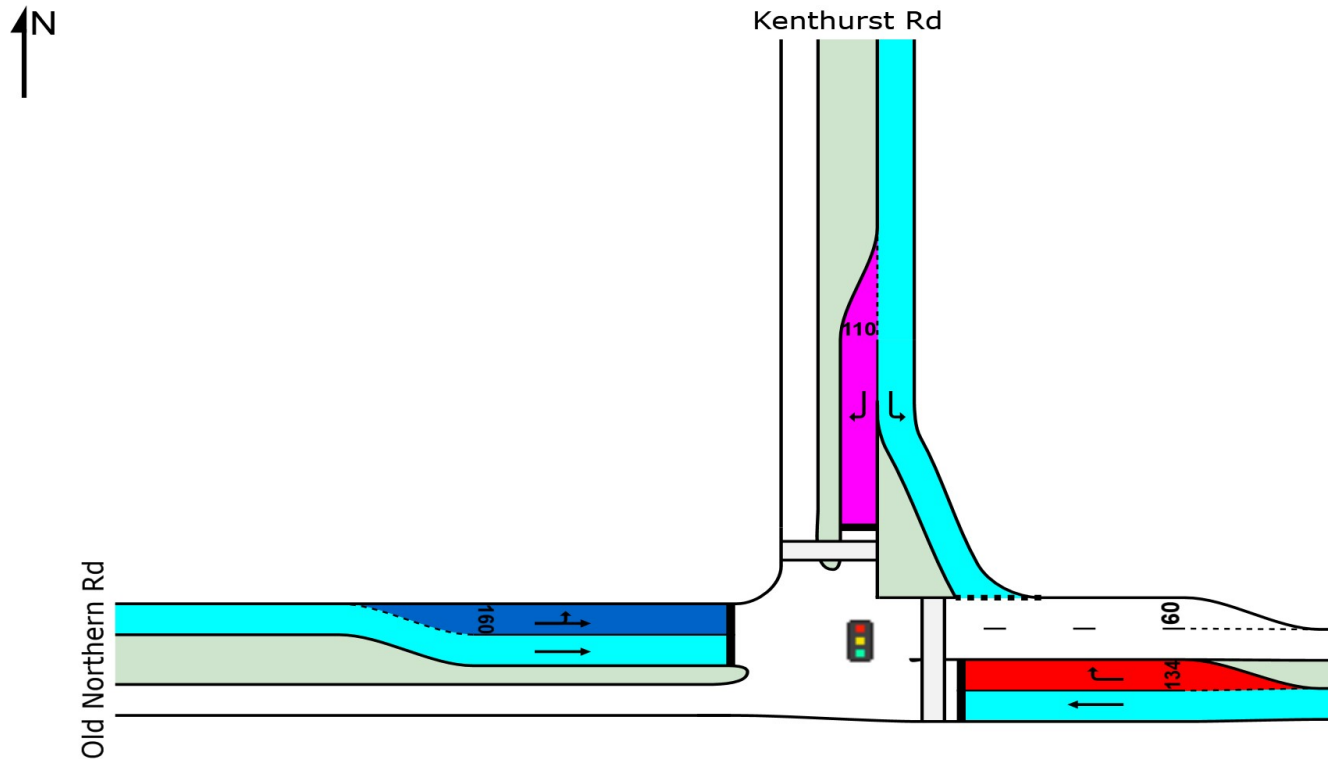
 **Site: 1 [I07-Old Northern Rd/Kenthurst Rd AM]**

Old Northern Rd/Kenthurst Rd - 2016

Signals - Fixed Time Coordinated Cycle Time = 139 seconds (User-Given Phase Times)

All Movement Classes

	East	North	West	Intersection
LOS	D	C	B	C



Colour code based on Level of Service



Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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MOVEMENT SUMMARY

Site: 1 [I07-Old Northern Rd/Kenthurst Rd PM]

Old Northern Rd/Kenthurst Rd - 2016

Signals - Fixed Time Coordinated Cycle Time = 90 seconds (User-Given Phase Times)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Old Northern Rd											
5	T1	551	7.1	0.450	8.1	LOS A	11.7	86.7	0.53	0.47	53.0
6	R2	521	9.5	0.969	76.7	LOS F	29.6	223.8	1.00	1.29	26.2
Approach		1072	8.3	0.969	41.4	LOS C	29.6	223.8	0.76	0.87	35.3
North: Kenthurst Rd											
7	L2	531	2.8	0.538	12.9	LOS A	11.2	80.5	0.61	0.76	48.8
9	R2	336	4.7	0.899	56.6	LOS E	17.7	128.9	1.00	1.00	30.5
Approach		866	3.5	0.899	29.9	LOS C	17.7	128.9	0.76	0.85	39.6
West: Old Northern Rd											
10	L2	371	7.7	0.338	6.1	LOS A	0.5	3.6	0.03	0.58	52.9
11	T1	546	6.9	0.850	22.9	LOS B	21.7	161.3	0.89	0.86	43.6
Approach		917	7.2	0.850	16.1	LOS B	21.7	161.3	0.54	0.75	46.9
All Vehicles		2855	6.5	0.969	29.8	LOS C	29.6	223.8	0.69	0.82	39.8

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

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

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

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

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

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

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped	
P2	East Full Crossing	0	32.1	LOS D	0.0	0.0	0.84	0.84	
P3	North Full Crossing	2	20.7	LOS C	0.0	0.0	0.68	0.68	
All Pedestrians		2	22.2	LOS C			0.70	0.70	

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

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

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

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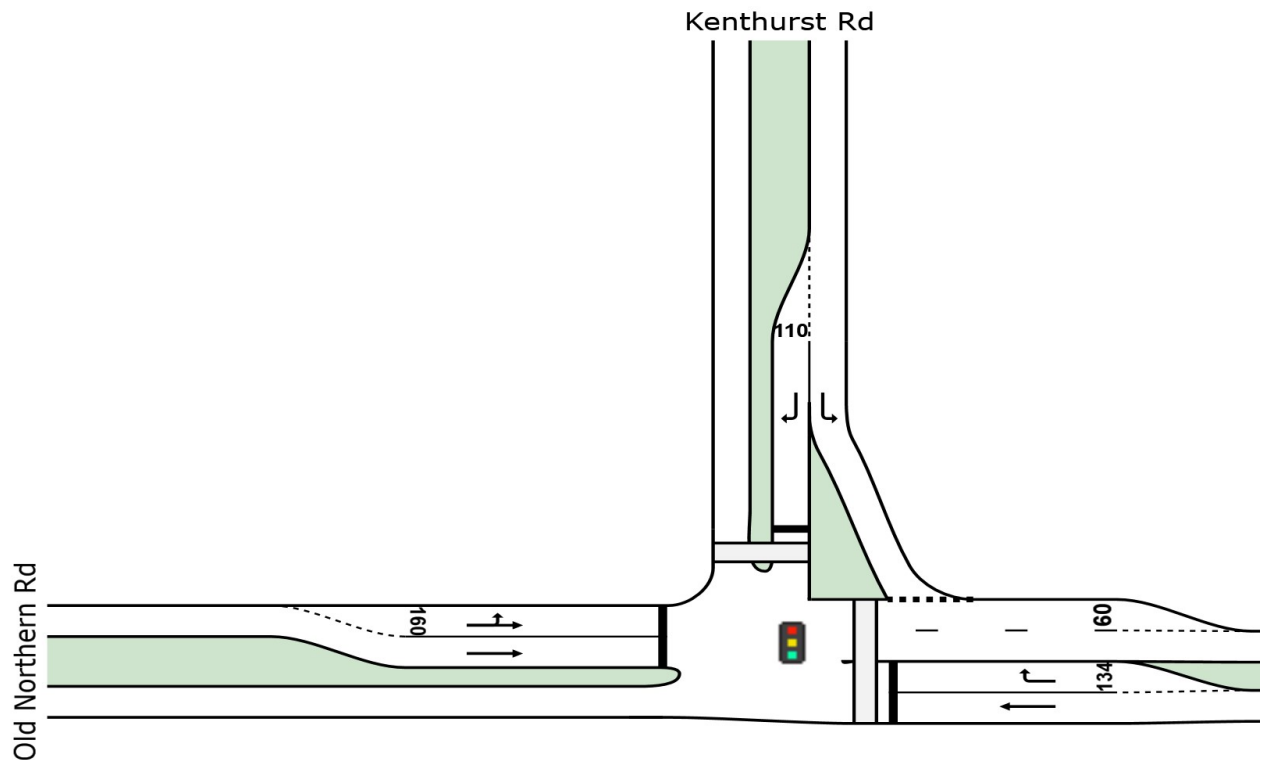
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SITE LAYOUT

 **Site: 1 [I07-Old Northern Rd/Kenthurst Rd PM]**

Old Northern Rd/Kenthurst Rd - 2016
Signals - Fixed Time Coordinated



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QUEUE DISTANCE (%ILE)

Largest 95% Back of Queue Distance for any lane used by movement (metres)

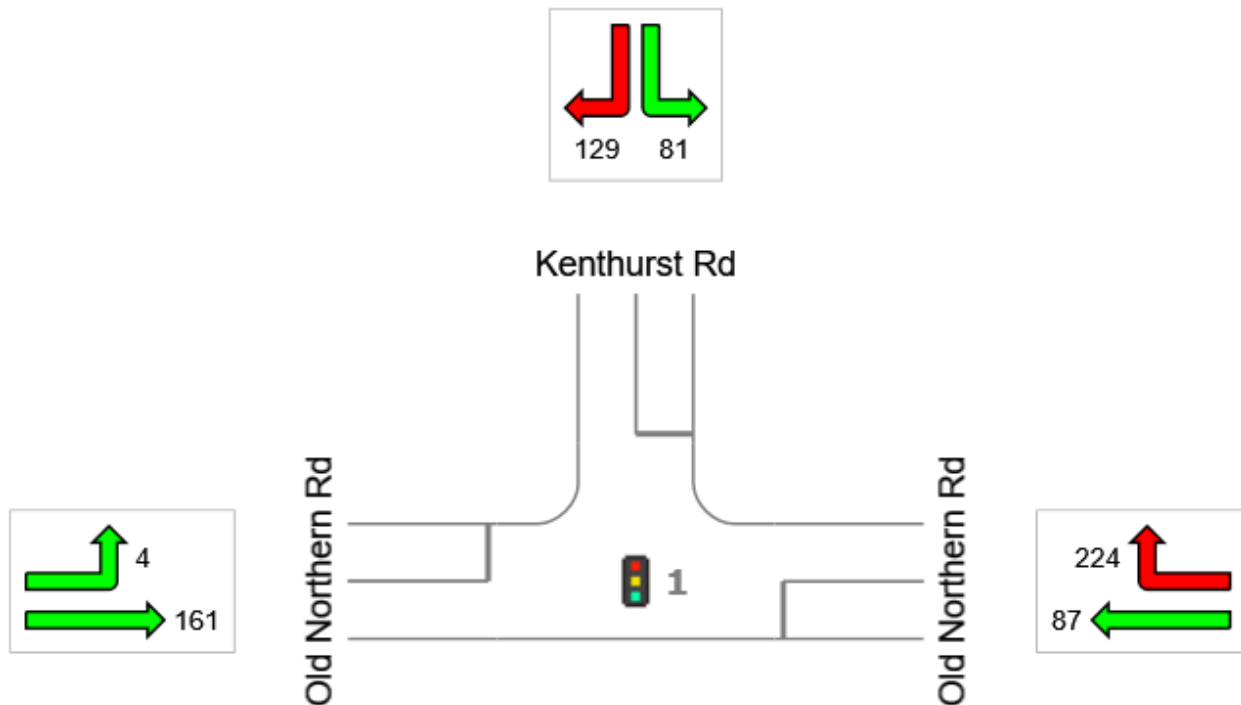
 **Site: 1 [I07-Old Northern Rd/Kenthurst Rd PM]**

