Shepparton South East Growth Corridor

Precinct Structure Plan - Transport Impact Assessment

Prepared for: Victorian Planning Authority

Ref: 300304922 | Date: 13 September 2023

Revision

Revision	Date	Comment	Prepared By	Approved By
C	01/07/2019	Final	Daniel Mead	Reece Humphreys
D-Dr	11/03/2021	Draft	Rebecca Strachan	Reece Humphreys
D	27/07/2021	Final	Rebecca Strachan	Reece Humphreys
E-Dr	25/05/2022	Draft	Rebecca Strachan	Reece Humphreys
E	06/06/2022	Final	Rebecca Strachan	Reece Humphreys
F-Dr	18/07/2023	Draft	Rebecca Strachan	Reece Humphreys
F-Dr2	24/07/2023	Draft	Rebecca Strachan	Reece Humphreys
F-Dr3	31/08/2023	Draft	Rebecca Strachan	Reece Humphreys
F-Dr4	13/09/2023	Draft	Rebecca Strachan	Reece Humphreys

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For and on behalf of

Stantec Australia Pty Ltd

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Acknowledgment of Country

In the spirit of reconciliation, Stantec acknowledges the Traditional Custodians of country throughout Australia and their connections to land, sea and community. We pay our respect to their Elders past and present, and extend that respect to all Aboriginal and Torres Strait Islander peoples.

Limitations

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1. Introduction

1.1 Background and Proposal

The Shepparton South-East Precinct Structure Plan (SSEPSP) is currently being prepared by the Victorian Planning Authority (VPA), in association with Greater Shepparton City Council. When completed, the SSEPSP will provide a long-term plan to guide future development and the Development Contributions Plan (DCP) to apportion the cost of realising the infrastructure required to support the future development of the Shepparton South-East Precinct (SSEPSP).

The SSEPSP is a 385-hectare area generally bounded by Doyles Road to the east, Broken River to the south and existing commercial and residential areas to the north and west respectively. When complete, the PSP will have the capacity to accommodate the land uses summarised in Table 1.1.

Table 1.1 – Development Schedule

Land Use	Proposed
Residential	2,525 dwellings
School	880 students
Community Facilities	4,200 sqm
Retail	3,500 sqm

Stantec Australia Pty Ltd (formerly GTA Consultants) were commissioned by the Greater Shepparton City Council (Council) in 2014 to undertake a transport study for the SSEPSP to confirm the transport network required to support the PSP, including intersection layouts to input into the Development Contributions Plan (DCP). Council then engaged Stantec to update the Transport Impact Assessment Report (TIAR) in 2019 to inform the future planning scheme amendment.

In 2022 the Victorian Planning Authority (VPA) engaged Stantec to finalise the TIAR for exhibition of the PSP.

1.2 Purpose of this Report

The purpose of this report is to test and validate the proposed transport network that is set out in the Placed Based Plan of the PSP. It seeks to summarise and capture the outcomes of a range of background studies and reports that have informed items such as intersection type and control for the PSP.

In completing the report, the following items have been assessed:

1. existing and future road infrastructure and operating conditions surrounding the PSP
2. traffic generation and distribution characteristics of the ultimate PSP development
3. ability of the proposed road network to accommodate the future demands of the PSP
4. a determination of the suitability of the proposed intersection types (and layouts) to accommodate the future demands of the PSP.

The outputs of this report form part of an input into determining the transport infrastructure requirements in the preparation of the Developer Contributions Plan (DCP).

1.3 References

In preparing this report, reference has been made to the following:

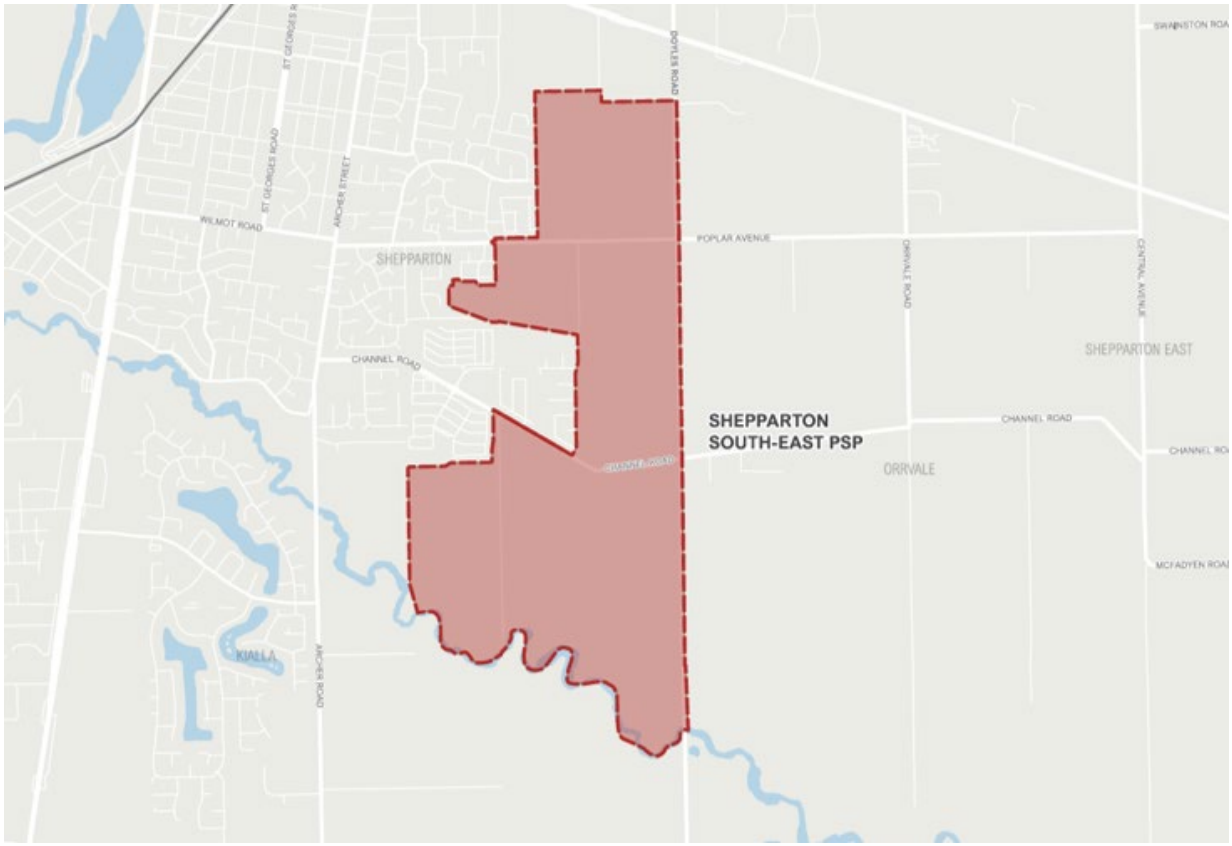
- Greater Shepparton Planning Scheme
- plans and documentation for the PSP prepared by the VPA
- traffic surveys undertaken by Greater Shepparton City Council and the Department of Transport and Planning (DTP) as referenced in the context of this report
- various technical data as referenced in this report
- an inspection of the site and its surrounds
- other documents as nominated.

2. Site Context

2.1 Location

The SSEPSP is a site of approximately 385 hectares and is located 3.5km southeast of the Shepparton CBD. The location of the subject site and the surrounding environs is shown in Figure 2.1.

Figure 2.1 – Subject Site and is Environs



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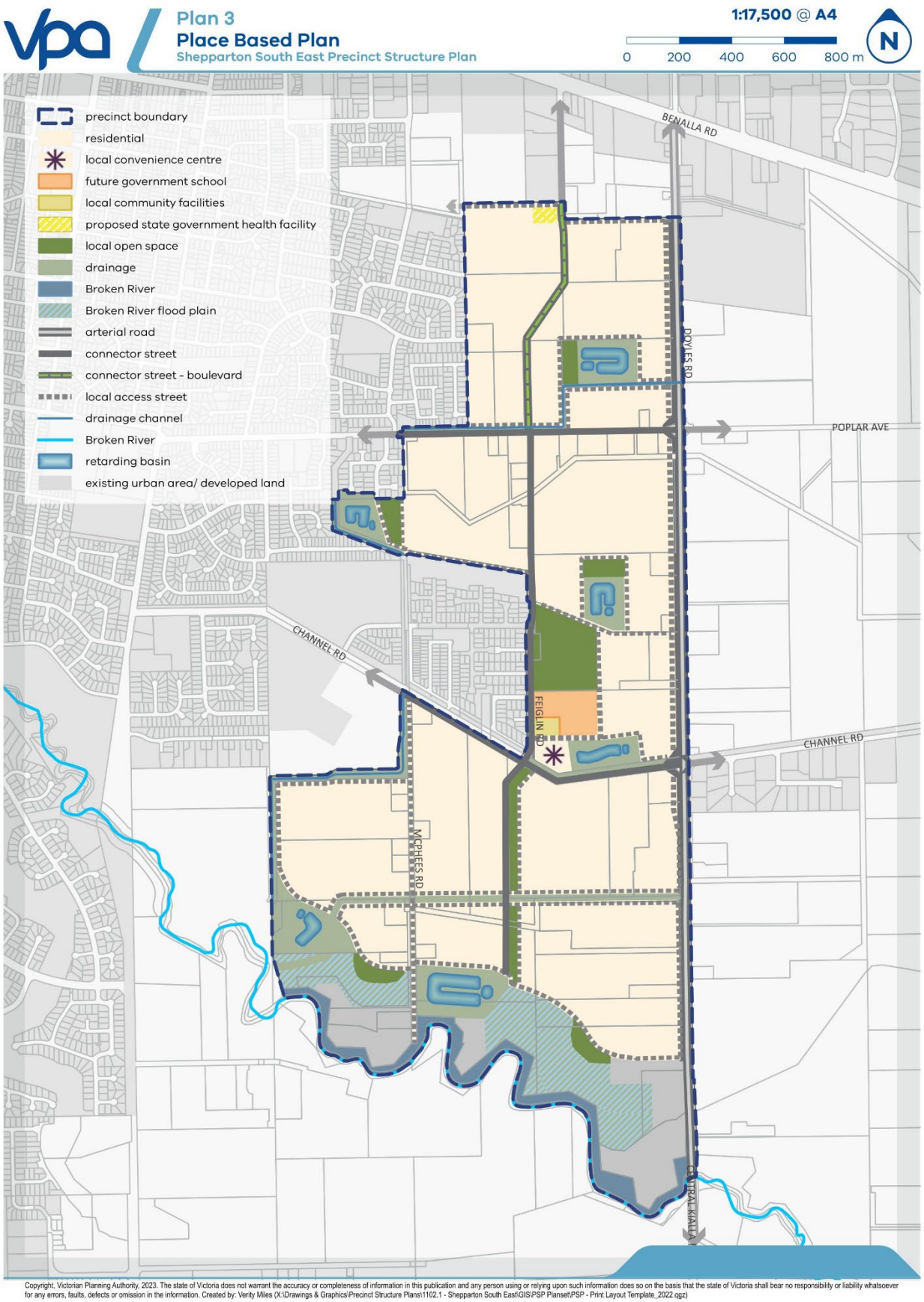
2.2 Precinct Structure Plan

It is envisaged that the SSEPSP includes a range of standard single dwelling low-density residential lots, as well as supporting educational, commercial and community services. The proposed Placed Based Plan, prepared by the VPA, of the PSP is shown in Figure 2.2.

Figure 2.2 – Shepparton South East PSP – Placed Based Plan



Source: Plan provided by VPA

The urban structure aims to utilise, where possible, the existing road network and configuration, as well as providing localised access and connections to existing and proposed land uses. Further discussion on the proposed arrangements and suitability of the road network is provided in the following sections.

2.3 Anticipated Development Yields

The anticipated development yields for the SSEPSP were provided by the VPA study team and are summarised based on the sub-areas outlined in Figure 2.3 and Table 2.1. The internal sub-areas (or zones) have been adopted in the modelling process which is summarised in Section 3.