Old Northern Rd/Kenthurst Rd - 2016

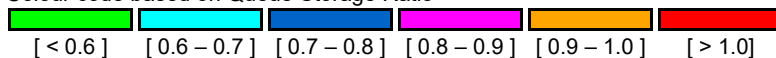
Signals - Fixed Time Coordinated Cycle Time = 90 seconds (User-Given Phase Times)

All Movement Classes

	East	North	West	Intersection
Vehicle Queue (%ile)	224	129	161	224



Colour code based on Queue Storage Ratio



LANE LEVEL OF SERVICE

Lane Level of Service

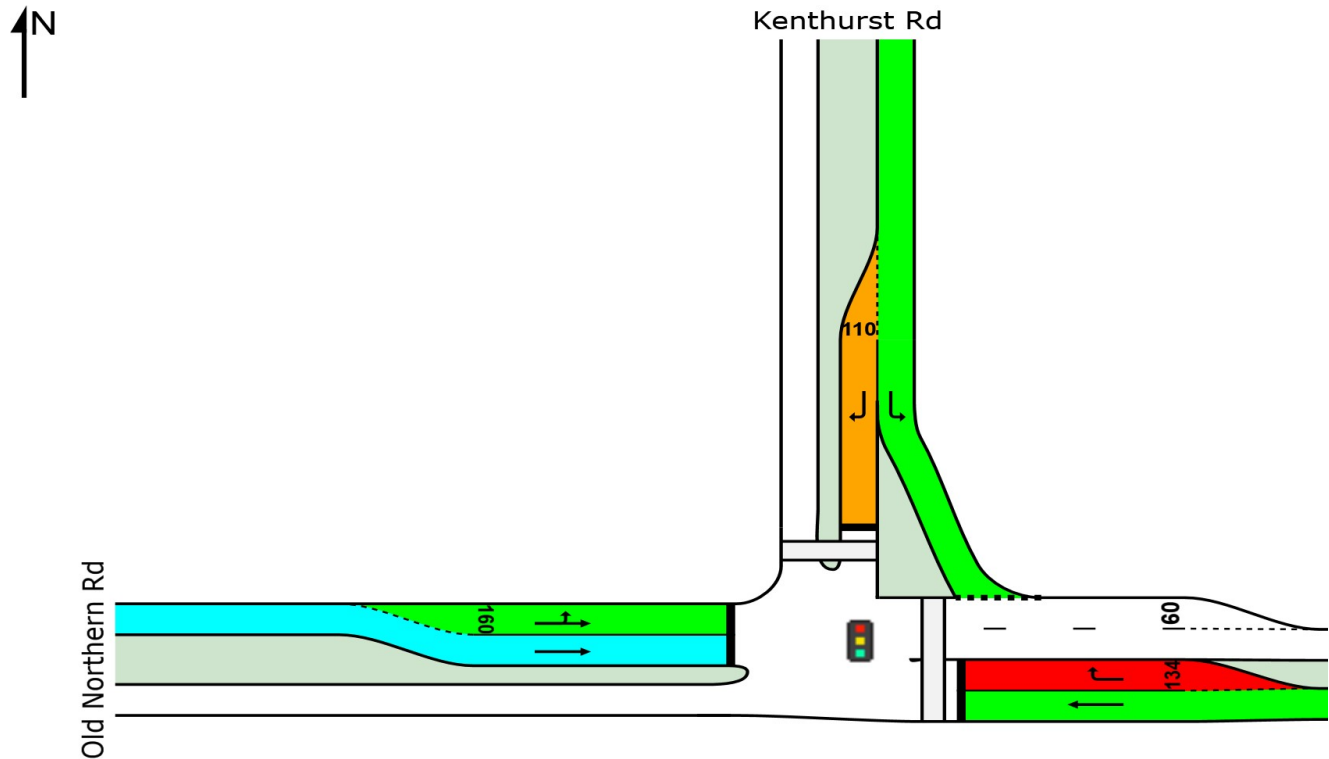
 **Site: 1 [I07-Old Northern Rd/Kenthurst Rd PM]**

Old Northern Rd/Kenthurst Rd - 2016

Signals - Fixed Time Coordinated Cycle Time = 90 seconds (User-Given Phase Times)

All Movement Classes

	East	North	West	Intersection
LOS	C	C	B	C



Colour code based on Level of Service



Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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MOVEMENT SUMMARY

Site: 1 [I07-Old Northern Rd/Kenthurst Rd AM-upgrade2]

Old Northern Rd/Kenthurst Rd

Signals - Fixed Time Coordinated Cycle Time = 60 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Old Northern Rd											
5	T1	627	6.1	0.251	4.3	LOS A	3.7	27.0	0.43	0.37	56.1
6	R2	485	4.2	0.902	39.0	LOS C	13.2	96.0	0.97	1.00	36.0
Approach		1113	5.3	0.902	19.5	LOS B	13.2	96.0	0.66	0.64	45.1
North: Kenthurst Rd											
7	L2	682	2.6	0.734	14.3	LOS A	13.5	96.3	0.81	0.84	48.0
9	R2	532	2.7	0.888	42.7	LOS D	9.6	69.1	1.00	1.06	34.7
Approach		1214	2.6	0.888	26.7	LOS B	13.5	96.3	0.89	0.94	41.1
West: Old Northern Rd											
10	L2	351	5.9	0.895	30.9	LOS C	18.8	138.0	0.96	1.02	39.9
11	T1	807	5.9	0.895	21.0	LOS B	18.8	138.0	0.94	0.98	44.2
Approach		1158	5.9	0.895	24.0	LOS B	18.8	138.0	0.95	0.99	42.8
All Vehicles		3484	4.6	0.902	23.5	LOS B	18.8	138.0	0.84	0.86	42.9

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

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

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

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

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

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

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	0	24.3	LOS C	0.0	0.0	0.90	0.90
P3	North Full Crossing	1	18.4	LOS B	0.0	0.0	0.78	0.78
P4	West Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
All Pedestrians		54	24.3	LOS C			0.90	0.90

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

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

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

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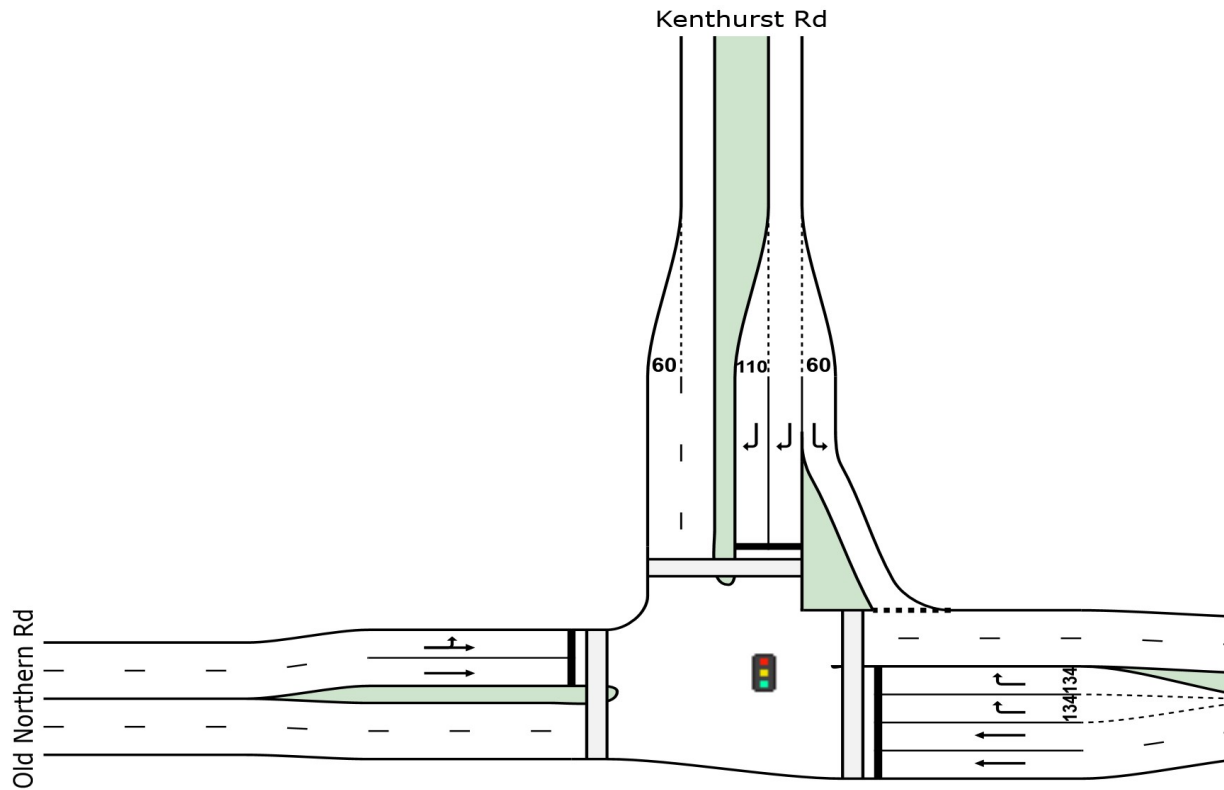
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Project: U:\Projects\PS106684__South_Dural_Senio4_WIP\Docs\SIDRA\AmolK\SouthDural_2026Base_RevA_from TMAP.sip7

SITE LAYOUT

Site: 1 [I07-Old Northern Rd/Kenthurst Rd AM-upgrade2]

Old Northern Rd/Kenthurst Rd
Signals - Fixed Time Coordinated



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QUEUE DISTANCE (%ILE)

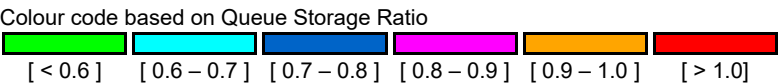
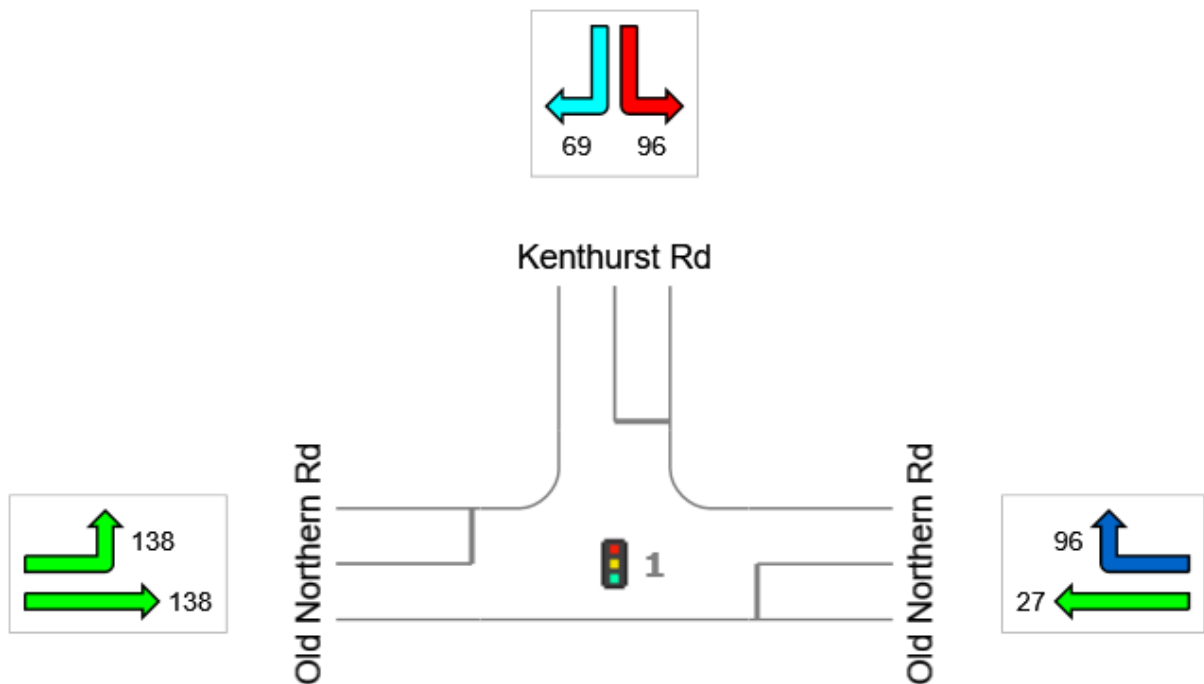
Largest 95% Back of Queue Distance for any lane used by movement (metres)