Figure 2.3 – PSP Zone Structure

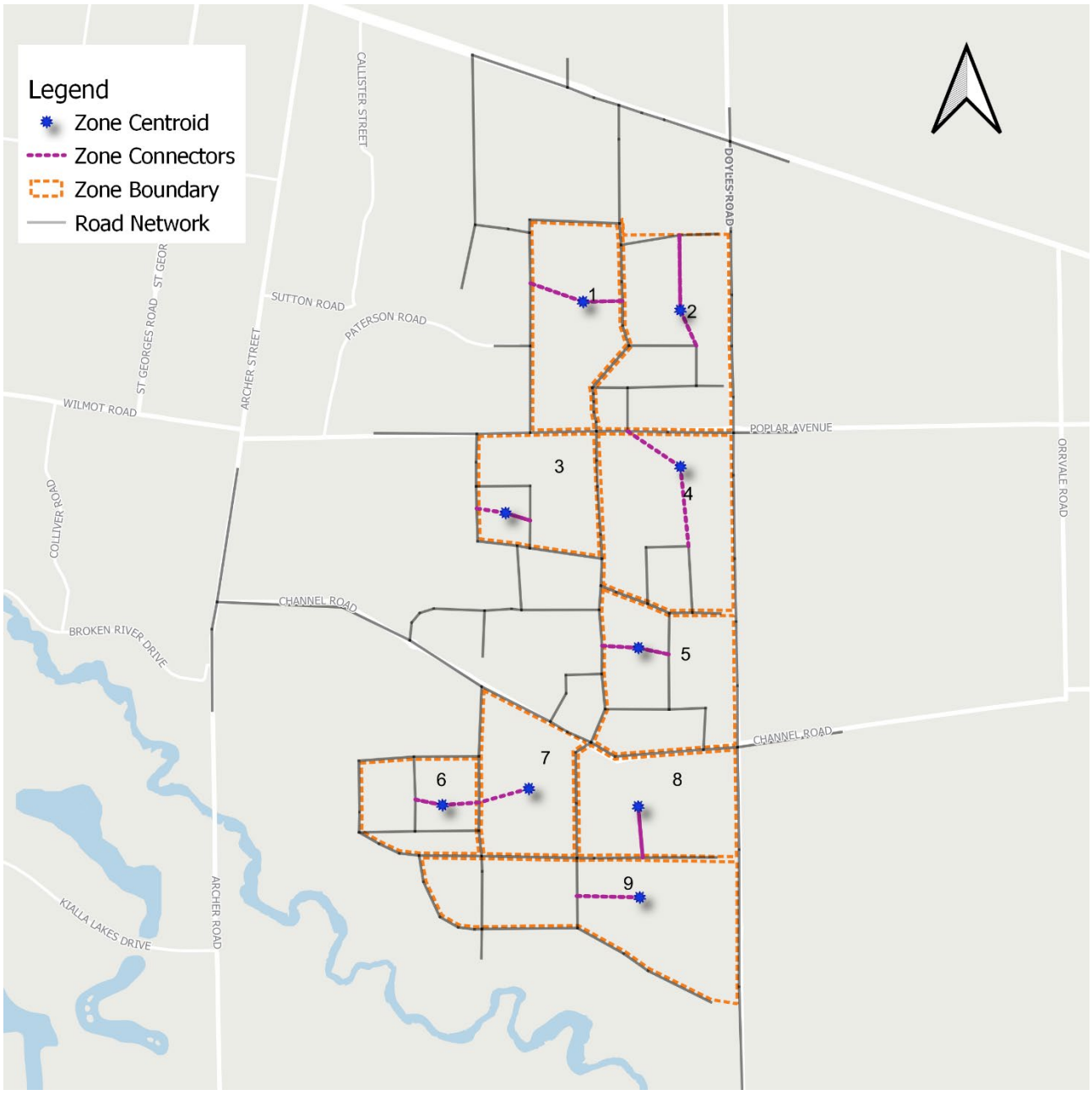


Table 2.1 – Anticipated Development Yields

Zone	Residential	Primary School	Community Facilities	Retail Uses
1	254 dwellings	-	-	
2	331 dwellings	-	-	
3	237 dwellings	-	-	
4	348 dwellings	-	-	
5	145 dwellings	35,000 sqm 808 students 40 Staff	4,200 sqm	3,500 sqm
6	191 dwellings	-	-	
7	215 dwellings	-	-	
8	271 dwellings	-	-	
9	533 dwellings	-	-	
Total	**2,525 dwellings**	**808 students**	**4,200**	**3,500 sqm**

As outlined in Table 2.1, the PSP is anticipated to ultimately include some 2,525 residential dwellings, a school with up to 808 students, 4,200 sqm of community facilities and 3,500 sqm of retail uses.

2.4 SSEPSP Transport Network

The transport network of the PSP has been developed to align with the existing network and to minimise the number of new links. The PSP is bordered by an arterial road (Doyles Road) to the east, existing commercial land uses to the north, Broken River along its southern frontage and an existing residential road network to the west. The road network presented in the PSP has been reproduced in Figure 2.4. The existing and anticipated future characteristics of the key roads and intersections surrounding and within the PSP are discussed in the following sections.

2.4.1 Arterial Roads

Midland Highway (Benalla Road)

Midland Highway (A300) functions as a primary state arterial road (VicRoads' controlled) and is located within a Road Zone (Category 1) in the Greater Shepparton Planning Scheme. It is a divided two-way road aligned in an east-west direction and configured two-lanes in each direction, with a raised median that accommodates right turn lanes. A 60km/h speed limit applies. A service lane exists in sections on the southern side of the road, providing access to the fronting properties.

Midland Highway provides a strategic function with the efficient movement of freight between Benalla and Bendigo via Shepparton. It was only recently duplicated between Florence Street and Doyles Road (completed July 2013) and is expected to be further duplicated east to Orrvale Road in the near future (refer to Planning Scheme Amendment C148 of the Greater Shepparton Planning Scheme).

Midland Highway between High Street and Doyles Road currently carries approximately 16,080 vehicles per day[1].

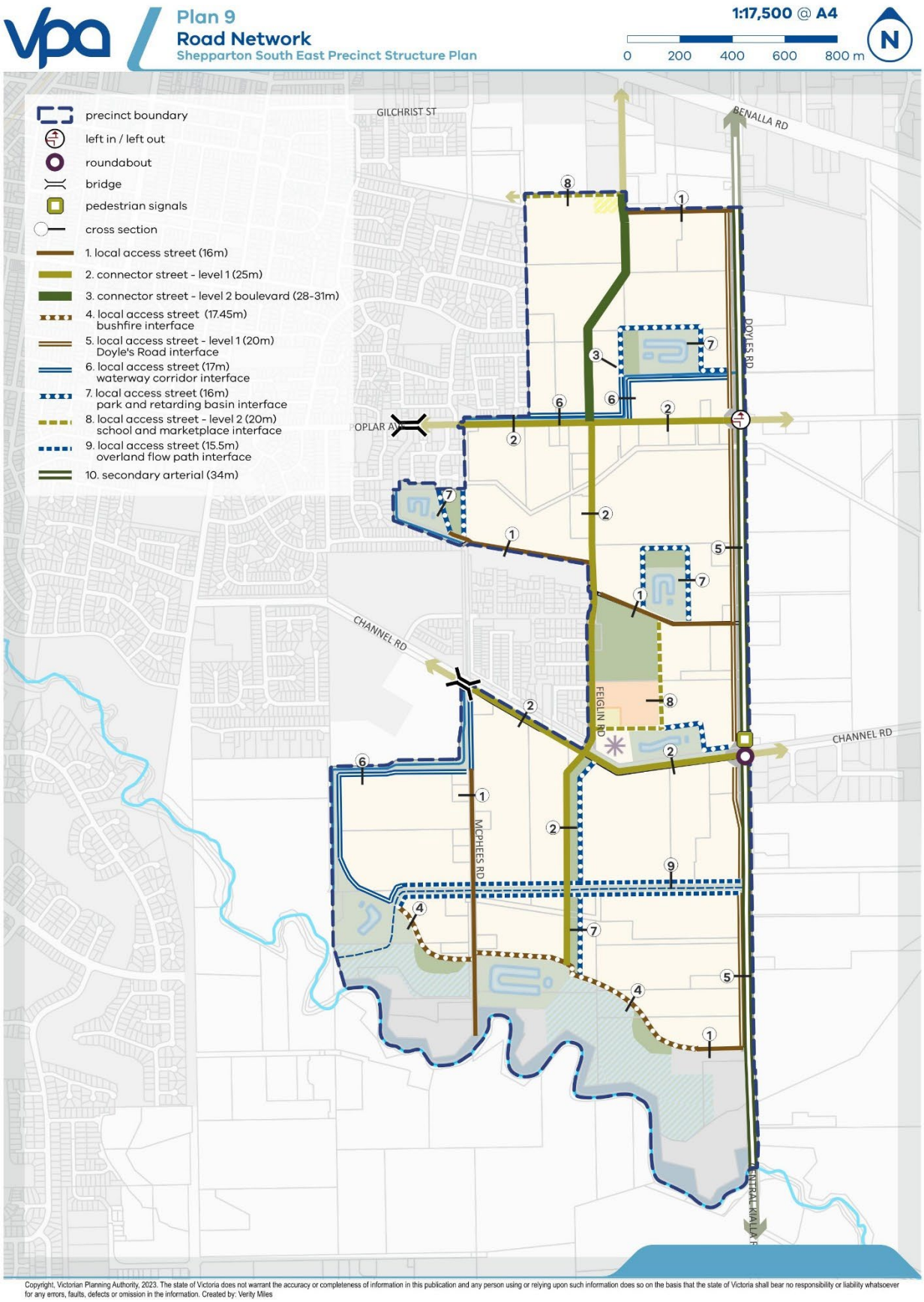
Doyles Road

Doyles Road (C391) functions as a secondary arterial road (VicRoads' controlled) and is currently part of the heavy vehicle bypass route, known as the Shepparton Alternative Route (SAR) which connects Goulburn Valley Highway on the southern edge of Shepparton to the Grahamvale Road intersection at Congupna. It is also located within a Road Zone (Category 1) in the Greater Shepparton Planning Scheme. It is a two-way road aligned in a north-south direction and configured with a two-lane carriageway (one lane in each direction), with localised widening at some intersections to provide for right turn deceleration lanes. A 60km/h speed limit applies between Midland Highway and the northern side of Poplar Avenue, and an 80km/h speed limit applies between the northern side of Poplar Avenue and River Road.

It is understood that a business case has been prepared that investigates capacity upgrades along the Shepparton Alternative Route (SAR) and including Doyles Road. Once delivered, the SAR would include roundabout upgrades and asphalt resurfacing to accommodate additional freight movements.
Doyles Road south of Benalla Road currently carries approximately 8,900 vehicles per day (19% heavy vehicles)[2].

[1] Based on SCATS data analysis of the intersection of Midland Highway and Zurcas Lane, in May 2023.
[2] Based on traffic surveys undertaken by Greater Shepparton Council in November 2018.

Figure 2.4 – Road network around PSP



2.4.1 Local Roads

Zurcas Lane

Zurcas Lane is a local road (Council controlled) and functions as a local access street – Level 1. It extends south into the study area from its signalised intersection with Midland Highway, and is a two-way road aligned in a north-south direction and configured with a two-lane carriageway (one lane in each direction) with kerbside parking. A default local road speed limit of 50km/h applies.

Zurcas Lane is currently primarily used as a local access route to the abutting commercial properties but is proposed to provide the study area with localised access, as well as a route between Midland Highway and Poplar Avenue. Zurcas Lane, south of Midland Highway currently carries approximately 700 vehicles per day (2% heavy vehicles)[3].

Archer Street

Archer Street is a local road (Council controlled) and functions as a connector street – Level 2. To the west of the study area, it is a two-way road aligned in a north-south direction and configured with a two-lane carriageway (one lane in each direction) with kerbside parking and on-road bicycle lanes, as well as a bus service. A speed limit of 60km/h applies between Midland Highway and Oxbow Avenue with localised 40km/h speed limits applicable in sections during school peaks. Archer Street is primarily used as an access route for all the residential areas to the southeast of Shepparton to Midland Highway. Archer Street currently carries approximately 11,000 vehicles per day (5.0% heavy vehicles)[4] between Wimmera Drive and Channel Road.

Poplar Avenue

Poplar Avenue is a local road (Council controlled) that functions as a connector street – Level 1 and connects Archer Street to Doyles Road through the study area. It is a two-way road aligned in an east-west direction and configured with a two-lane carriageway (one lane in each direction). A 60km/h speed limit applies between Archer Street and 230m east of Streeton Drive. An 80km/h speed limit applies between 230m east of Streeton Drive and Doyles Road

Poplar Avenue will provide the study area with localised access, as well as a route between Archer Street and Doyles Road. It is proposed that Poplar Avenue will only have left in / left out movements on both sides of Doyles Road.

Poplar Avenue currently carries approximately 4,300 vehicles per day (3.5% heavy vehicles)[5] between Archer Street and Yorkshire Crescent.

Channel Road

Channel Road is a local road (Council controlled) that functions as a connector street – Level 1 and connects Archer Street to Doyles Road through the study area. It is a two-way road aligned in an east-west direction and configured with a two-lane carriageway (one lane in each direction). A 60km/h speed limit applies between Archer Street and Davinci Drive (eastern end). An 80km/h speed limit applies between Davinci Drive (eastern end) and Doyles Road.

Channel Road will provide the study area with localised access, as well as a route between Archer Street and Doyles Road. It is proposed that the intersection of Channel Road / Doyles Road will be upgraded to a roundabout with all movements permitted.

Channel Road currently carries approximately 2,400 vehicles per day (10% heavy vehicles)[6] between Mozart Avenue and Feiglin Road[7].

Feiglin Road

Feiglin Road is a local road (Council controlled) that functions as an access street and generally extends between Poplar Avenue and Channel Road. It is a two-way road aligned in a north-south direction and configured with a two-lane carriageway (one lane in each direction) with kerbside parking available in the southern residential section. Feiglin Road currently carries approximately 260vpd (10-14% heavy vehicles) at a point 200m south of Poplar Avenue[8].

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3 Based on Traffic Surveys conducted by Greater Shepparton City Council between 23-24 February 2021.

4 Based on Traffic Surveys conducted by Greater Shepparton City Council between 11-12 November 2020 on Archer Street between Wimmera Drive and Channel Road

5 Based on Traffic Surveys conducted by Greater Shepparton City Council on 21 July 2021 on Poplar Avenue between Archer Street and Yorkshire Crescent.

6 Based on Traffic Surveys conducted by Greater Shepparton City Council on 21 July 2021 on Poplar Avenue between Archer Street and Yorkshire Crescent.

7 Based on Traffic Surveys conducted by Greater Shepparton City Council between 23-25 June 2020 on Channel Road between Mozart Avenue and Feiglin Road.

8 Based on Traffic Surveys conducted by Greater Shepparton City Council between 8-10 November 2018 on Feiglin Road, 200m south of Poplar Avenue.

Feiglin Road will provide the study area with localised access, as well as a route between Poplar Avenue and Channel Road.

2.4.2 Summary

These two-way daily traffic volumes are summarised in Table 2.2.

Table 2.2 – Summary of Two-Way Daily Volumes on Key Roads (Existing)

Road Name	Daily Traffic Volume	Classification / Authority	Number of lanes
Midland Highway	16,080vpd	Primary Arteria – DTP	Four Lanes (two each way)
Doyles Road	8,900vpd	Secondary Arterial – DTP	Two Lanes (one each way)
Archer Street	11,000vpd	Connector Street – Council	Two Lanes (one each way)
Poplar Avenue	4,300vpd	Connector Street – Council	Two Lanes (one each way)
Channel Road	2,400vpd	Connector Street – Council	Two Lanes (one each way)
Zurcas Lane	700vpd	Local Access Street – Council	Two Lanes (one each way)

DTP – Department of Transport and Planning

2.5 Future Transport Network in Shepparton

Planning and development of the transport network accessing and within Shepparton is ongoing. A number of north-south and east-west network improvements are proposed to support growth and to improve traffic and amenity in the existing parts of Shepparton. These improvements are generally built on the delivery of the Shepparton Bypass, which consists of the continuation of the duplicated four-lane cross-section of Goulburn Valley Highway to travel around the western side of Shepparton to Congupna in the north.

The associated 36km four-lane Shepparton Bypass was estimated to cost approximately $1.3 billion in 2016. As such, the project has been split into five stages, with a single carriageway each way in the first instance, to get the project underway and funded.

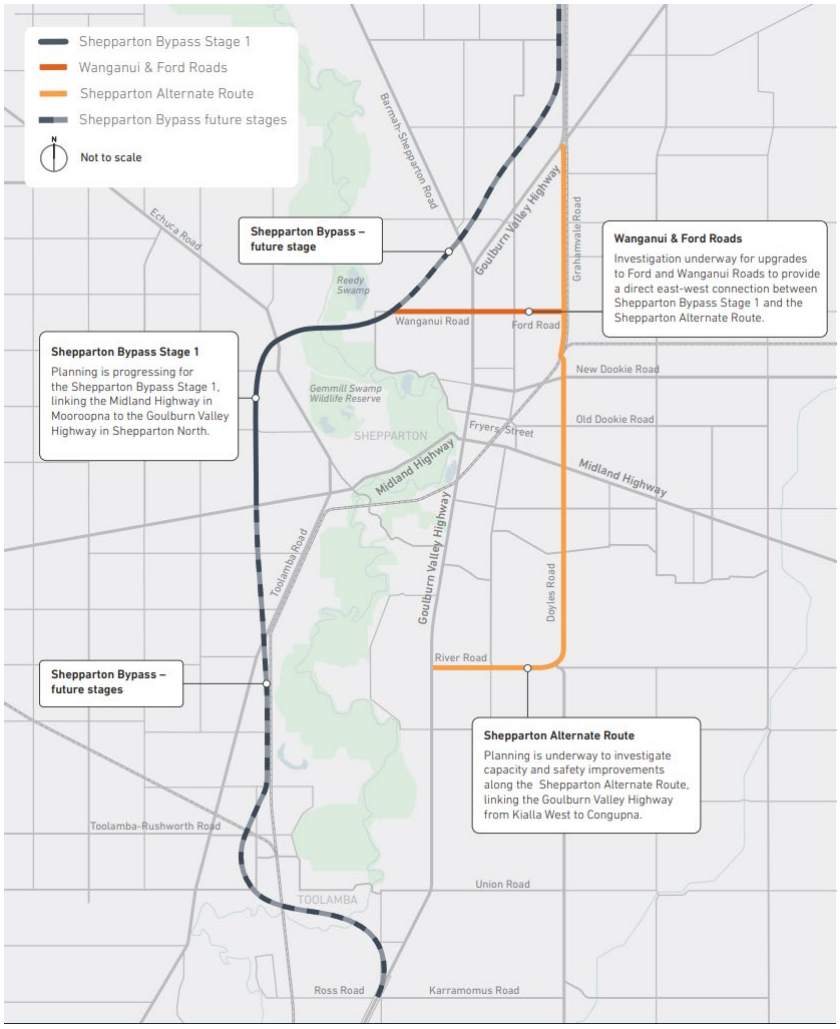
In the short term, the following network improvement are being investigated:

- Shepparton Bypass Stage 1: Between Midland Highway and Wanganui Road
- Shepparton Alternative Route (SAR): Upgrade of River Road, Doyles Road and Grahamvale Road
- Link between Bypass and SAR: Upgrade of Wanganui Road and Ford Road
- Midland Highway Safety Improvements.

The associated investigations are being led by Regional Roads Victoria (RRV)/DTP through a Project Liaison Group (PLG). The PLG includes representatives from Council, relevant Victorian Government agencies, key environment and community groups and local landowners.

An image of the network improvements currently being investigated is presented in Figure 2.5.

Figure 2.5 – Shepparton Network Improvements Being Investigated

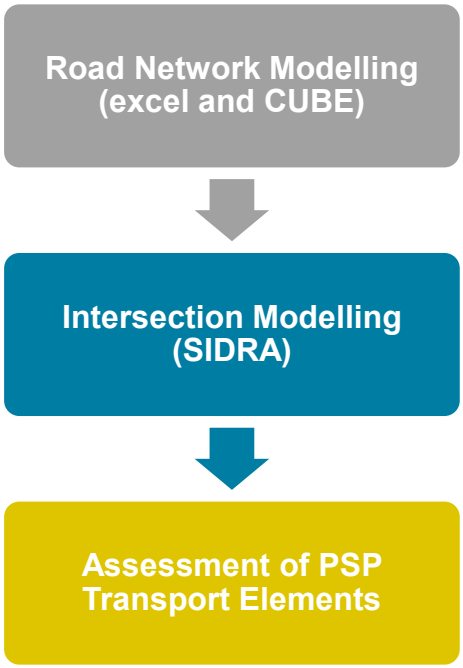


3. Traffic Impact

3.1 Overview

The approach to the overall transport impact assessment adopted for the analysis of the SSEPSP is broadly summarised in Figure 3.1.

Figure 3.1 – Traffic Impact Methodology



Traffic generation and distribution inputs are used to develop an origin-destination (O-D) matrix in excel. CUBE software is then used to assign the O-D matrix to the network resulting in network traffic volume plots and turning movement data.

The network AM and PM peak turning traffic volumes from the road network modelling are used to determine the intersection requirements through SIDRA Intersection modelling.

The outcome of the Road Network modelling and SIDRA Intersection modelling are used to assess the road network requirements of the PSP.

It is noted that the road network modelling outlined in this report provides a broad indication of the traffic volumes likely to be generated by the PSP and its surrounds.

For the purposes of this analysis, a design year of 2031 has been selected from a Base year of 2019. The design year represents a point in time when the PSP has been assumed to be delivered as well as the known transport network upgrades. The design year also accounts for broader growth in the surrounding areas of Shepparton.

The model is a peak period (one hour) AM and PM peak model with daily volumes extrapolated by using the AM and PM peak hour volumes and applying a peak to daily ratio which was obtained from localised tube count surveys[9].

It is acknowledged that the analysis is based on future road network and development yield inputs, which are centred on a range of underpinning assumptions that may vary as the development of the area proceeds.

Section 3.2 summarises the Road Network Modelling, with the Intersection Modelling summarised in Section 4.

3.2 Road Network Modelling Methodology

The road network modelling process for this study is based on the following steps:

Step 1: Traffic Generation: the trips generated by the PSP area were calculated by applying appropriate generation rates to the land uses defined within each of the internal zones of the study area.

Step 2: Traffic Distribution: the generated trips are distributed to internal and external zones based on key origins and destinations in and around the PSP area. In conjunction with Step 1 this allows an origin-destination (O-D) matrix for the PSP generated traffic to be formulated in excel.

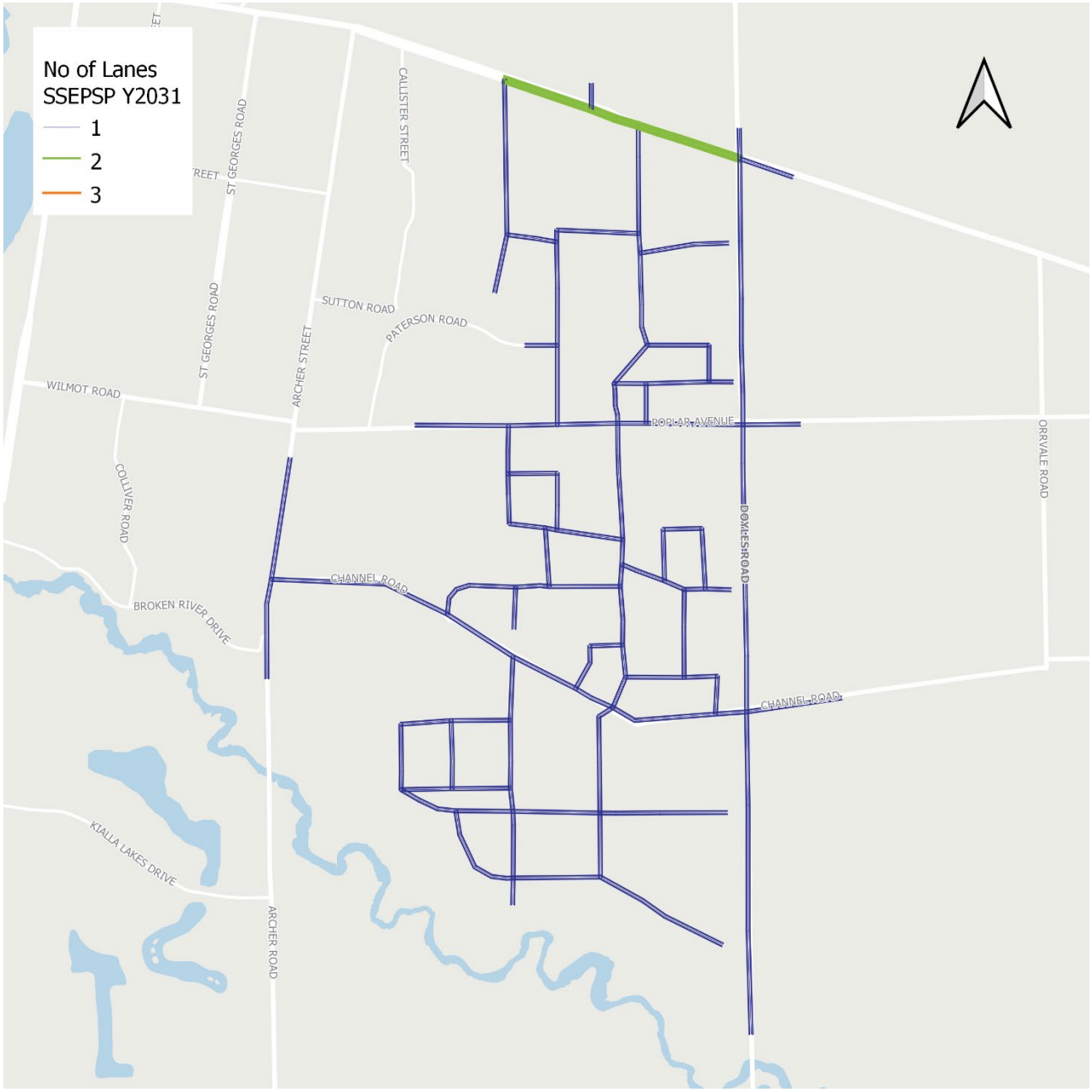
Step 3: Background Traffic Volume Assessment: the anticipated 2031 background traffic volumes on the network that do not have an origin or destination in the PSP area were assessed.