 **Site: 1 [I07-Old Northern Rd/Kenthurst Rd AM-upgrade2]**

Old Northern Rd/Kenthurst Rd
Signals - Fixed Time Coordinated Cycle Time = 60 seconds (Practical Cycle Time)

All Movement Classes

	East	North	West	Intersection
Vehicle Queue (%ile)	96	96	138	138



DEGREE OF SATURATION

Ratio of Demand Volume to Capacity (v/c ratio)

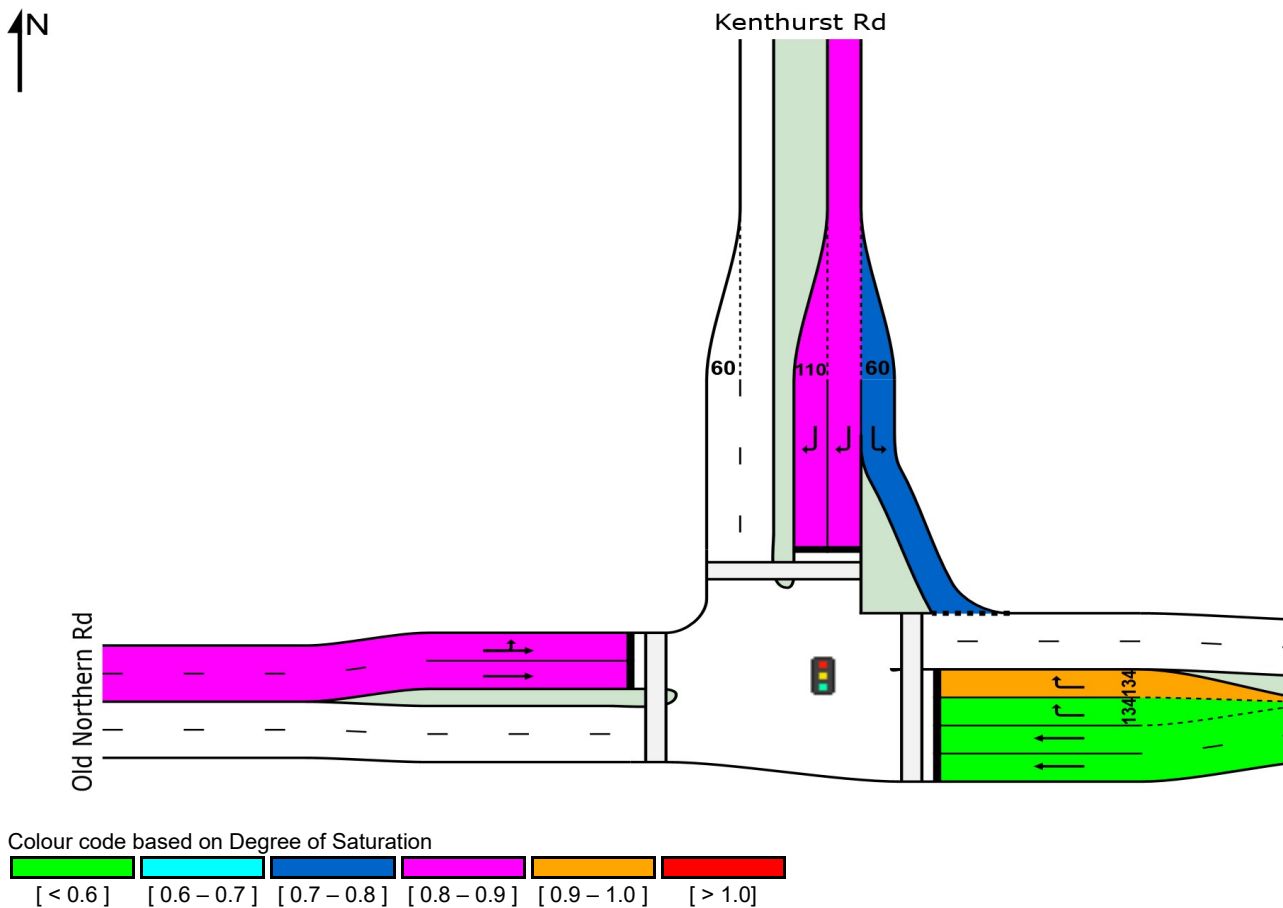
 **Site: 1 [I07-Old Northern Rd/Kenthurst Rd AM-upgrade2]**

Old Northern Rd/Kenthurst Rd

Signals - Fixed Time Coordinated Cycle Time = 60 seconds (Practical Cycle Time)

All Movement Classes

	East	North	West	Intersection
Degree of Saturation	0.90	0.89	0.89	0.90



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Project: U:\Projects\PS106684__South_Dural_Senior4_WIP\Docs\SIDRA\AmolK\SouthDural_2026Base_RevA_from TMAP.sip7

MOVEMENT SUMMARY



Site: 1 [I07-Old Northern Rd/Kenthurst Rd PM-upgrade2]

Old Northern Rd/Kenthurst Rd

Signals - Fixed Time Coordinated Cycle Time = 90 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Old Northern Rd											
5	T1	692	7.1	0.253	4.2	LOS A	4.9	36.3	0.35	0.31	56.2
6	R2	655	9.5	0.911	48.9	LOS D	25.8	195.3	0.95	0.96	32.8
Approach		1346	8.3	0.911	25.9	LOS B	25.8	195.3	0.64	0.63	41.7
North: Kenthurst Rd											
7	L2	666	2.8	0.782	17.7	LOS B	19.2	137.5	0.76	0.84	46.0
9	R2	422	4.7	0.894	59.5	LOS E	11.0	80.3	1.00	1.01	29.9
Approach		1088	3.5	0.894	33.9	LOS C	19.2	137.5	0.86	0.91	38.1
West: Old Northern Rd											
10	L2	465	7.7	0.862	27.7	LOS B	22.5	167.4	0.88	0.89	40.8
11	T1	686	6.9	0.862	21.8	LOS B	23.4	173.8	0.88	0.86	43.9
Approach		1152	7.2	0.862	24.2	LOS B	23.4	173.8	0.88	0.87	42.6
All Vehicles		3586	6.5	0.911	27.8	LOS B	25.8	195.3	0.78	0.79	40.8

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

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

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

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

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

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

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	0	39.2	LOS D	0.0	0.0	0.93	0.93
P3	North Full Crossing	2	23.5	LOS C	0.0	0.0	0.72	0.72
P4	West Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
All Pedestrians		55	38.7	LOS D			0.93	0.93

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

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

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

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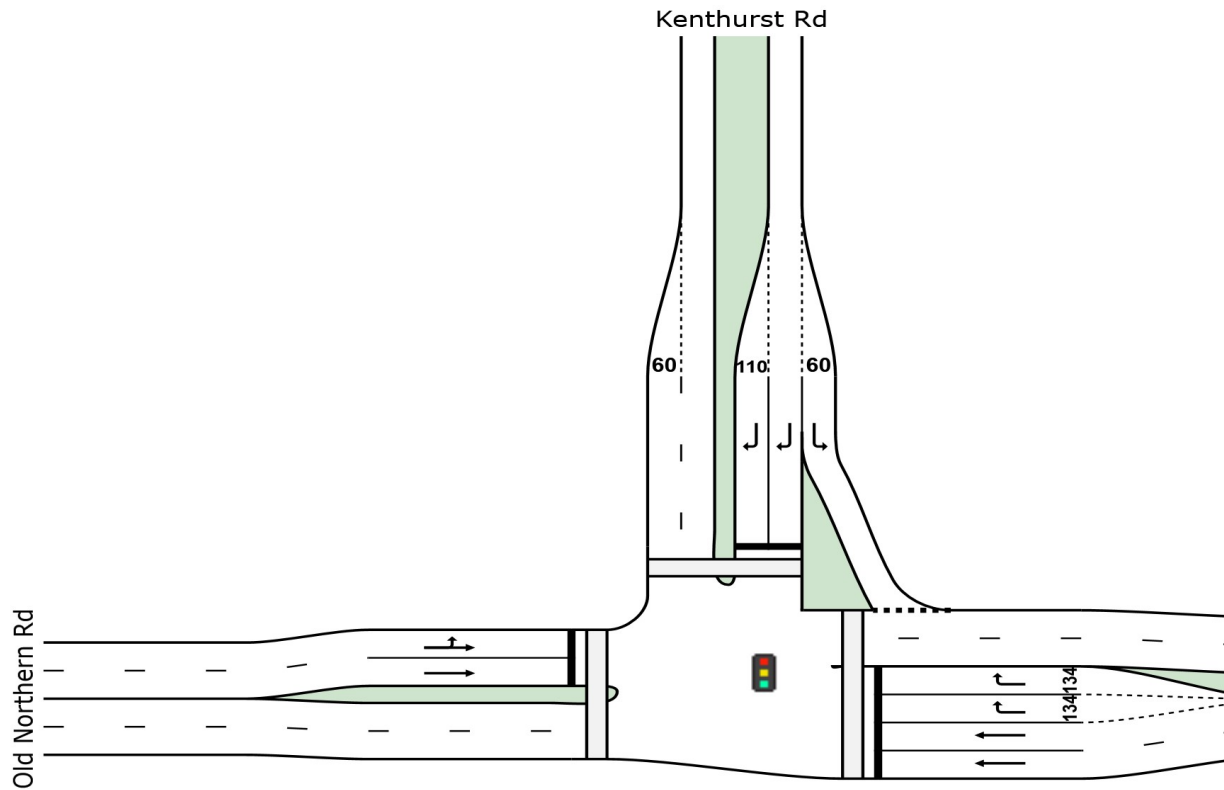
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SITE LAYOUT

Site: 1 [I07-Old Northern Rd/Kenthurst Rd PM-upgrade2]

Old Northern Rd/Kenthurst Rd
Signals - Fixed Time Coordinated



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QUEUE DISTANCE (%ILE)

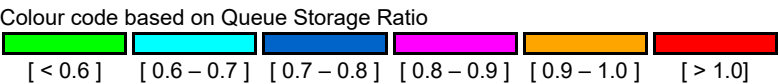
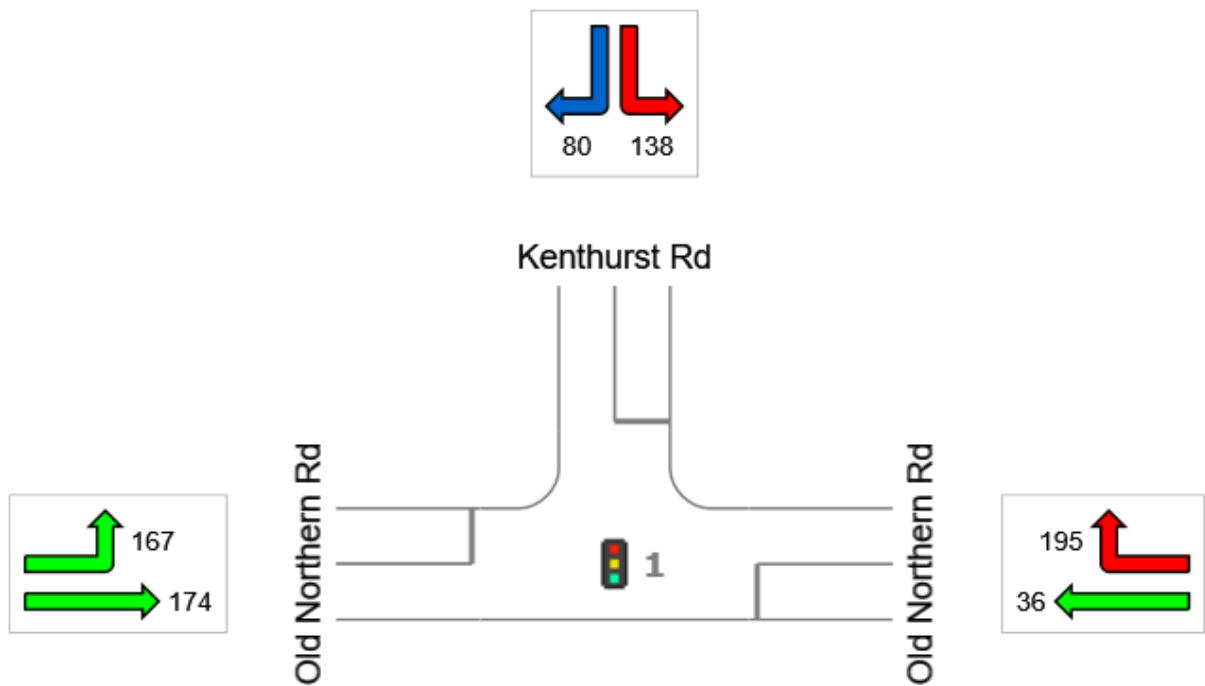
Largest 95% Back of Queue Distance for any lane used by movement (metres)