[9] Daily Traffic Volumes formula = $5.505964 * (AM\ Peak\ Hour + PM\ Peak\ Hour)$

Step 4: Traffic Assignment: the O-D matrix and background traffic volume data was input into CUBE modelling software which assigned the vehicle trips onto the road network. The CUBE assignment process distributes traffic with consideration given to the travel time and capacity constraints of road links; however, it does not consider changes in travel behaviour as a result of delays experienced at intersections (which would require more detailed operational modelling).

Each of the above steps and the resulting 2031 post-development traffic volumes are summarised in the following sub-sections. The extent of the modelled network is shown graphically in Figure 3.2.

Figure 3.2 – Shepparton South East Transport Model Extent (Future Network)



3.3 Model Suitability

3.3.1 Background

The assignment model developed for this project was originally prepared in 2014 as part of the initial engagement on the PSP. Since the initial development of the 2014 model, a standalone strategic transport model of Shepparton was developed by AECOM for the City of Greater Shepparton that is owned by the Department of Transport and Planning (Formerly DoT) and has helped inform analysis and planning of the Shepparton transport network.

In 2018 the model was updated by Major Road Projects Victoria (MRPV) to reflect more specific elements of the design of Stage 1 of the Shepparton Bypass and other proposed network level interventions. Unfortunately, MRPV have advised Stantec that they are unable to obtain a copy of the 2018 model update. The model is referred to as the Shepparton Strategic Transport Model (SSTM).

In 2018, the DTP also developed a model of Shepparton as part of the expansion of the State-wide Victorian integrated Transport Model (S-VITM).

As part of the update to the TIAR in 2018, a review was undertaken of the three models to obtain consensus and agreement from stakeholders on the preferred model to utilise moving forward. The memorandum, dated 4th December 2018, indicated that in the vicinity of the study area the SSEPSP Model (i.e. this model) is the most accurate model when compared to traffic counts. It also recommended the use of this model such that it is able to easily adjust Base Volumes to reflect the existing volumes on the network.

The above approach has been agreed with the VPA, DTP and The City of Greater Shepparton.

3.3.2 SSEPSP Model Updates

As part of this transport impact assessment there was opportunity to review the original SSEPSP model and ensure that it accurately reflected existing conditions. In doing so, the following refinements were made to the 2018 base model:

- The zone connector locaions at the northern end of the model were updated to include Zurcas Lane, and align the zone connector for the western zone to be opposite Florence Street (Zone 17), thereby facilitating full turning movements.
- The existing internal road network and zone connector locations were updated to allow more accurate distribution of traffic from zones.
- Speed limits along the existing roads were corrected to reflect changed conditions.

Figure 3.3 – Original Zone Structure

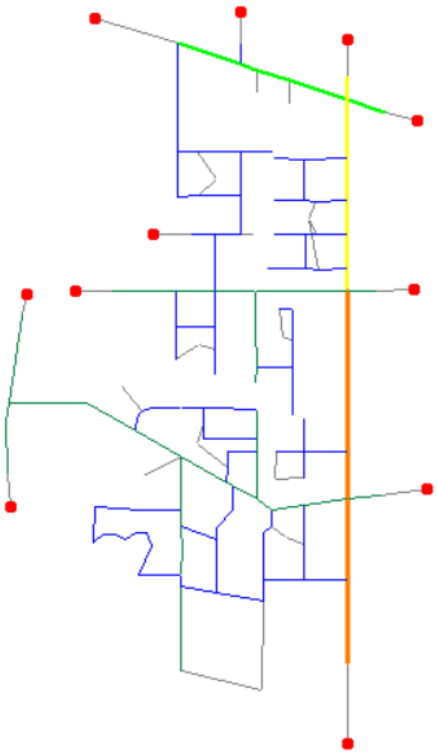
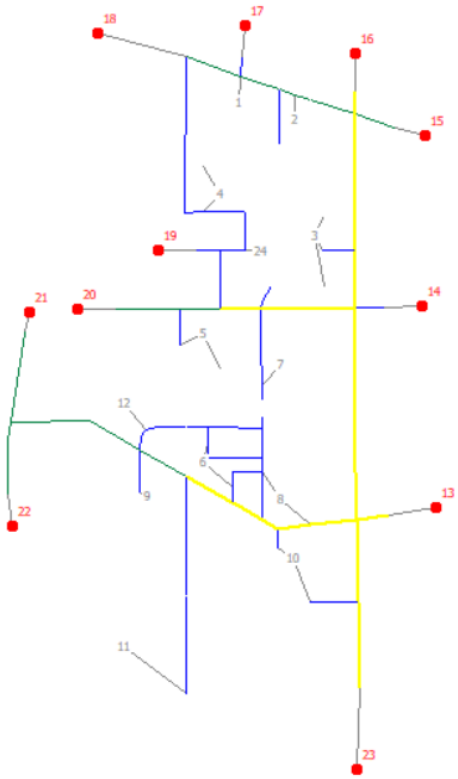


Figure 3.4 – Updated Zone Structure



All model outputs have been converted to reflect a 1 hour peak period instead of the previous 2 hour peak periods. This allows ease of understanding plots, direct addition of site generated traffic and adaption to turning movement counts for the SIDRA analysis discussed further on in this report.

The observed traffic volumes used for comparison against the model were also reviewed, using additional surveys along Doyles Road and SCATS data at signalised intersections along Midland Highway.

As a result of the above changes, the model validation performance presented in this report has improved providing greater confidence in the future year assessments.

3.3.3 Comparison of modelled and observed data (2018)

A comparison of the updated 2018 Base (modelled) and 2018 observed data[10] has been undertaken and is summarised in Table 3.1. The comparison has focused on the Doyles Road and the Midland Highway due to the availability of data, the lack of network in the VITM.

Table 3.1 – Comparison of Base Case (modelled) and 2018 observed data

Location	Direction	AM Peak				PM Peak			
		Modelled	Obs.	Diff	GEH	Modelled	Obs.	Diff	GEH
Doyles Road South of Midland	NB	474	280	194	9.99	344	535	-191	9.11
	SB	298	330	-32	1.81	452	570	-118	5.22
Doyles Road South of Poplar	NB	437	420	17	0.82	337	455	-118	5.93
	SB	313	220	93	5.70	419	420	-1	0.05
Doyles Road South of Channel	NB	317	260	57	3.36	215	135	80	6.05
	SB	176	110	66	5.52	279	260	19	1.16
Midland Highway @Florence	EB	316	230	86	5.19	494	740	-246	9.88
	WB	386	450	-64	3.13	554	530	24	1.05
Midland Highway @ Zurcas Lane	EB	366	310	56	3.03	640	730	-90	3.45
	WB	453	450	3	0.12	640	530	110	4.53

The comparison indicates that that AM peak model is generally higher than the observed (by approximately 9.8%), however the GEH[11] values are less than 10. Conversely, the PM peak model is generally lower than the observed data (by approximately 14.2%) however this also shows a good correlation (GEH) between the two data sets.

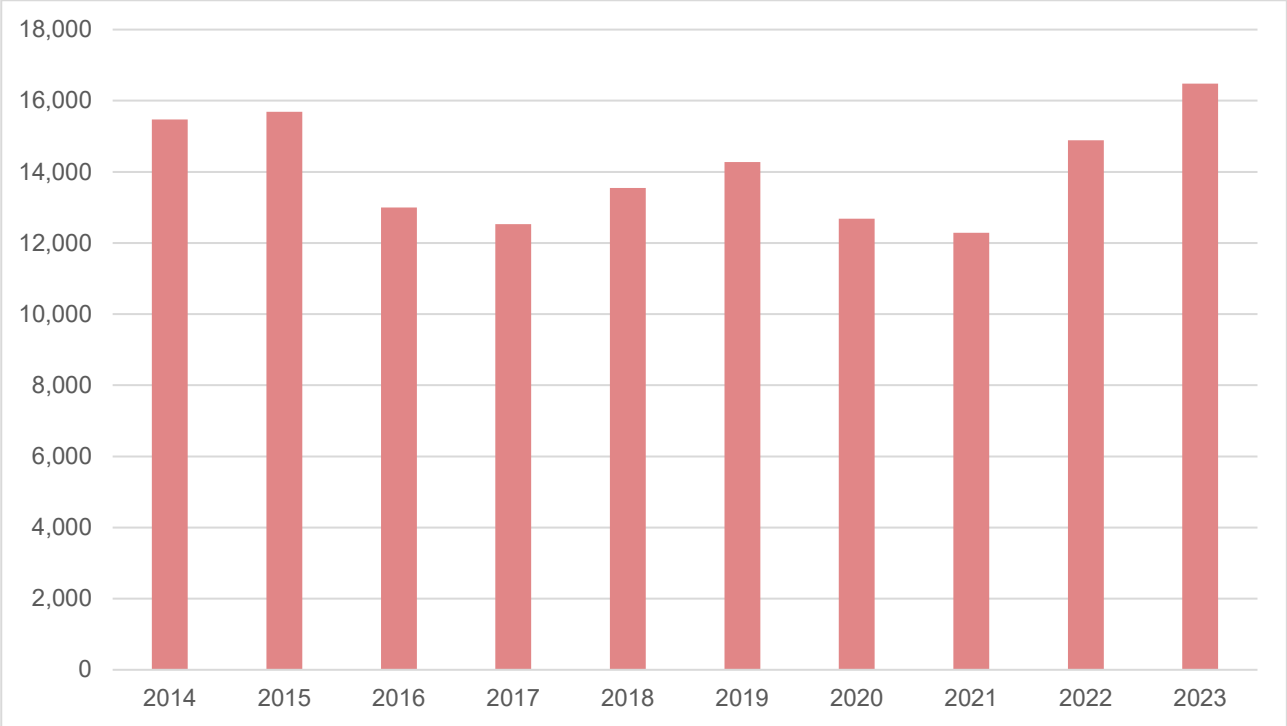
Although there are some differences between the two data sets, the modelled daily volumes are less than 5% lower than the observed, indicating a comparative assessment has been undertaken. It is highlighted that the modelled volumes on Doyles Road, in the vicinity of the Channel Road intersection, are higher than observed volumes in both the AM and PM peak period and result in (conservatively) higher forecast for the 2031 volumes. Therefore it is considered that the use of the SSEPSP model is appropriate for understanding the performance of the network directly adjacent to the PSP and the intersection treatment proposed in this assessment.

It is also noted that the model is representative of a 2018 base case and in order to understand any changes in travel on the Shepparton Network a review of SCATS detector data for the last 10 years has been undertaken and summarised in Figure 3.5.

[10] Peak hour observed data based on Tube Count Surveys from 13-19 November 2018. SCATS detector count data from the same time period has been used to determine observed demands along Midland Highway.

[11] GEH value is a formula used to compare two sets of traffic volumes.

Figure 3.5 – Average Weekday Volumes on Midland Highway and Zurcas Lane for Month of May



The review focuses on the intersection of Midland Highway and Zurcas Lane which has the most complete set of data for that last 10 years in the vicinity of the site. The data is the average weekday data for all movements for all Thursdays across the entire month of May and shows that the volumes on the Midland Highway have only reached levels of 2014 and 2015 this year, with varying levels of growth and an average 0.7% per annum increase between 2014 and 2023.

There are a number of factors that may influence the daily volumes including COVID, the economy, new links in the network and changes in travel behaviour.

Overall, the data review shows that the agreed 2018 model is still relevant and suitable for use as part of this assessment.

3.4 Traffic Generation

The individual land use components of the PSP have been assessed and appropriate traffic generation rates for each land use type have been adopted to determine the amount of traffic likely to be generated by the PSP.

The traffic generation rates for the various land uses were sourced from surveys undertaken by Stantec and other traffic and transport consultants, as well as the New South Wales Road Transport Authority (RTA) "Guide to Traffic Generating Developments" (RTANSW) document.

The traffic generation rates adopted in the assessment of the PSP are summarised in Table 3.2.

Table 3.2 – Adopted Traffic Generation Rates

Land Use	Generation Rate			Source
	AM Peak	PM Peak	Daily	
Residential	1.0 trips/household	1.0 trips/household	10.0 trips/household	Surveys by Stantec and others of comparable sites with limited public transport accessibility.
School (student)	0.7 trips/student	0 trips/student	1.3 trips/student	Surveys by Stantec and other consultants
School (staff)	1.0 trip/staff	1.0 trip/staff	2.0 trips/staff	First principles assessment
Community Facilities	5.0 trips/100sqm	5.0 trips/100sqm	50 trips/100sqm	RTANSW and first principles
Retail	1.21 trips / sqm	12.5 trips / sqm	121 trips / 100sqm	RTANSW

When complete the PSP will have complimentary land uses meaning that 25% of residential trips will be internal to the PSP. Specifically, the Department of Education have advised that the school will service future residents of the precinct only, and the local convenience centre is designed to service local needs only and is unlikely to attract out of precinct users given its proximity to the Shepparton Marketplace.

The rates outlined in Table 3.2 are comparable to rates adopted by Stantec in the assessment of other recently completed PSPs in Regional Victoria and in Melbourne's growth areas. These have been discussed with and approved by the DTP.

Based on the development yields presented in Table 2.1, Table 3.3 has been prepared to show the anticipated traffic generation for the respective zones within the PSP.

Table 3.3 – Anticipated Traffic Generation (Based on the latest Placed Based Plan)

Zone	Daily		AM Peak Hour		PM Peak Hour	
	Total Trips	Total External Trips	Total Trips	Total External Trips	Total Trips	Total External Trips
1	2,540	1,905	254	191	254	191
2	3,310	2,483	331	248	331	248
3	2,370	1,778	237	178	237	178
4	3,480	2,610	348	261	348	261
5	8,915	1,168	1,003	149	833	149
6	1,910	1,433	191	143	191	143
7	2,150	1,613	215	161	215	161
8	2,710	2,033	271	203	271	203
9	5,330	3,998	533	400	533	400
Total	**32,715**	**19,018**	**3,383**	**1,934**	**3,213**	**1,934**

Table 3.3 indicates an expected total daily PSP traffic generation of some 32,700 daily vehicle movements, of which 19,000 vehicle movements per day, or 42% of all trips, will travel externally to the PSP area. The external trips include 75% of residential trips and all school (staff) movements, whilst the internal trips include 25% of residential trips and all trips by the retail, school (students) and community uses.

3.5 Traffic Distribution and Assignment

3.5.1 Directional Splits

The directional split of traffic (i.e. ratio between the inbound and outbound traffic movements) for the various land uses is outlined in Table 3.4.

Table 3.4 – Directional Split of Traffic by Land Use

Land use	AM Peak Hour		PM Peak Hour	
	Inbound	Outbound	Inbound	Outbound
Residential	20%	80%	60%	40%
School (student)	50%	50%	N/A	N/A
School (staff)	100%	0%	0%	100%
Community Facilities	50%	50%	50%	50%
Retail	50%	50%	50%	50%

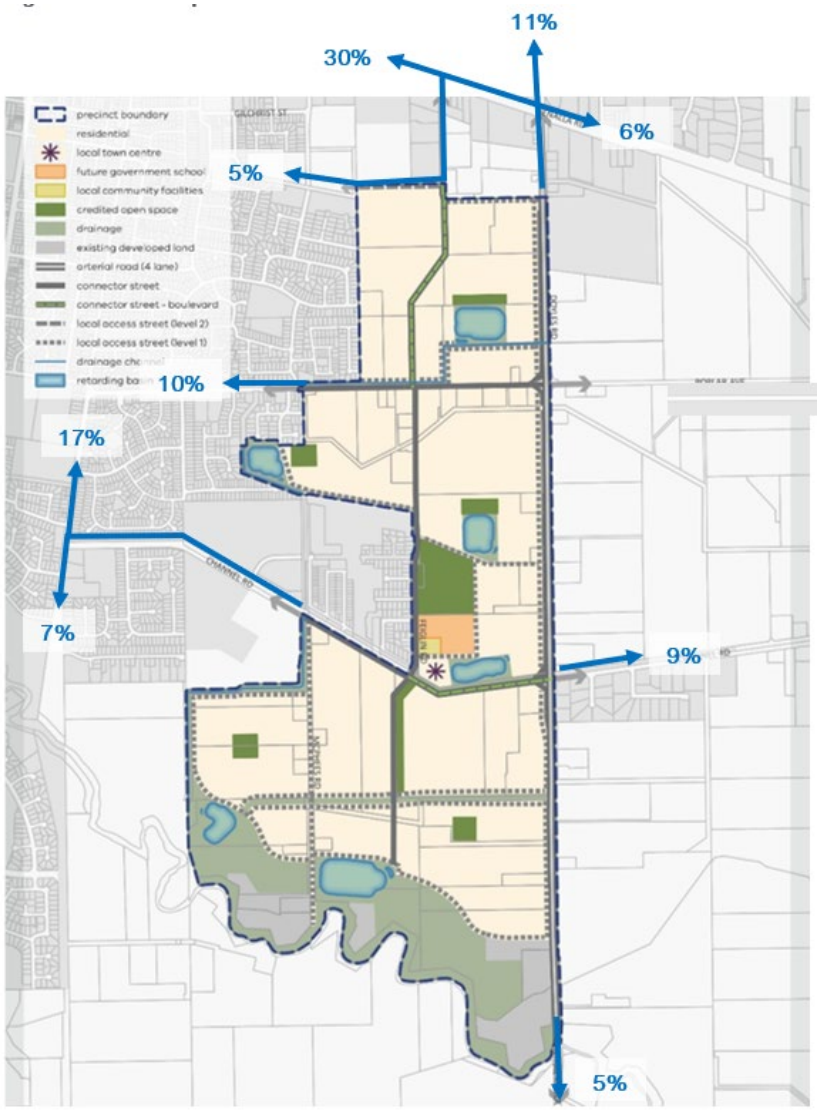
N/A the PM peak sits outside of the school peak

3.5.2 External Trip Distribution

The distribution of traffic generated by the SSEPSP onto the external road network has been determined based on the attractiveness of the connecting road network and the surrounding major locations of employment, retail/commercial areas, and community facilities. Most notably in the area are the bordering arterial roads to the north and east of the PSP, and the Shepparton City Centre which is located northwest of the subject site. The distribution of trips to the east is representative of travel between the farming communities and Benalla, Violet Town and Euroa.

The adopted directional distributions are presented in Figure 3.6.

Figure 3.6 – Development Traffic Distribution



The distributions have also been validated against select link analysis undertaken of the State-wide Victorian integrated Transport Model (S-VITM) which shows a similar profile. We note that the distributions do not assign traffic on Poplar Boulevard east of Doyles Road as this intersection will be converted into a left in / left out arrangement.

3.5.3 Internal trip distribution

The distribution of internal trips within SSEPSP (i.e. intra zonal trips) are assigned based on the proportion of residential dwellings that each zone includes and the specific traffic generate4d by the internal land uses such as retail and school trips.

3.5.4 Background Traffic Volume Growth

To inform this study, the traffic conditions proximate to the Shepparton South-East precinct have been obtained from the 2016 model prepared for the City of Greater Shepparton. The 2016 model includes the years of 2016, 2021, 2031 and 2041, and does not include the Shepparton Bypass.

Based on the model outputs, the following growth rates have been applied for external traffic growth in the model:

- Doyles Road will increase traffic by 1% per annum over a 13 year period, between 2018 and 2031
- Midland Highway will increase its through traffic by 1% per annum over a 13 year period, between 2018 and 2031

These growth rates are considered conservatively high given the variability of growth observed the past 10 years on the Midland Highway (refer to Figure 3.5) as well as not factoring in possible reductions should the Shepparton Bypass be delivered.

3.5.5 Traffic Assignment – Resultant Volumes

With the above inputs, the PSP generated traffic and background traffic volumes are applied to the model and distributed throughout the internal and connecting road network. Where available route choices exist, the traffic volumes are generally distributed based on the shortest travel path and travel times, which take into consideration the capacity constraints defined for each road link.

3.6 Modelling Outputs

Appendix A provides the traffic modelling outputs which are one hour link volume plots for the following scenarios:

1. BC 2018 is the Base Case model
2. BC 2031 is the Base Case model showing the 2031 background traffic growth demand **without** the SSEPSP, on the future road network but **without** the left in / left out at Poplar Boulevard.
3. PC01 is the 2031 background traffic growth demand **without** the SSEPSP on the future road network but **with** the left in / left out at Poplar Boulevard. This scenario represents any redistribution of existing growthed traffic as a result of future road network changes.
4. PC02 includes the 2031 background traffic growth demand, redistributed existing growthed traffic **plus** the SSEPSP on the future road network and **with** the left in / left out at Poplar Boulevard

The two-way daily traffic volumes along key routes around and within the PSP are also discussed in the following sections of this report.

3.7 External Road – Road Hierarchy Assessment

The existing and expected daily traffic volumes along the roads external to the SSEPSP are summarised in Table 3.5.

Table 3.5 – Summary of Ultimate Two-Way Daily Volumes on Key Roads

Road and location	2018 Modelled Daily Volume (Base Case)	2031 Modelled Daily Volume (PC02)
Midland Highway west of Florence Street	12,300vpd	15,950vpd
Midland Highway west of Doyles Road	11,410vpd	15,300vpd
Doyles Road between Poplar Boulevard and Midland Highway	8,250vpd	12,950vpd
Doyles Road south of Channel Road	4,050vpd	5,650vpd
Archer Street north of Channel Road	10,650vpd	14,250vpd

The outputs show that the forecast volume increase on the Midland Highway will be in the order of 3,600 and 3,900 vehicles per day, whilst Doyles Road will increase by between 1,600 and 4,700 vehicles per day. Archer Street will increase by 3,600 vehicles per day north of Channel Road. Each of these are discussed in more detail below.

3.7.1 Midland Highway

Table 3.5 shows that the traffic volumes along Midland Highway will increase by approximately 3,900 vehicles per day west of Doyles Road and 3,650 vehicles per day west of Florence Street. Whilst these increases will have an impact the daily volumes, the total is significantly less than theoretical capacity for a four-lane road which is 36,000 vehicles per day. The expected increases will not require any upgrades to the capacity and classification of the Midland Highway.

3.7.2 Doyles Road

DTP (RRV) has indicated that it plans to duplicate Doyles Road at some future date. Based on the traffic network modelling set in this section of the report, which accounts for background growth up to 2031 and the post-development

traffic volumes generated by the PSP, it is expected that traffic volumes on Doyles Road will increase from 8,250 vehicles per day to accommodate in the order of 12,950 vehicles per day.

This level of daily traffic is less than the 18,000 – 20,000 vehicles per day value for the theoretical capacity for a two-lane road. As such, the development of the PSP in isolation is not considered to be sufficient to warrant the duplication of Doyles Road, and a two-lane carriageway will have sufficient capacity to accommodate its demand.

With respect to Doyles Road, traffic volumes are just one factor that would trigger a need for duplication. Other factors would include the role and function of the road, the users, safety and access requirements for adjacent land parcels. It is understood that the primary driver for duplication of Doyles Road is its role and function for the movement of freight which is documented in the "Bypassing Shepparton Business Case" submitted to DTP by MRPV in December 2020.

Any duplication of Doyles Road will be delivered by State through an appropriate delivery agency (MRPV or DTP).

3.7.3 Archer Street

The modelling indicates that traffic volumes along Archer Street are anticipated to increase from 10,650 vehicles per day to 14,250 vehicles per day between Wilmot Road and Channel Road. Archer Street is a local road and functions as a Connector Street – Level 2, which has a target traffic volume of 3,000-7,000 vehicles per day according to Clause 56.06 of the Greater Shepparton Planning Scheme. It is noted that the Scheme provides target volumes rather than capacity which relies upon a range of factors to determine the need for upgrades.

In this regard, Archer Street is anticipated to carry approximately double the upper target traffic volume by 2031 and would be operating more in line with an arterial road if unconstrained. To reduce the reliance on Archer Street in the future, it is strongly recommended that Council develop a local area traffic management plan and continue to strengthen accessibility for walking, cycling and public transport usage.

3.7.4 Internal Road Network

A road hierarchy has currently been proposed within the PSP, adopting typical cross sections for each of the road types. A critical element when assessing the suitability of the proposed designs is to evaluate the anticipated daily traffic volumes against the expected capacity of each road type. These two-way daily traffic volumes are summarised in Table 3.6.