 **Site: 1 [I07-Old Northern Rd/Kenthurst Rd PM-upgrade2]**

Old Northern Rd/Kenthurst Rd
Signals - Fixed Time Coordinated Cycle Time = 90 seconds (Practical Cycle Time)

All Movement Classes

	East	North	West	Intersection
Vehicle Queue (%ile)	195	138	174	195



DEGREE OF SATURATION

Ratio of Demand Volume to Capacity (v/c ratio)

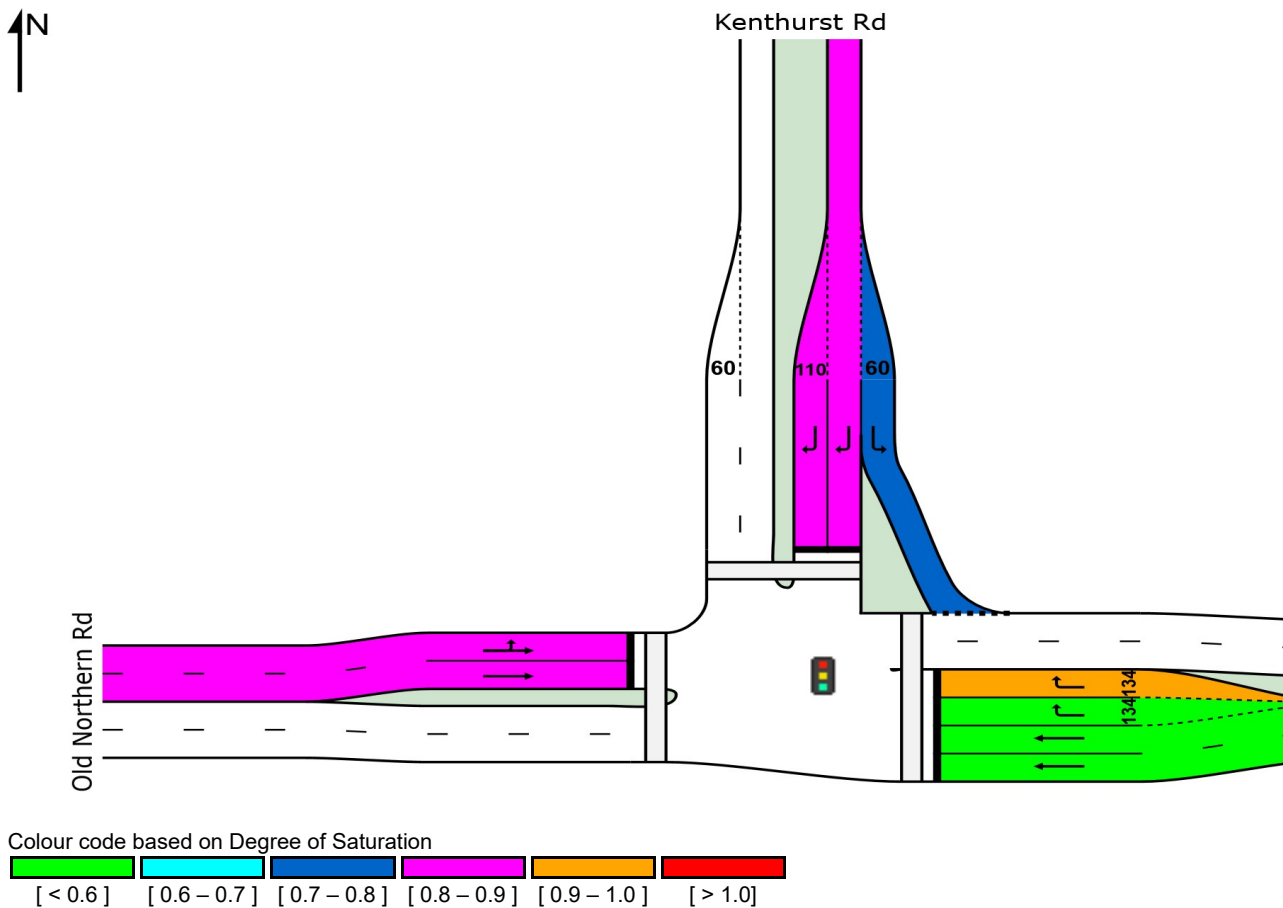
 **Site: 1 [I07-Old Northern Rd/Kenthurst Rd PM-upgrade2]**

Old Northern Rd/Kenthurst Rd

Signals - Fixed Time Coordinated Cycle Time = 90 seconds (Practical Cycle Time)

All Movement Classes

	East	North	West	Intersection
Degree of Saturation	0.91	0.89	0.86	0.91



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Project: U:\Projects\PS106684__South_Dural_Senior4_WIP\Docs\SIDRA\AmolK\SouthDural_2026Base_RevA_from TMAP.sip7

MOVEMENT SUMMARY

Site: 106 [I106-Franlee Road and ONR-AM]

Franlee Road and Old Northern Road Intersection

Signals - Fixed Time Isolated Cycle Time = 60 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Old Northern Road											
2	T1	949	5.9	0.525	5.1	LOS A	9.9	72.8	0.51	0.45	55.3
3	R2	12	0.0	0.031	19.1	LOS B	0.2	1.6	0.75	0.67	44.7
Approach		961	5.8	0.525	5.3	LOS A	9.9	72.8	0.51	0.46	55.2
East: Franlee Road											
4	L2	37	0.0	0.060	20.3	LOS B	0.7	5.2	0.71	0.70	44.1
6	R2	33	0.0	0.132	31.5	LOS C	0.9	6.2	0.91	0.71	38.7
Approach		69	0.0	0.132	25.5	LOS B	0.9	6.2	0.80	0.70	41.4
North: Old Northern Road											
7	L2	9	0.0	0.334	16.5	LOS B	5.5	40.0	0.67	0.58	49.5
8	T1	951	4.5	0.752	14.5	LOS A	17.2	125.2	0.82	0.75	48.4
Approach		960	4.5	0.752	14.5	LOS A	17.2	125.2	0.82	0.75	48.4
All Vehicles		1991	5.0	0.752	10.4	LOS A	17.2	125.2	0.67	0.61	51.1

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

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

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

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

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

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

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped	
P1	South Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90	
P2	East Full Crossing	53	11.4	LOS B	0.1	0.1	0.62	0.62	
P3	North Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90	
All Pedestrians		158	20.0	LOS C			0.81	0.81	

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

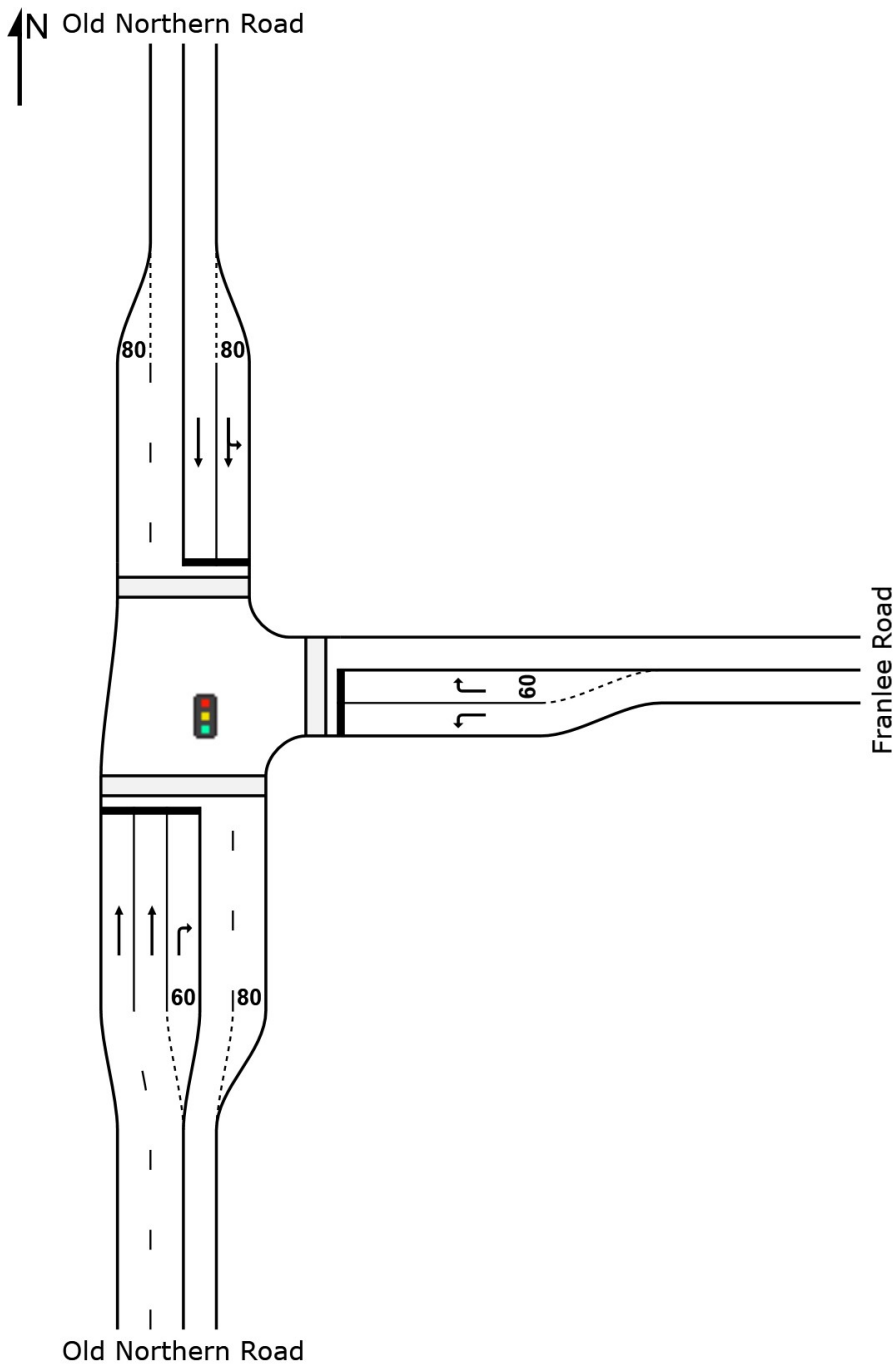
Pedestrian movement LOS values are based on average delay per pedestrian movement.