Table 3.6 – SSEPSP Road Hierarchy Assessment

Road	VPA Road Classification and Description	Planning Scheme Equivalent Road Classification	Expected Daily Traffic Volume	Target Traffic Volume
Zurcas Lane	**Connector Street – Boulevard** One 3.5m traffic lane and 2.1m indented parking lane in each direction, separated by a 3-6m median. Footpaths on both sides and a bidirectional off road bike path on one side.	Connector Street Level 2	5,600vpd	3,000 - 7000vpd
Channel Road between Doyles Road and Feiglin Road		Connector Street Level 2	8,800vpd	3,000 - 7000vpd
Channel Road between Feiglin Road and McPhees Road	**Connector Street** One 3.5m traffic lane and 2.1m indented parking lane in each direction. Footpaths on both sides and a bidirectional off road bike path on one side.	Connector Street Level 1	7,100vpd	3,000vpd
Poplar Avenue between Feiglin Road and Streeton Drive		Connector Street Level 1	3,950vpd	2,000 - 3,000vpd
Poplar Avenue between Doyles Road and Feiglin Road		Connector Street Level 1	2,300-2,500vpd	2,000 - 3,000vpd
Feiglin Road between Poplar Boulevard and Channel Road		Connector Street Level 2	7,150vpd	3,000 - 7,000vpd
Feiglin Road south of Channel Road		Connector Street Level 1	8,500vpd	2,000 - 3,000vpd

The results presented in Table 3.6 indicate that the expected daily traffic volumes for a number of midblock sections of the road network could be expected to exceed the target traffic volumes and may operate with a higher function than proposed through the VPA Road Classifications.

The daily traffic volume ranges associated with the classification are a guide to informing a roads classification and that the current modelling undertaken is based on a coarse road network for the distribution of traffic. With the introduction of a fine-grained network as part of a subdivision, the traffic volumes are likely to be lower on these key roads as traffic is dispersed through the network.

Buckingham Street on the existing network, between Feiglin Road and Channel Road, has the potential to attracted higher than expected (and desired) traffic volumes, compared to its function. This road is an alternative to Feiglin Road and Channel Road however it is likely that the resultant volumes may be lower on this road due to the coarse nature of the model.

In order to manage this potential conflict, LATM measures should be considered along Buckingham Street. Specifically, where the north-south shared path along the drain (aligned with McPhees Road to the south) intersecting Buckingham Street is proposed, a raised priority crossing facility for the shared path could be provided, as indicated in Figure 9 of the VicRoads' Design Guidance for strategically important cycling corridors (Edition 1, December 2016).

Overall, the modelling assessment shows that the PSP's transport network will be capable of accommodating the anticipated ultimate daily traffic volumes through the development of additional local access roads as part of the subdivision and their access arrangements. In addition, broader planning strategies such as the implementation of local area traffic management, walking and cycling strategies and accessible public transport are encouraged to reduce the traffic generation rates within the SSEPSP and the anticipated volumes along key roads. These items will be the responsibility of Council to manage through their policy frameworks and regulatory practices.

4. Intersection Assessments

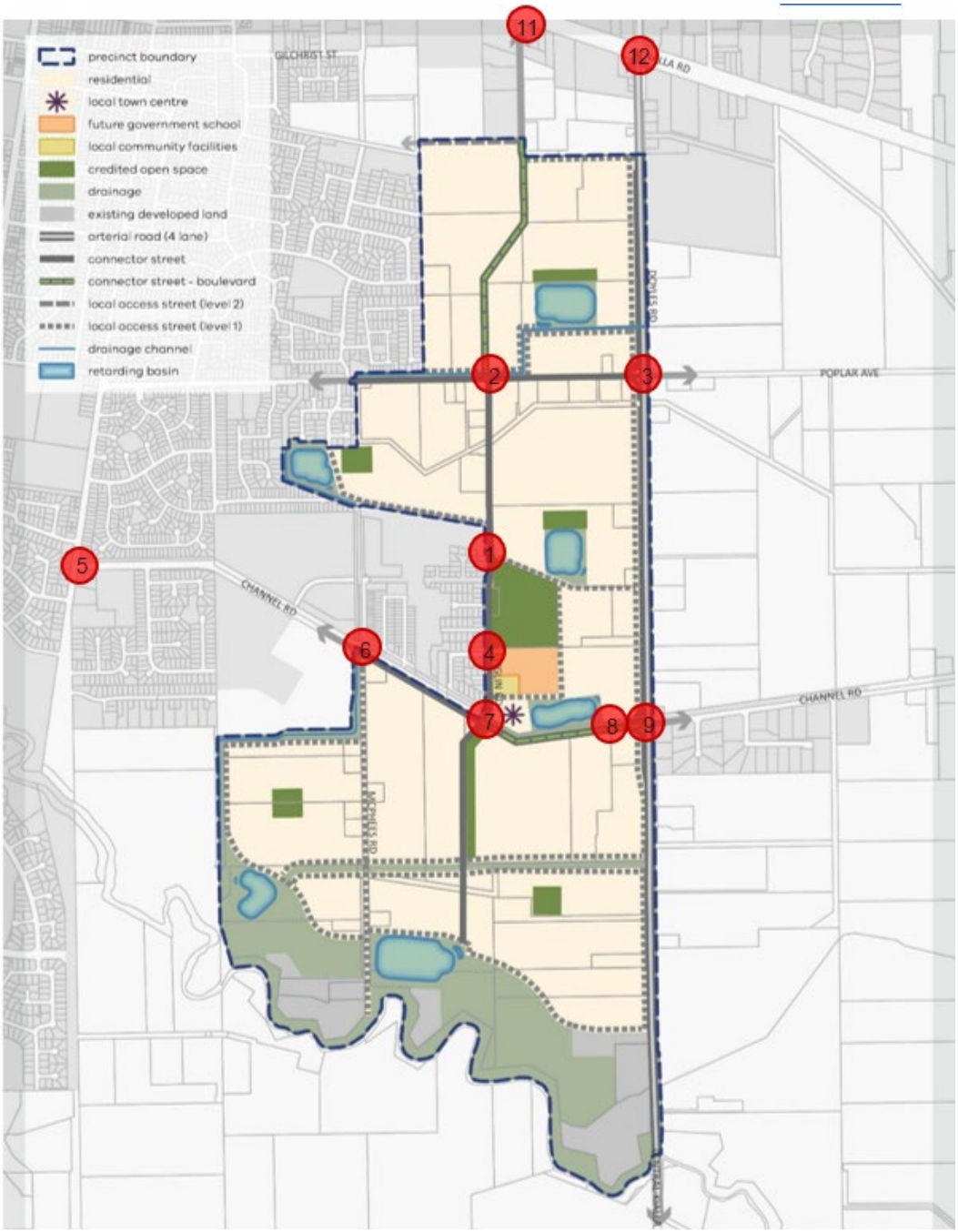
4.1 Overview

Assessments of a select number of intersections have been undertaken to determine the suitability of the proposed layouts with the expected 2031 post-development traffic volumes (PC02). The selection of these intersections has been completed in partnership with Council and the DTP and are generally in accordance with the planning guidelines for a PSP.

It should also be noted that the purpose of assessing the performance of the intersections within and connecting to the PSP is to provide guidance into determining the cost and apportionment of constructing them and informing the associated Development Contributions Plan (DCP). Subsequent assessments and analysis of new intersections to be delivered by the subdivision will be assessed through the standard planning application and referral process.

The intersections that have been assessed are shown in Figure 4.1.

Figure 4.1 – Intersections to be assessed in the context of Shepparton South East PSP



4.2 Selection of Intersection Treatment Types

VicRoads' *Supplement to Austroads Guide to Traffic Management. Part 6* (Edition 1, October 2015) specifies that at intersections of primary/primary or primary/secondary arterial roads, where traffic volumes in particular during the peak periods are appropriately low enough, the selection of a 'roundabout' treatment should be defined as a "most likely treatment" rather than "may be an appropriate treatment". Signalised intersections may be necessary if the major approach carries at least 600 vehicles per hour (two-way) and the minor road carries at least 200 vehicles per hour (two-way) or if the traffic flows are significantly unbalanced.

In this regard, the internal intersections of the PSP are considered to be able to be suitably serviced by roundabouts. These intersection types tend to be the most land intensive but provide a high level of traffic capacity and low severity car-on-car accidents. However, roundabouts do have limited ability in supporting crossing pedestrians, and the mixing of cyclists and vehicles within the circulating lane. As the designs of the internal roundabouts progress, it is recommended that consideration be given to providing central refuges that are at least 2.0m wide and achieve approach and circulating vehicle speeds of approximately 20km/h to support pedestrian and bicycle movements.

With regards to the intersections interfacing with the surrounding road network, the existing intersection types will generally be maintained, except for those on Doyles Road and Archer Street. The specific intersection treatments are discussed in more detail below.

4.2.1 Doyles Road – Shepparton Alternative Route (SAR).

Doyles Road is part of the SAR (refer to Section 2.5) which operates as the north-south bypass of Shepparton until the full length of Shepparton Bypass is constructed. The analysis undertaken within this report has indicated that it is expected to carry in the order of 13,000 vehicles per day by 2031.

The DTP are also safeguarding the long-term operation of the corridor and are determining the road reserve required to accommodate its ultimate cross-section. For duplication of the carriageway to a four-lane separated arrangement, this is typically warranted when daily volumes reach 18,000 to 20,000 vehicles per day which are not expected to be exceeded with the development of the SSE PSP.

The design of the two access intersections for the SSEPSP on Doyles Road at Poplar Avenue and Channel Road have been through a rigorous consultation process with Council, VPA and the DTP. These have sought to agree on the intersection requirements that would be required for the PSP as well as the broader requirements for the SAR as a strategic transport link, including the minimum design standards.

General agreement was reached on a proposed layout and arrangement for the Poplar Avenue and Channel Road intersections with Doyles Road as follows:

1. The intersection designs be prepared so that they match into the existing two lane carriageway with suitable deflection on the north and south approaches for the anticipated design vehicles, the 80km/h speed zone and an urban-rural interface environment. The designs also seek to:
    - maximise the use of existing infrastructure and align with the following design guidance provided by DTP as far as practical
    - be Safe Systems compliant with the design solution to include a solution to reduce the speed of vehicles prior to entering the intersection.
2. The intersections have been designed to conform with Road Design Note 04-01 – Heavy Vehicle Network Access Considerations and the Austroads Standards for geometric design
3. Provide for Left-In / Left-Out only movements at the Doyles Road / Poplar Avenue intersection, and
4. Provide a roundabout controlled intersection at the Doyles Road / Channel Road intersection.

Each of the intersections are discussed in more detail in the following sub-sections.

4.2.2 Doyles Road / Poplar Avenue

The Doyles Road / Poplar Avenue intersection is currently a cross intersection which operates under give way control, with priority given to the Doyles Road movements. Consultation with DTP/RRV have agreed that the intersection will operate under a left in / left arrangement as part of the delivery of the SAR. The following principles have been agreed with its design:

1. A raised central median on Doyles Road to physical prevent through and right-turn movements from and into Poplar Avenue.

2. Maintaining access for a 19m semi-trailer to and from the Poplar Avenue approaches due to existing farming land uses. Designing access to and from Poplar Avenue east approach for a 12.5m truck. Since the development of these plans, VPA has been requested to provide access for a B-Double design vehicle on both sides of Poplar Avenue. Although the current design does not allow for these vehicles, the design will be updated to ensure that these vehicles can be accommodated.

The design plans are currently being developed by One Mile Grid in consultation with DTP and the City of Greater Shepparton and is separate to this report.

4.2.3 Doyles Road / Channel Road

The Doyles Road / Channel Road intersection is currently a cross intersection which operates under give way control, with priority given to the Doyles Road movements. With an expected increase in traffic due to the development of the PSP, and the upgrade of Doyles Road as part of the Shepparton Alternative Route, the intersection type that will safely manage the intersection operation has been considered. Based on consultation with DTP and utilising the VicRoads' guidance outlined above, it has been agreed amongst stakeholders that a roundabout is the most suitable option.

A design of the roundabout controlled intersection will provide one lane in each direction with appropriate deflection and space to cater for a 24m B-Double.

The design plans are currently being developed by One Mile Grid in consultation with DTP and the City of Greater Shepparton and is separate to this report.

4.2.4 Archer Street / Channel Road

The Archer Street / Channel Road intersection currently operates under give way control, with priority given to the Archer Street movements. The increase in traffic movements and the interaction with pedestrians will result in it requiring to be upgraded to a signalised intersection. This will afford the precinct with the ability to remove the existing zebra crossing facility on Archer Street to the north of Channel Road. In order to maximise the use of the shared path along the northern side of Channel Road, crossing facilities on the northern approach are recommended. The potential conflict with people using this crossing facility and right-turning vehicles out of Channel Road should be able to be managed through appropriate signal phasing (i.e. run separately or at least provide a head-start to the crossing phase).

The upgrade of this intersection will be managed by the City of Greater Shepparton and is not included in the DCP.

4.3 Intersection Volumes

CUBE modelling software is a coarse modelling platform and hence care should be exercised when extracting individual links or turning movement flows. It is typically not used for the purpose of determining intersection turning movements, as turning movements are influenced by a number of factors not considered by such a modelling platform.

Typically, we would include an 'adjustment' process when finalising volumes to inform the SIDRA analysis, however the modelled network accurately represents the number of intersections expected on Doyles Road and Archer Street and as such these have been extracted directly. The limited number of alternate opportunities for vehicles to travel through the PSP network means that the analysis would not underrepresent the expected turning volumes at the intersections and the approach is considered appropriate.

The resulting 2031 post-development peak hour traffic volumes for the intersections are presented in Appendix B.

4.4 Intersection Modelling

The key intersections have been assessed under PC02 which represents the full buildout of the PSP and the background growth in the network. The purpose of this assessment is to ensure that the proposed intersection treatments, particularly those on the external network, are sufficient to cater for the ultimate development of the PSP.

The anticipated peak hour traffic volumes are presented in Appendix B.

The key intersections have been assessed using *SIDRA INTERSECTION*[12], a computer-based modelling package which calculates intersection performance. The software was used to determine the intersection layout requirements required to cater for the anticipated post-development traffic volumes.

The commonly used measure of intersection performance is referred to as the *Degree of Saturation (DOS)*. The DOS represents the flow-to-capacity ratio for the most critical movement on each leg of the intersection.

[12] Program used under license from Akcelik & Associates Pty Ltd.

For signalised intersections, a DOS of around 0.90 has been typically considered the 'ideal' limit, beyond which queues and delays increase disproportionately[13]. For unsignalised intersections a DOS of 0.80 is considered the 'ideal' limit. The DTP have agreed that an upper limit of 0.85 will be acceptable for the Doyles Road / Channel Road roundabout.

The SIDRA modelling results, and intersection layouts are provided in Appendix A, with a summary of the outputs is shown in Table 4.1.

Table 4.1 – Summary of SIDRA outputs

Intersection No.	Name	Future Intersection Type	Degree of Saturation	Average Delay (S)
1	Zurcas Ln / School Access	Priority Controlled (Giveway)	0.25 (0.45)	2.5 (3.7)
2	Zurcas Ln / Feiglin Rd / Poplar Ave	Roundabout	0.32 (0.41)	5.8 (6.2)
3	Doyles Rd / Poplar Ave	Left in / Left out	0.39 (0.43)	2.2 (3.0)
4	Feiglin Rd / Buckingham St	Roundabout	0.10 (0.08)	2.7 (2.7)
5	Archer St / Channel Rd	Signals	0.73 (0.77)	23.4 (21.4)
6	Channel Rd / McPhees Rd	Priority Controlled (Giveway)	0.53 (0.33)	5.2 (4.6)
7	Feiglin Rd / Channel Rd	Roundabout	0.63 (0.51)	7.9 (6.4)
8	Channel Rd / Eastern Access St	Priority Controlled (Giveway)	0.26 (0.49)	2.1 (3.0)
9	Doyles Rd / Channel Rd	Roundabout [2]	0.66 (0.85)	9.3 (18.9)
10	Midland Hwy / Doyles Rd	Roundabout	0.29 (0.46)	6.9 (7.9)
11	Midland Hwy / Zurcas Ln	Signals	0.40 (0.50)	11.9 (12.2)

All results are AM (PM)

The analysis shows that:

- The proposed roundabout at the Doyles Road / Channel Road intersection will operate satisfactorily with a left in / left out arrangement at Poplar Avenue on Doyles Road.
- The roundabout controlled intersection at Channel Road and Doyles Road will also operate at acceptable levels with a DoS of less than 0.66 in the AM peak and 0.85 in the PM peak.
- The Midland Highway / Doyles Road roundabout and Midland Highway / Zurcas Lane signalised intersections are anticipated to operate satisfactorily in both peak periods.
    - It is noted that the right turn demand from Zurcas Lane to Midland Highway (i.e. south to east) is anticipated to be in the order of 120vph in the PM peak. At this location, the pedestrian crossing is located on the eastern side of the intersection, meaning that right turn vehicles are required to give way to pedestrians. It is recommended that as part of the broader network management that the Department of Transport and Council monitor the level of pedestrian demand and consider protection in the form of flashing 'give way to pedestrians' signs for motorists. Alternatively, the intersection could be reconfigured to provide the pedestrian crossing on the western side of the intersection as part of separate works.
- The remaining intersections within the PSP operate at acceptable levels during the peak periods.

The performance assessment demonstrates that a single lane roundabout at the Doyles Road / Channel Road roundabout would provide acceptable capacity to support access to/from the PSP. Through agency engagement, the design of the roundabout has been amended to provide two lane approaches on Doyles Road (i.e. the SAR) to respond to the DTP submission. Whilst the analysis of the two lane approaches on Doyles Road has not been undertaken, it can be concluded that the intersection will perform better than the operational levels presented in Table 4.1.

[13] SIDRA INTERSECTION 4.0 adopts the following criteria for Level of Service assessment:

LOS		Intersection Degree of Saturation (DOS) or X value	
		Unsignalised Intersection	Signalised Intersection
A	Excellent	<=0.50	<=0.60
B	Very Good	0.50-0.70	0.60-0.75
C	Good	0.70-0.80	0.75-0.90
D	Acceptable	0.80-0.90	0.90-0.95
E	Poor	0.90-1.00	0.95-1.00
F	Very Poor	>=1.0	>=1.0

4.5 Doyles Road Additional Analysis

4.5.1 Trigger Point Analysis

Further analysis of the Doyles Road / Channel Road and Doyles Road / Poplar Boulevard intersections has been undertaken to understand the number of lots that would be able to be developed prior to the need for their upgrading. The following assumptions have been made for this assessment:

- a residential trip generation rate of 1 trip per household would be applied in both peak periods, with no reduction for internal trips due to the assumption that the school, community and retail facilities moy not be constructed.
- a linear delivery of the SSEPSP has been provided from day 1. This represents a year on year increase of 194 dwellings over a 13 year period from the Base Year.
- Background traffic growth is assumed at 1% per annum from the Base Year and applied to the Doyles Road through traffic
- 46% of the generated traffic from the SSEPS has been assigned to Poplar Avenue and 54% has been assigned to Channel Road. This is based on the proportion of development that is expected to occur in the vicinity of these roads and the likely development fronts of the PSP.
- the development generated traffic and background growth have been added proportionally to the existing traffic volumes for the number of lots and respective year.
- the analysis does not consider any redistribution of traffic from the SSEPSP to other parts of the network such as Archer Street or Zurcas Lane.

Having regard to the assumptions outlined above, Table 4.2 has been prepared to summarise the number of lots and performance of the existing priority-controlled intersection for the respective assessment years.

Table 4.2 – Doyles Road / Channel Road Intersection – Performance as a Give Way Intersection

Year	Approximate Number of Lots	Doyles Rd / Poplar Avenue		Doyles Road / Channel Road		Comment
		AM Peak DoS	PM Peak DoS	AM Peak DoS	PM Peak DoS	
Existing	0	0.27	0.50	0.25	0.45	
Year 3	583	0.31	0.67	0.36	0.56	
Year 4	777	0.33	0.74	0.39	0.60	
Year 5	971	0.37	0.83	0.43	0.64	Poplar East approach exceeds DOS > 0.8. All other movements can operate satisfactorily.
Year 6	1,165	0.43	0.92	0.46	0.69	Poplar east and west approach DOS > 0.8
Year 8	1,554	0.60	1.17	0.54	0.77	
Year 9	1,748	0.68	1.33	0.60	0.81	Channel Road DOS > 0.8
Year 13	2,525	1.18	2.29	0.75	0.98	

Table 4.2 shows that the existing priority-controlled intersections will be able to accommodate between four (4) to five (5) years of development, or a little more than 780 lots, whilst operating at a DOS of less than 0.8 in all of the peak periods respectively. By year six (6), or 1,165 lots, the Doyles Road / Poplar Avenue intersection will exceed this figure and reach a DOS of 0.92, which is the point that queues and delays would start to increase.

The analysis also shows that the Doyles Road / Channel Road intersection is able to operate in its current form up to year 9, however this assumes that there will be no redistribution of traffic from the Doyles Road / Poplar Avenue intersection as a result of congestion and / or its conversion to a left in / left out arrangement. Indeed, any redistribution of traffic through other parts of the PSP and network will reduce demand and increase the number of lots for each respective year that have been assessed at the two intersections.

Having consideration of the trigger analysis, and the potential for redistribution of trips from Poplar Avenue when it reaches a DOS of 0.8, it can be concluded that in the order of 800 lots should be applied as a cap or trigger for when the Doyles Road / Poplar Boulevard intersection is required to be converted to a left in / left out intersection, and the Doyles Road / Channel Road intersection be converted to roundabout controlled intersection.

It is noted that this assessment is based on operational performance of the PSP only and does not consider other factors that may influence the need to upgrade the intersection. These factors will be considered and managed by Council and DTP as the responsible authorities.

4.5.2 External Traffic Usage

An analysis of the traffic modelling outputs has been undertaken to identify the proportion of traffic using the intersection which has been generated by the SSE PSP. Table 4.3 has been prepared to demonstrate the percentage of traffic on each approach and the overall breakdown of traffic in the two peak periods.

Table 4.3 – Summary of Ultimate traffic volumes on at Doyles Road / Channel Road Intersection (2031)

Approach	SSE PSP	Other	SSE PSP	Other	SSE PSP	Other	Total	SSE PSP Percentage of Total traffic
	AM Peak		PM Peak		Total (AM & PM Peak)			
North (Doyles Road)	980	520	1,370	980	2,350	1,500	3,850	61%
East (Poplar Boulevard)	120	120	490	490	610	610	1,220	50%
South (Doyles Road)	980	450	1,510	720	2,490	1,170	3,660	68%
West (Poplar Boulevard)	230	270	240	370	470	640	1,110	42%
Total	**2,310**	**1,360**	**3,610**	**2,560**	**5,920**	**3,920**	**9,840**	**60%**
North (Doyles Road)	980	450	1,510	720	2,490	1,170	3,660	68%
East (Channel Road)	420	240	660	490	1,080	730	1,810	60%
South (Doyles Road)	490	390	530	440	1,020	830	1,850	55%
West (Channel Road)	1,030	250	1,200	200	2,230	450	2,680	83%
Total	**2,920**	**1,330**	**3,900**	**1,850**	**6,820**	**3,180**	**10,000**	**68%**

Table 4.3 shows that the total traffic passing through the Channel Road and Doyles Road intersection is in the order of 10,000 vehicles across both peak periods. Along Doyles the proportion of traffic from the SSEPSP will be 61% north of Poplar Boulevard and 55% south of Channel Road.

5. Policy Review

5.1 Introduction

Once approved, the delivery of the PSP will be undertaken through the planning application process for the respective subdivisions. This will be completed in a staged manner that will require each application to accord with the planning scheme requirements. This section provides an assessment of the PSP against the relevant planning scheme access and mobility requirements including Clause 56 of the Greater Shepparton Planning Scheme and the Infrastructure Design Manual.

5.2 Clause 56.06

Clause 56 of the Greater Shepparton Planning Scheme sets out the following purpose:

"To implement the State Planning Policy Framework and the Local Planning Policy Framework, including the Municipal Strategic Statement and local planning policies.
To create liveable and sustainable neighbourhoods and urban places with character and identify.
To achieve residential subdivision outcomes that appropriately respond to the site and its context for:

- *Metropolitan Melbourne growth areas*
- *Infill sites within established residential areas*
- ***Regional cities and towns***

To ensure residential subdivision design appropriately provides for:

- *Policy implementation*
- *Liveable and sustainable communities*
- *Resident lot design*
- *Urban landscape*
- ***Access and mobility management***
- *Integrated water management*
- *Site management*
- *Utilities."*

Clause 56 consists of a number of provisions made up of objectives and standards for implementation within the design of a new subdivision. The Clause states the following in respect to objectives and standards:

- *"Objectives. An objective describes the desired outcome to be achieved in the completed subdivision.*
- *Standards. A standard contains the requirements to meet the objective.*

A standard should normally be met. However, if the responsible authority is satisfied that an application for an alternative design solution meets the objective, the alternative design solution may be considered."