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

SITE LAYOUT

 **Site: 106 [I106-Franlee Road and ONR-AM]**

Franlee Road and Old Northern Road Intersection
Signals - Fixed Time Isolated



QUEUE DISTANCE (%ILE)

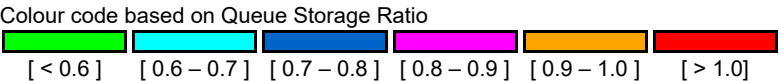
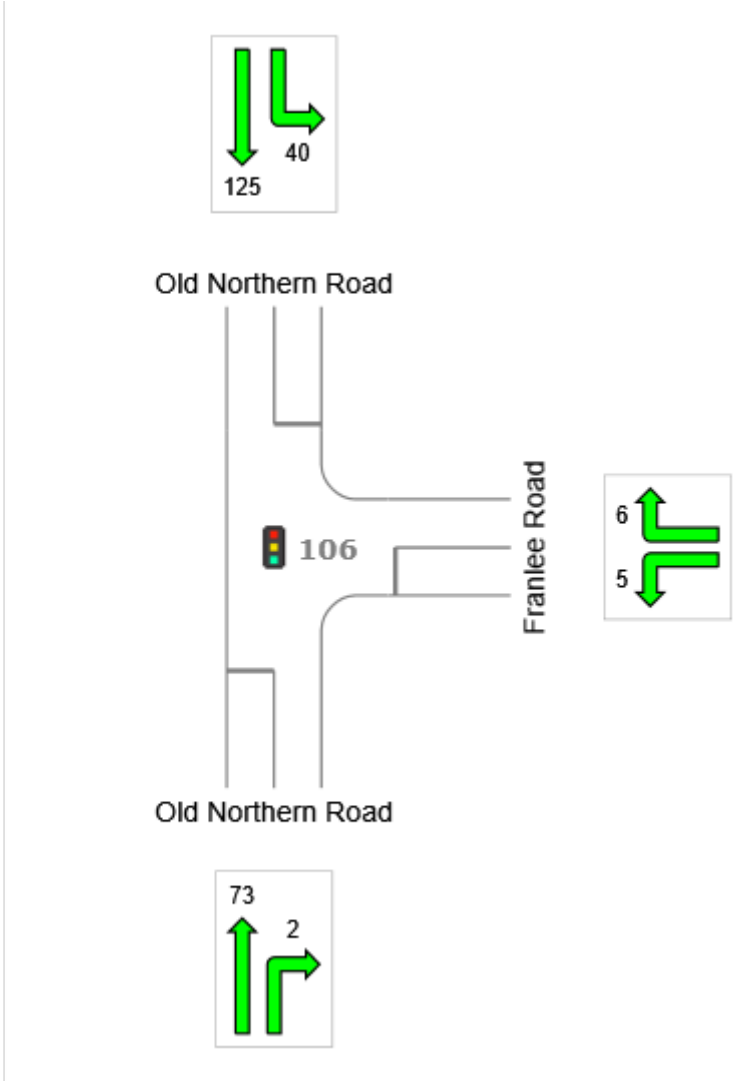
Largest 95% Back of Queue Distance for any lane used by movement (metres)

 **Site: 106 [I106-Franlee Road and ONR-AM]**

Franlee Road and Old Northern Road Intersection
Signals - Fixed Time Isolated Cycle Time = 60 seconds (Practical Cycle Time)

All Movement Classes

	South	East	North	Intersection
Vehicle Queue (%ile)	73	6	125	125



DEGREE OF SATURATION

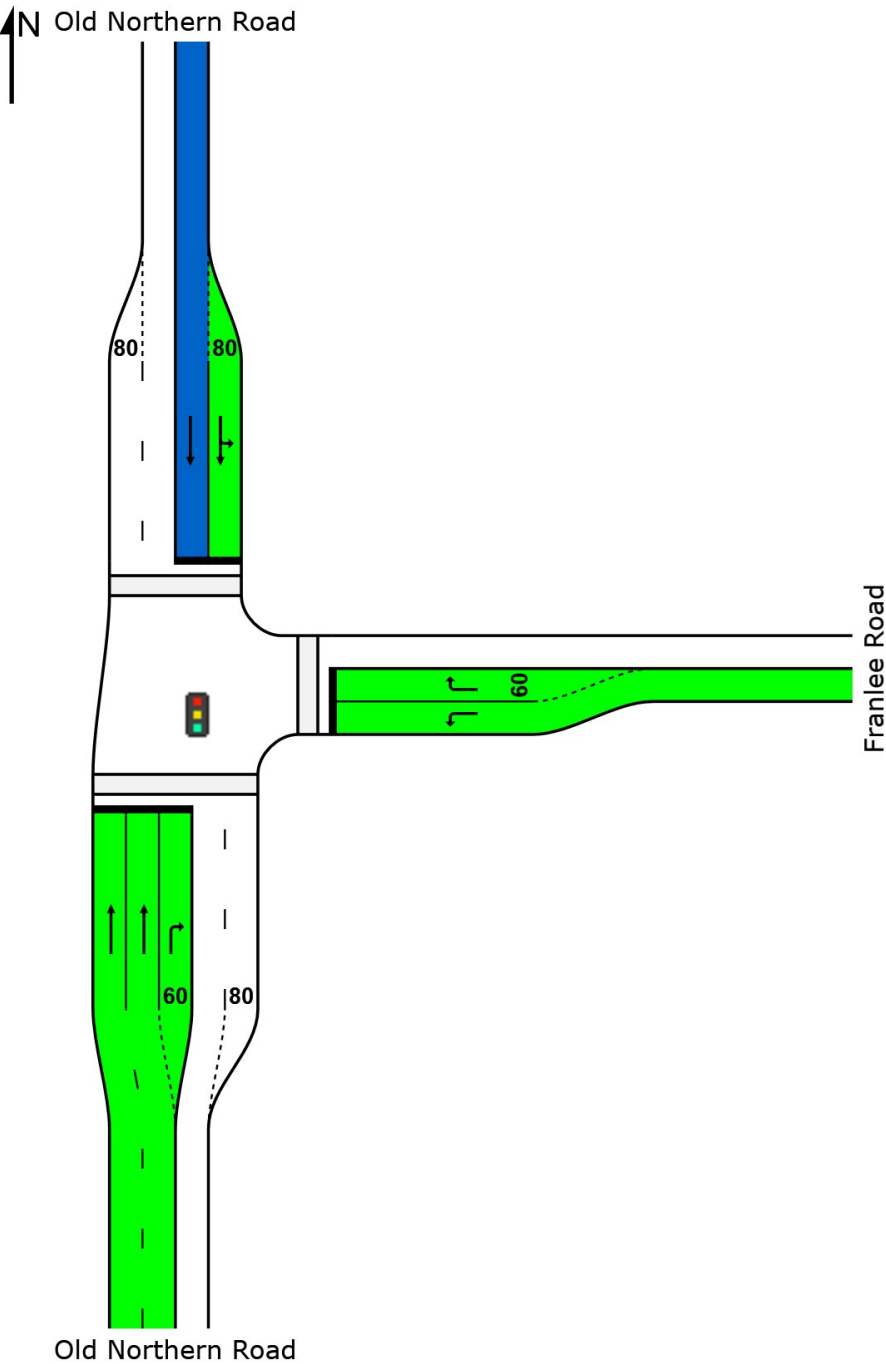
Ratio of Demand Volume to Capacity (v/c ratio)

 **Site: 106 [I106-Franlee Road and ONR-AM]**

Franlee Road and Old Northern Road Intersection
Signals - Fixed Time Isolated Cycle Time = 60 seconds (Practical Cycle Time)

All Movement Classes

	South	East	North	Intersection
Degree of Saturation	0.53	0.13	0.75	0.75



Colour code based on Degree of Saturation



MOVEMENT SUMMARY

Site: 106 [I106-Franlee Road and ONR-PM]

Franlee Road and Old Northern Road Intersection

Signals - Fixed Time Isolated Cycle Time = 50 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Old Northern Road											
2	T1	917	7.2	0.397	5.8	LOS A	5.7	42.3	0.56	0.48	54.7
3	R2	21	0.0	0.397	12.4	LOS A	5.5	40.7	0.62	0.52	52.2
Approach		938	7.1	0.397	5.9	LOS A	5.7	42.3	0.56	0.48	54.6
East: Franlee Road											
4	L2	9	0.0	0.013	15.9	LOS B	0.1	1.0	0.64	0.65	46.5
6	R2	6	0.0	0.024	26.3	LOS B	0.1	1.0	0.88	0.65	41.0
Approach		16	0.0	0.024	20.1	LOS B	0.1	1.0	0.74	0.65	44.1
North: Old Northern Road											
7	L2	16	0.0	0.389	18.0	LOS B	5.1	37.1	0.77	0.66	48.4
8	T1	886	6.2	0.877	21.7	LOS B	18.9	139.0	0.93	0.98	44.2
Approach		902	6.1	0.877	21.6	LOS B	18.9	139.0	0.93	0.97	44.2
All Vehicles		1856	6.5	0.877	13.7	LOS A	18.9	139.0	0.74	0.72	48.9

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

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

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

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

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

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

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped	
P1	South Full Crossing	53	19.4	LOS B	0.1	0.1	0.88	0.88	
P2	East Full Crossing	53	12.3	LOS B	0.1	0.1	0.70	0.70	
P3	North Full Crossing	53	19.4	LOS B	0.1	0.1	0.88	0.88	
All Pedestrians		158	17.0	LOS B			0.82	0.82	

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

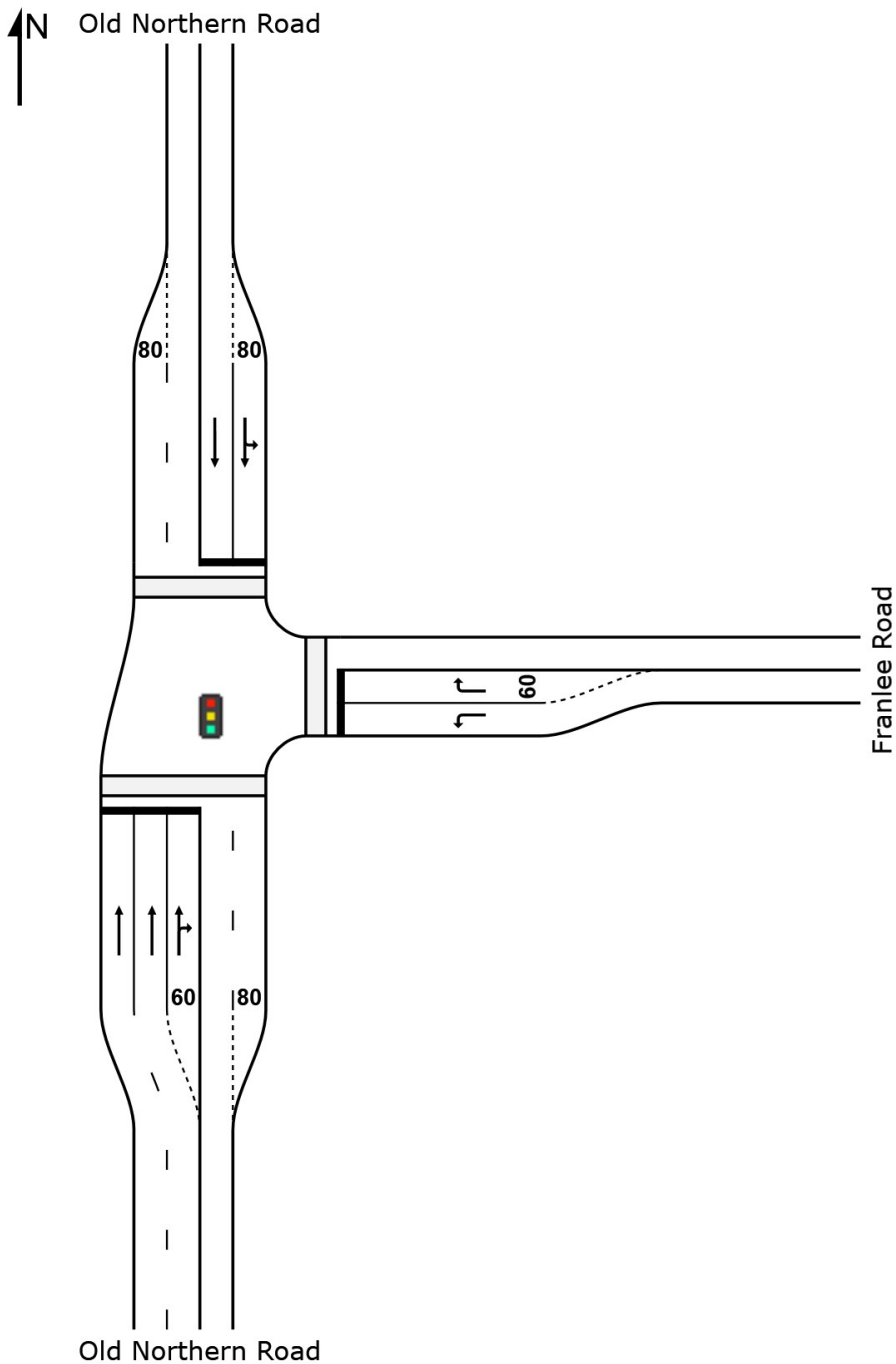
Pedestrian movement LOS values are based on average delay per pedestrian movement.

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

SITE LAYOUT

 **Site: 106 [I106-Franlee Road and ONR-PM]**

Franlee Road and Old Northern Road Intersection
Signals - Fixed Time Isolated



QUEUE DISTANCE (%ILE)

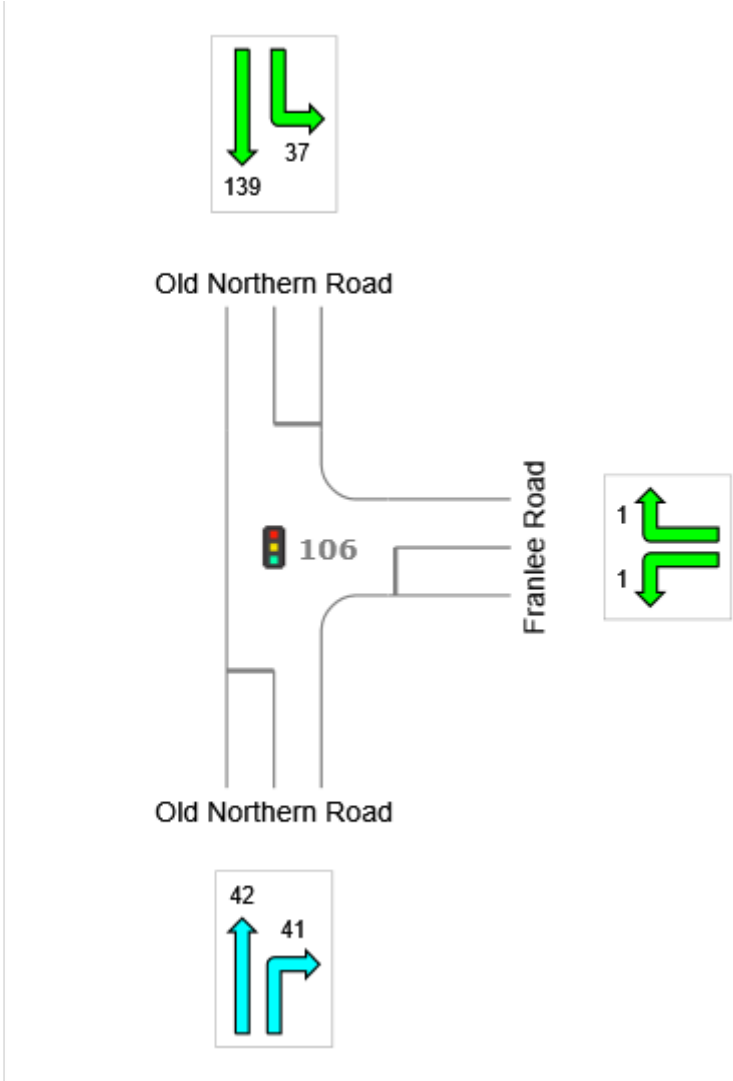
Largest 95% Back of Queue Distance for any lane used by movement (metres)

 **Site: 106 [I106-Franlee Road and ONR-PM]**

Franlee Road and Old Northern Road Intersection
Signals - Fixed Time Isolated Cycle Time = 50 seconds (Practical Cycle Time)

All Movement Classes

	South	East	North	Intersection
Vehicle Queue (%ile)	42	1	139	139



Colour code based on Queue Storage Ratio



DEGREE OF SATURATION

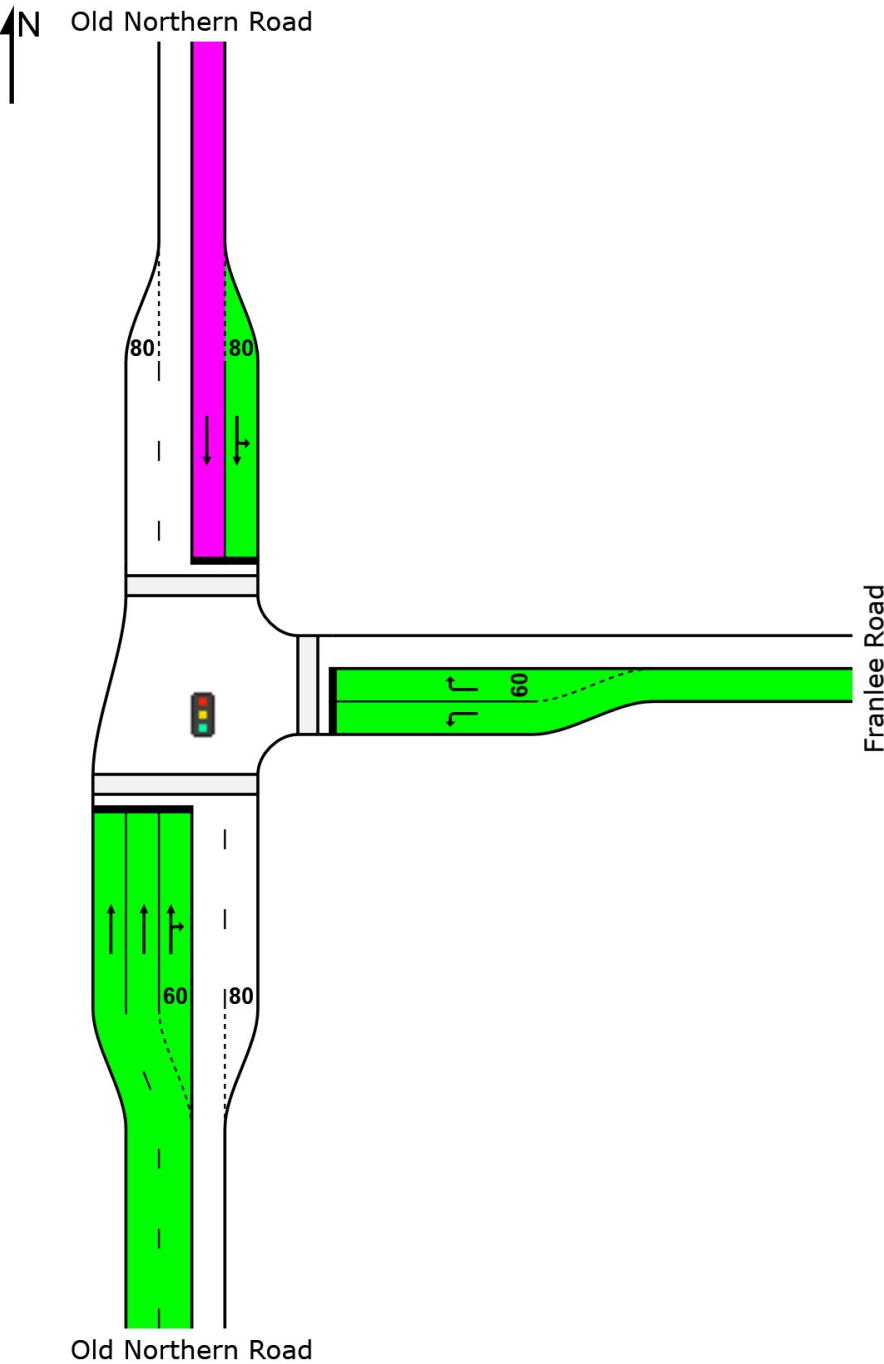
Ratio of Demand Volume to Capacity (v/c ratio)

 **Site: 106 [I106-Franlee Road and ONR-PM]**

Franlee Road and Old Northern Road Intersection
Signals - Fixed Time Isolated Cycle Time = 50 seconds (Practical Cycle Time)

All Movement Classes

	South	East	North	Intersection
Degree of Saturation	0.40	0.02	0.88	0.88



Colour code based on Degree of Saturation



MOVEMENT SUMMARY

Site: 106 [I106-Franlee Road and ONR-AM]

Franlee Road and Old Northern Road Intersection

Signals - Fixed Time Isolated Cycle Time = 50 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Old Northern Road											
2	T1	1158	5.9	0.497	5.7	LOS A	7.8	57.7	0.59	0.52	54.9
3	R2	12	0.0	0.029	17.9	LOS B	0.2	1.4	0.79	0.66	45.3
Approach		1169	5.9	0.497	5.8	LOS A	7.8	57.7	0.59	0.52	54.8
East: Franlee Road											
4	L2	37	0.0	0.052	16.2	LOS B	0.6	4.0	0.66	0.69	46.4
6	R2	33	0.0	0.126	27.0	LOS B	0.7	5.2	0.91	0.71	40.6
Approach		69	0.0	0.126	21.3	LOS B	0.7	5.2	0.77	0.70	43.5
North: Old Northern Road											
7	L2	9	0.0	0.812	25.4	LOS B	15.2	110.6	0.96	0.97	44.2
8	T1	1159	4.5	0.812	19.9	LOS B	15.2	110.7	0.96	0.97	45.2
Approach		1168	4.5	0.812	19.9	LOS B	15.2	110.7	0.96	0.97	45.2
All Vehicles		2407	5.0	0.812	13.1	LOS A	15.2	110.7	0.78	0.75	49.3

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

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

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

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

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

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

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped	
P1	South Full Crossing	53	19.4	LOS B	0.1	0.1	0.88	0.88	
P2	East Full Crossing	53	12.3	LOS B	0.1	0.1	0.70	0.70	
All Pedestrians		105	15.8	LOS B			0.79	0.79	

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

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

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

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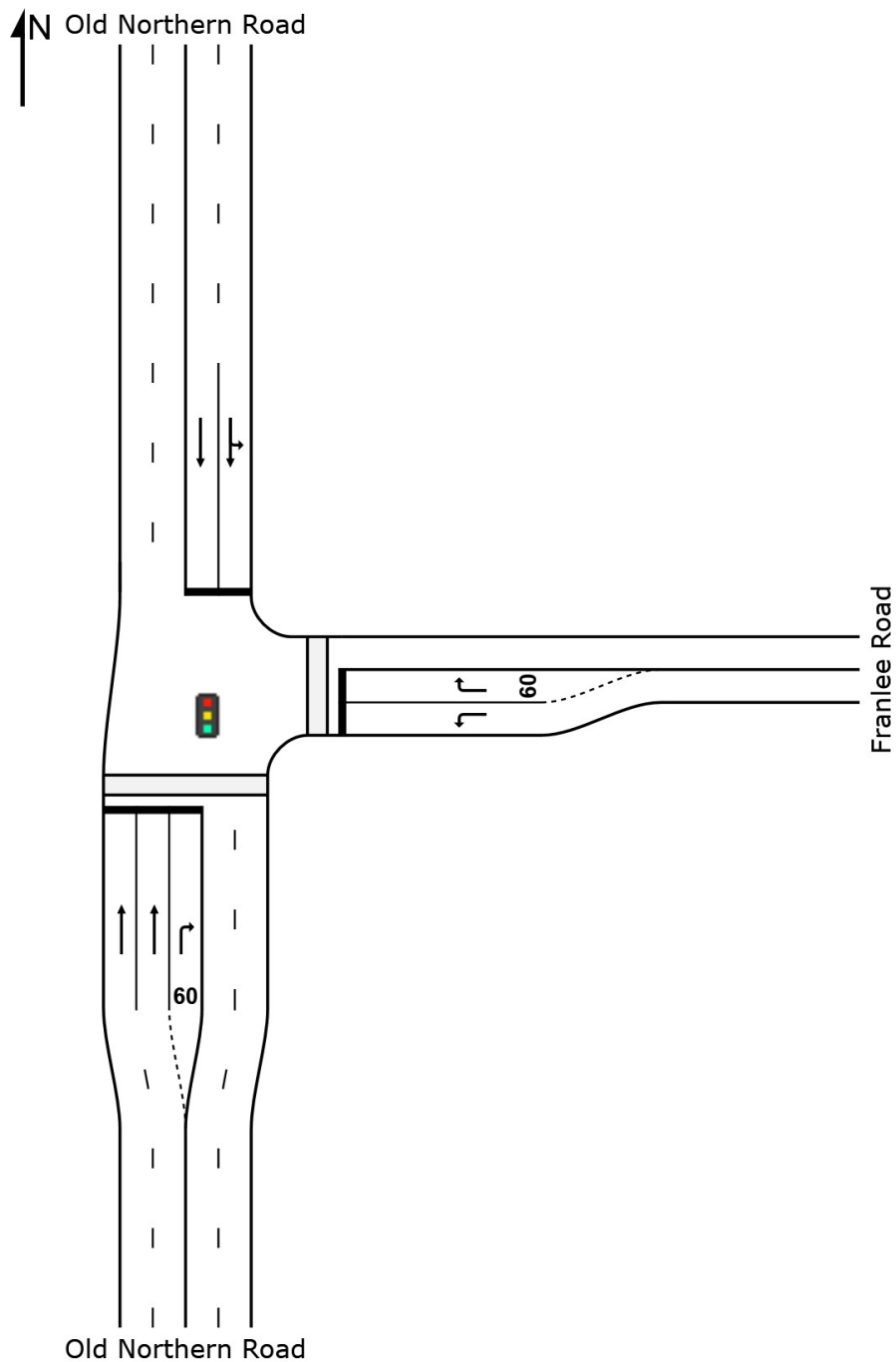
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SITE LAYOUT

 **Site: 106 [I106-Franlee Road and ONR-AM]**

Franlee Road and Old Northern Road Intersection
Signals - Fixed Time Isolated



QUEUE DISTANCE (%ILE)

Largest 95% Back of Queue Distance for any lane used by movement (metres)

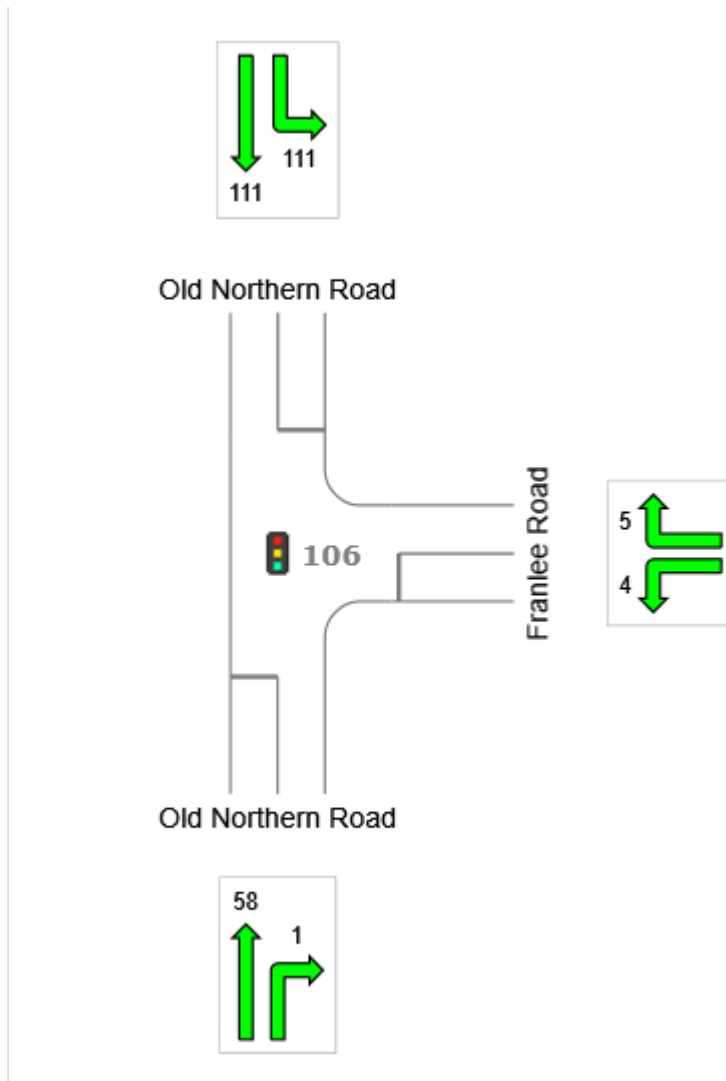
 **Site: 106 [I106-Franlee Road and ONR-AM]**

Franlee Road and Old Northern Road Intersection

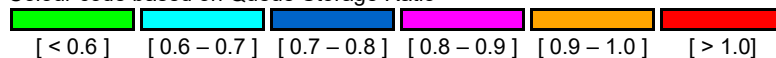
Signals - Fixed Time Isolated Cycle Time = 50 seconds (Practical Cycle Time)

All Movement Classes

	South	East	North	Intersection
Vehicle Queue (%ile)	58	5	111	111



Colour code based on Queue Storage Ratio



DEGREE OF SATURATION

Ratio of Demand Volume to Capacity (v/c ratio)

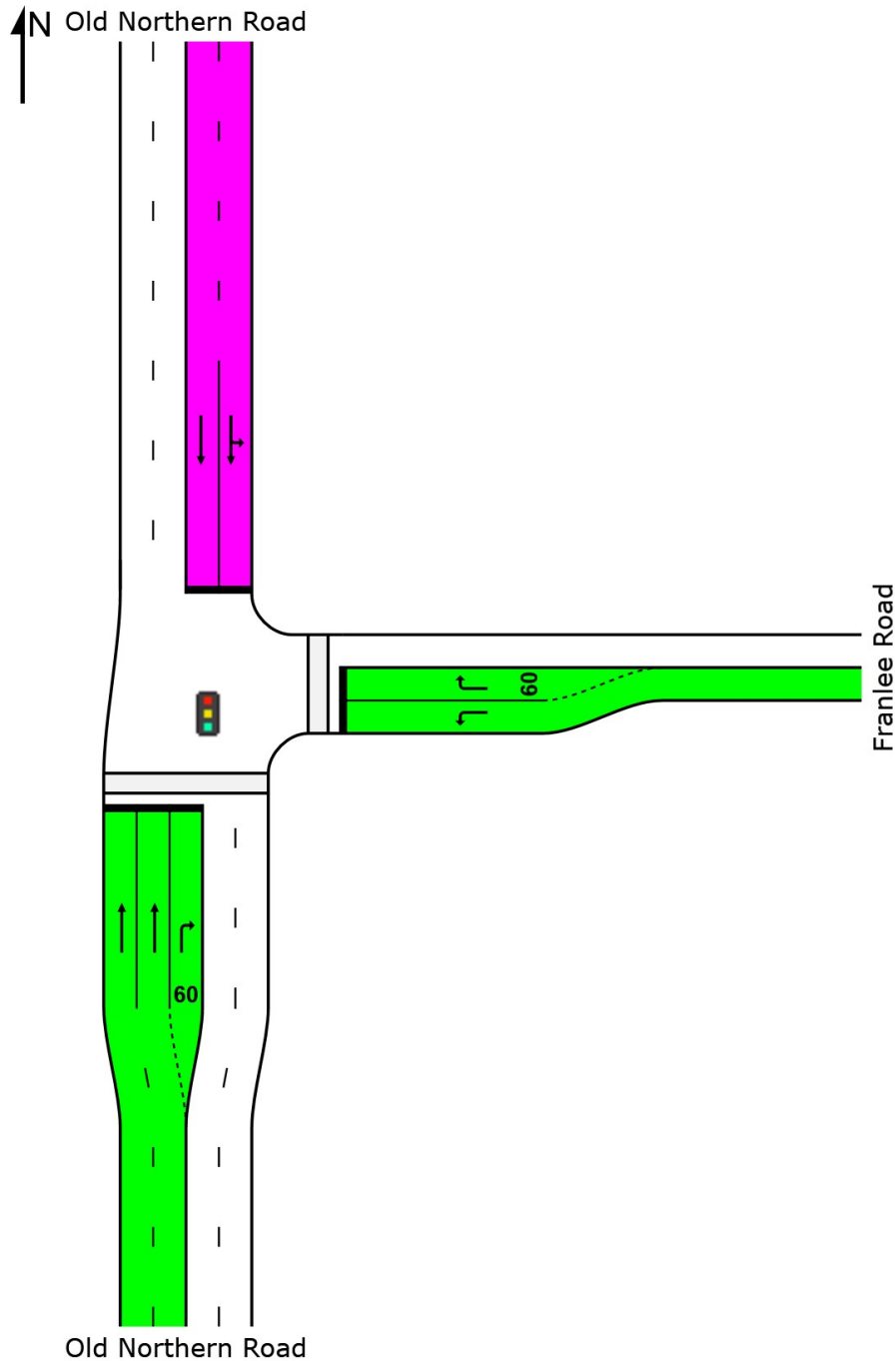
 **Site: 106 [I106-Franlee Road and ONR-AM]**

Franlee Road and Old Northern Road Intersection

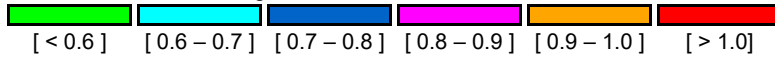
Signals - Fixed Time Isolated Cycle Time = 50 seconds (Practical Cycle Time)

All Movement Classes

	South	East	North	Intersection
Degree of Saturation	0.50	0.13	0.81	0.81



Colour code based on Degree of Saturation



MOVEMENT SUMMARY

 **Site: 106 [I106-Franlee Road and ONR-PM]**

Franlee Road and Old Northern Road Intersection

Signals - Fixed Time Isolated Cycle Time = 50 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Old Northern Road											
2	T1	1152	7.2	0.499	5.7	LOS A	7.8	58.1	0.59	0.52	54.9
3	R2	21	0.0	0.053	18.1	LOS B	0.4	2.5	0.80	0.68	45.2
Approach		1173	7.1	0.499	5.9	LOS A	7.8	58.1	0.59	0.53	54.7
East: Franlee Road											
4	L2	9	0.0	0.013	15.9	LOS B	0.1	1.0	0.64	0.65	46.5
6	R2	6	0.0	0.024	26.3	LOS B	0.1	1.0	0.88	0.65	41.0
Approach		16	0.0	0.024	20.1	LOS B	0.1	1.0	0.74	0.65	44.1
North: Old Northern Road											
7	L2	16	0.0	0.793	24.4	LOS B	14.2	104.8	0.95	0.94	44.8
8	T1	1114	6.1	0.793	18.8	LOS B	14.2	104.9	0.95	0.94	45.8
Approach		1129	6.1	0.793	18.9	LOS B	14.2	104.9	0.95	0.94	45.7
All Vehicles		2318	6.5	0.793	12.3	LOS A	14.2	104.9	0.77	0.73	49.8

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

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

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

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

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

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

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped	
P1	South Full Crossing	53	19.4	LOS B	0.1	0.1	0.88	0.88	
P2	East Full Crossing	53	12.3	LOS B	0.1	0.1	0.70	0.70	
All Pedestrians		105	15.8	LOS B			0.79	0.79	

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

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

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

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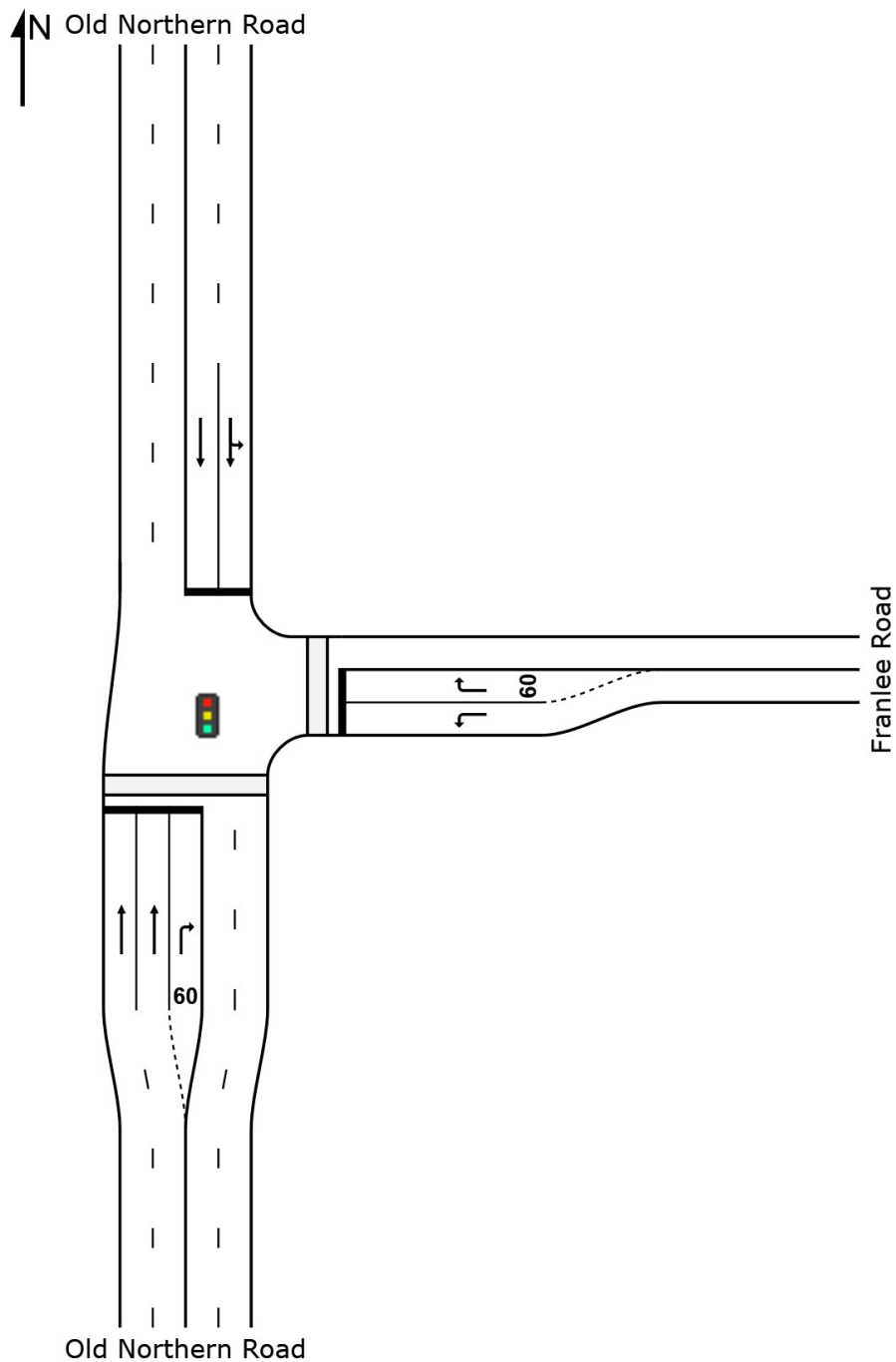
Organisation: PARSONS BRINCKERHOFF AUSTRALIA | Processed: Wednesday, November 1, 2017 8:29:34 PM

Project: U:\Projects\PS106684__South_Dural_Senior\4_WIP\Docs\SIDRA\Amolk\SouthDural_2026Base_RevA.sip7

SITE LAYOUT

 **Site: 106 [I106-Franlee Road and ONR-PM]**

Franlee Road and Old Northern Road Intersection
Signals - Fixed Time Isolated



QUEUE DISTANCE (%ILE)

Largest 95% Back of Queue Distance for any lane used by movement (metres)

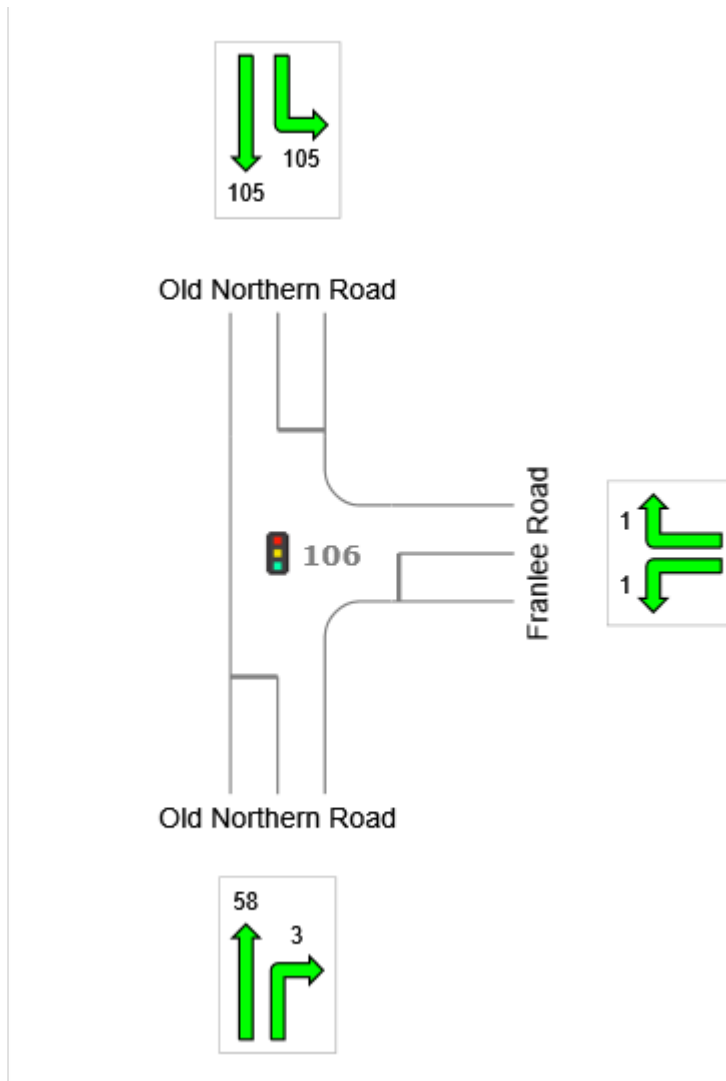
 **Site: 106 [I106-Franlee Road and ONR-PM]**

Franlee Road and Old Northern Road Intersection

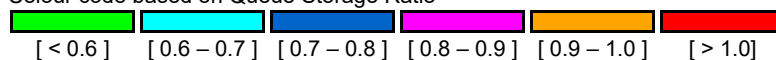
Signals - Fixed Time Isolated Cycle Time = 50 seconds (Practical Cycle Time)

All Movement Classes

	South	East	North	Intersection
Vehicle Queue (%ile)	58	1	105	105



Colour code based on Queue Storage Ratio



DEGREE OF SATURATION

Ratio of Demand Volume to Capacity (v/c ratio)

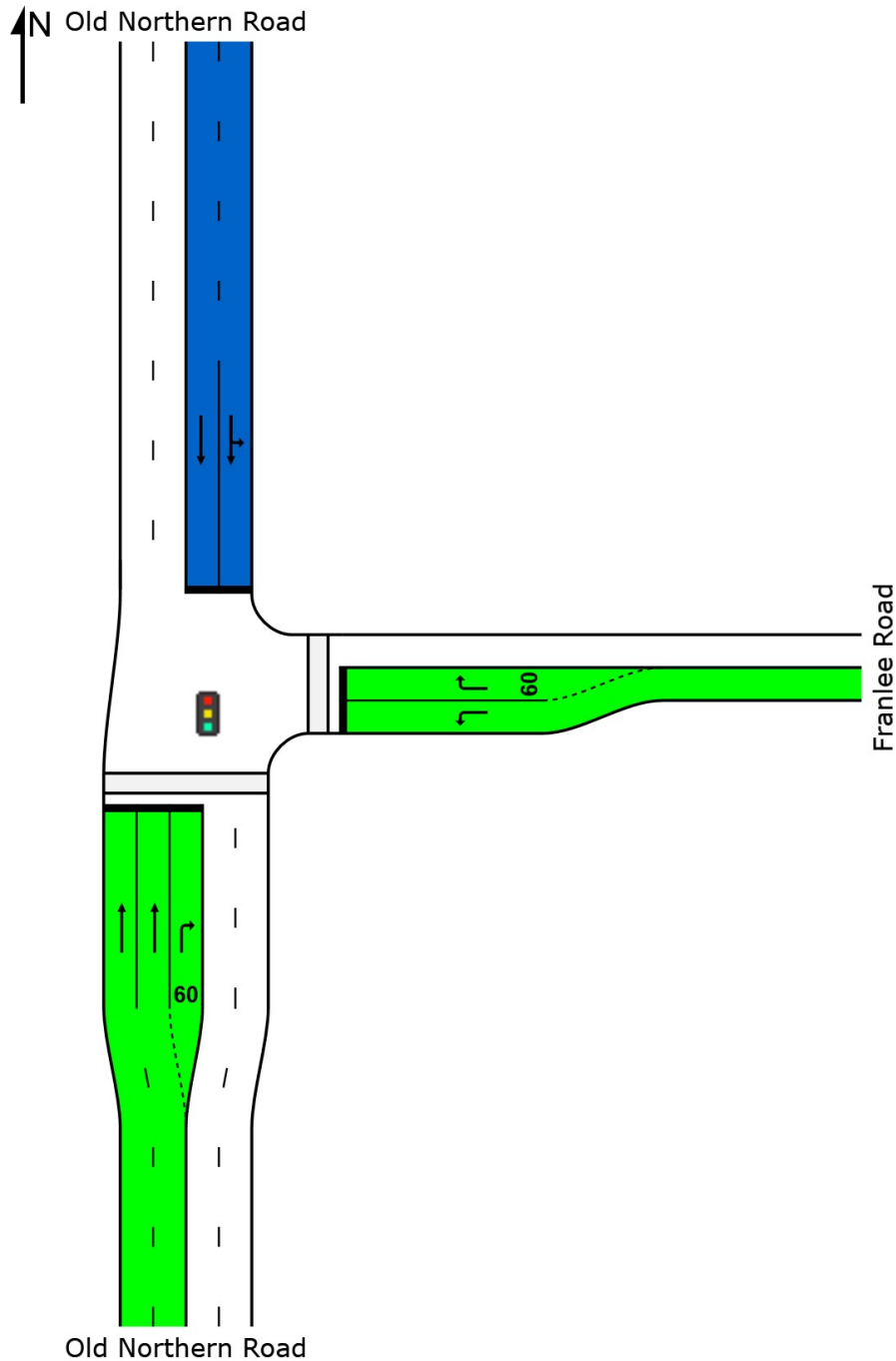
 **Site: 106 [I106-Franlee Road and ONR-PM]**

Franlee Road and Old Northern Road Intersection

Signals - Fixed Time Isolated Cycle Time = 50 seconds (Practical Cycle Time)

All Movement Classes

	South	East	North	Intersection
Degree of Saturation	0.50	0.02	0.79	0.79



Colour code based on Degree of Saturation