The relevant transport and access areas of Clause 56 that will be considered within this report is Clause 56.06, which aims to:

"achieve an urban structure where compact and walkable neighbourhoods are clustered to support larger activity centres on the Principal Public Transport Network in Metropolitan Melbourne and on the regional public transport network outside Metropolitan Melbourne.
To provide for walking (including persons with impaired mobility), cycling, public transport and other motor vehicles in an integrated manner.
To contribute to reduced car dependence, improved energy efficiency, reduced greenhouse gas emissions and reduced air pollution."

Standard C14 of the Clause requires that a plan of the layout of the neighbourhood be prepared that meets the objectives of:

- Clause 56.06-2 Walking and cycling network

- Clause 56.06-3 Public Transport network
- Clause 56.06-4 Neighbourhood Street network.

Clause 56.06 divides walking and cycling facilities, public transport facilities and street network design into two areas, being Network Objectives and Detail Objectives, of which much of the latter is a matter for detailed design and therefore only the general intent agreed to as part of the Structure Plan.

5.3 Walking & Cycling Network

The walking and cycling network and detailed objectives set out within Clauses 56.06-2 and 56.06-5 respectively state the following:

Clause 56.06-2

- *"To contribute to community health and well-being by encouraging walking and cycling as part of the daily lives of residents, employees and visitors.*
- *To provide safe and direct movement through and between neighbourhoods by pedestrian and cyclists.*
- *To reduce car use, greenhouse gas emissions and air pollution."*

Clause 56.06-5

- *"To design and construct footpaths, shared cycle path networks that are safe, comfortably, well-constructed and accessible for people with disabilities.*
- *To design footpaths to accommodate wheelchairs, prams, scooters and other footpath vehicles".*

Standards C15 and C18 set out the requirements that should be met to meet the objectives of these Clauses.

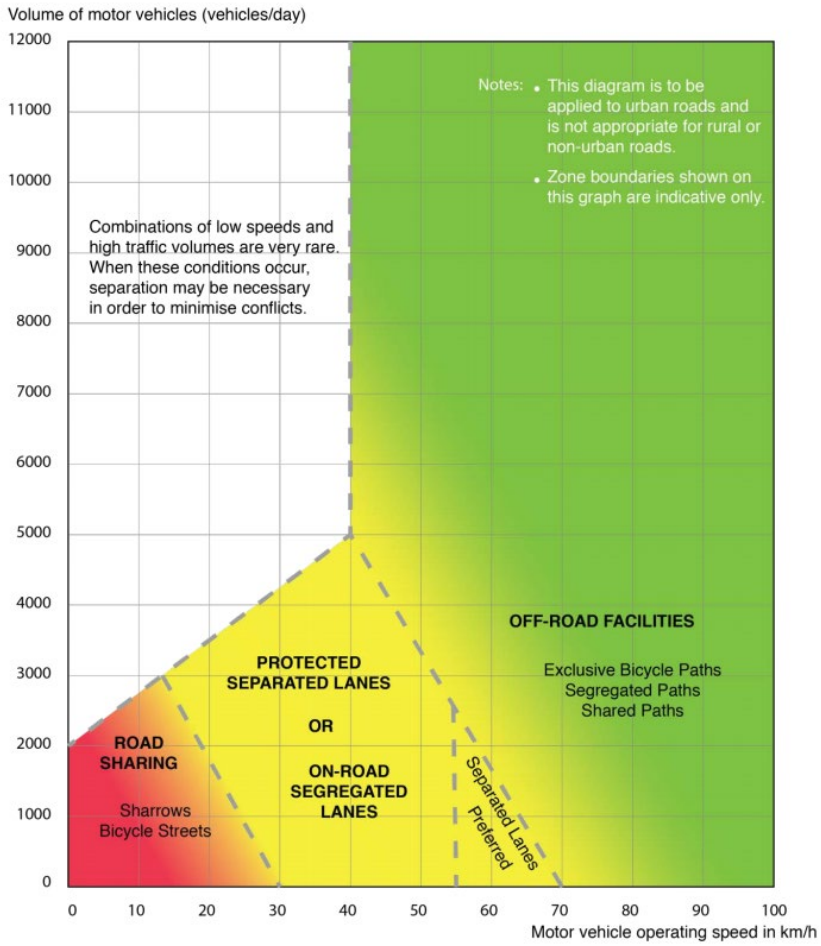
5.3.1 Proposed Treatments

The following active transport treatments are proposed in the PSP:

- Footpaths will be provided on both sides of the roads within the precinct
- Streets will be designed to encourage pedestrian and bicycle activity when adjacent to open space areas
- Connector streets to have a 3.0m wide dedicated bicycle facility on one side.

It is expected that the on-road traffic volume and speed environments on the other streets in the study area will generally be consistent with Figure 5.1 which reproduces the VicRoads' Design Guidance for Strategically Important Cycling Corridors. This is considered to provide a suitable level of access for pedestrians and cyclists of all abilities.

Figure 5.1 – Bicycle facilities based on volume and operating speeds of motor vehicles



Source: VicRoads

To support longer trips and integrate with the broad active transport network, the following facilities are proposed:

- Shared bicycle and pedestrian paths that directly link residents to the school and community facilities within the PSP.
- Provision of pedestrian and cyclist priority crossings on all slip lanes.

To the east and west of the site there are no specific bicycle facilities, but there is considered to be potential for local 'shimmy' routes, through specific traffic calming, wayfinding and arterial road crossing facilities to connect up with other open spaces and activity centres in the area.

5.3.2 Compliance to Clause 56

The objectives of Clauses 56.06-2 and 56.06-5 are considered to be met as follows:

- *A majority of lots would be within a reasonable walking distance of the following amenities:*
  - Public transport – Connector Roads within the precinct will be bus capable.
  - Public open space – suitable green belts and passive open space are being contemplated.
  - Community facilities – these are expected to be provided as part of the development.
- The walking and cycling network through the subdivision is logical and generally follows the pattern of streets and public open spaces as follows:
  - Connector Streets – will consist of either a shared pedestrian cycle path or dedicated on-road bicycle lanes
  - Public Open Spaces - shared paths through open spaces connecting to other facilities where possible.

- The walking and cycling network links into existing facilities allowing the cycling network to connect into the regional network.
- The proposed road reservations are sufficient to provide footpaths and cycle paths in line with the requirements of Table C1 of the Clause.

5.4 Public Transport

5.4.1 Statutory Requirements

Clauses 56.06-3 and 56.06-6 set out the public transport network and detailed design objectives for subdivisions as follows:

Clause 56.06-3

"To provide an arterial road and neighbourhood street network that supports a direct efficient and safe public transport system.

To encourage maximum use of public transport."

Clause 56.06-6

"To provide for the safe, efficient operation of public transport and the comfort and convenience of public transport users; and.

To provide public transport stops that are accessible to people with disabilities."

Standards C16 and C19 set out the standards that need to be met in relation to bus routes.

5.4.2 Proposed Treatments

All connector roads within the PSP will be designed to be bus capable. Bus routes and stop will be aligned so that all lots within the PSP area are within 400m of a stop.

5.4.3 Compliance with Clause 56

While the implementation of new bus services and improvement of any of the existing routes is a matter for the public transport operators and DTP, the objectives of Clauses 56.06-3 and 56.06-6 are considered to be met from a planning perspective.

5.5 Neighbourhood Streets

5.5.1 Statutory Requirements

Clauses 56.06.4 and 56.06-7 set out the neighbourhood street network and detail objectives and aims as follows:

Clause 56.06.4

"Provide for a direct, safe and easy movement through and between neighbourhoods for pedestrians, cyclists, public transport and other motor vehicles using the neighbourhood street network."

Clause 56.06.7

"To design and construct street carriageways and verges so that the geometry and traffic speeds provide an accessible and safe neighbourhood street system for all users."

Standards C17 and C20 set out a number of standards that should be met to achieve the aims of Clauses 56.06-4 and Clause 56.06-7.

5.5.2 Compliance

The proposed subdivision of the PSP would connect into the existing street network through a series of connecter and local access streets, all of which have suitable pedestrian infrastructure. An indicative road network hierarchy is shown in the Future Urban Structure in Figure 2.4.

Table 5.1 is an assessment of the cross sections on the PSP's proposed road hierarchy against the requirements of Clause 56.06-7 of the Greater Shepparton Planning Scheme and the Infrastructure Design Manual (IDM Version 5.3 – March 2020).

Table 5.1 – Assessment of Proposed Road Hierarchy Cross Section

Street Type	Road Reservation Width	Carriageway Width	Verge Width	Compliance with Clause 56	Compliance with IDM (V5.3)
Access Street	16.0m	7.3m (kerbside parking on both sides permitted)	8.6m (2 x 1.5m pedestrian path 2 x 2.8m nature strip)	Compliant with requirements for Access Street – Level 1.	Compliant with requirements for Access Street.
Connector Street - Level 1	24.0m	12.6m (7.0m traffic 2 x 2.3m parking bay	12.4m (2 x 2.5m shared path 2 x 3.7m nature strip)	Compliant with requirements for Connector Street – Level 1.	Compliant with requirements for Connector Street – Level 1
Connector Street - Level 2	30.0m	17.6m (2 x 3.5m traffic, 2 x 2.3m parking, 6.0m median)	12.4m (2 x 2.5m shared path 2 x 3.7m nature strip)	Compliant with requirements Connector Street – Level 2.	Compliant with Connector Street – Level 2 except for carriageway width.
Connector Street (Poplar Avenue – west of Feiglin Road)	22.0m	14.2m (7.0m traffic 2 x 1.5m bike lane 2 x 2.1m parking bay)	7.9m (2 x 2.35m nature strip 2 x 1.5m pedestrian path)	Compliant with Connector Street – Level 1 except for verge width.	Compliant with Connector Street – Level 1 except for verge width.
Connector Street - Level 1	24.0m	15.0m (7.0m traffic 2 x 1.7m bike lane 2 x 2.3m parking bay)	9.0m (1 x 3.05m nature strip 1 x 2.95m nature strip 2 x 1.5m pedestrian path)	Generally complaint with requirements for Connector Street Level 1.	Compliant with Connector Street – Level 1 except for verge width.
Connector Street (Chanel Road – west of Feiglin Road)	20.5m	11.2m (7.0m traffic 2 x 2.1m parking bay)	8.3m (1.5m pedestrian path 2.5m nature strip 2.5m shared path 1.8m nature strip)	Compliant with Connector Street – Level 1 except for verge width.	Compliant with Connector Street – Level 1 except for verge width and carriageway width.
Access Street – Bushfire Interface	16.0m	7.3m (kerbside parking on both sides permitted)	8.6m (2 x 1.5m pedestrian path 2 x 2.8m nature strip	Compliant with Access Street – Level 1.	Compliant with requirements for Access Street.

Overall, the proposed cross sections generally align with both the elements of Clause 56 and the IDM. It is noted that there are conflicting elements with each design guide that relate to the verge and in one instance the bicycle lane width. Further discussion on each design guide is provided in the following sub sections.

5.5.3 Compliance with Clause 56

As indicated within Table 5.1, the proposed road hierarchy meets or exceeds the minimum dimensions in most cases for carriageways, footpaths and cycle paths for the equivalent road type as specified within Table C1 of Clause 56.06. The instances where the street cross-section does not comply are mostly where the verge width falls short of the minimum requirement.

It is noted that all road reservations include additional widths at intersections in order to incorporate the visibility splay requirements set out within Standard C20.

The speed targets for the internal street network would be met due to the inclusion of the following and with reference to Table 8.1 in the VicRoads' Traffic Engineering Manual Volume 1, Chapter 8: Local Area Traffic Management:

- network design incorporating bends as slow points
- reducing block lengths and/or introduction of one-way sections
- provision of slow points or other similar suitable treatments to limit maximum leg lengths to achieve target speed.

The design of the latter would be undertaken as part of the detailed design of the street network and those that would be located on connector streets should be designed to accommodate buses.

The contemplated internal road network is anticipated to accommodate traffic volumes less than the associated road type's theoretical capacity, noting that the internal connecter streets will provide specific crossing facilities to support the separated bicycle facilities on one side of the connector streets at intersections with lower order roads.

In addition, it is noted that no dedicated on-road bicycle lanes are proposed for local access streets and certain connector streets. Mixed traffic conditions are considered appropriate for the majority of potential users as long as vehicle speeds are kept low through traffic calming treatments. Furthermore, widening the carriageway to accommodate dedicated bicycle lanes can often be counterproductive in trying to manage vehicle speeds.

5.5.4 Compliance with IDM Guidelines

Table 5.1 shows that the cross sections for each of the street types in comparison to the minimum requirements set out by the IDM guidelines. While the proposed Access Road dimensions comply with those specified in the guidelines, all other street types proposed in the PSP document do not meet the minimum requirements. Moreover, the non-compliance is due mostly to the widths of verges and carriageways. The proposed cross sections will not impact on the movement of traffic from a capacity perspective.

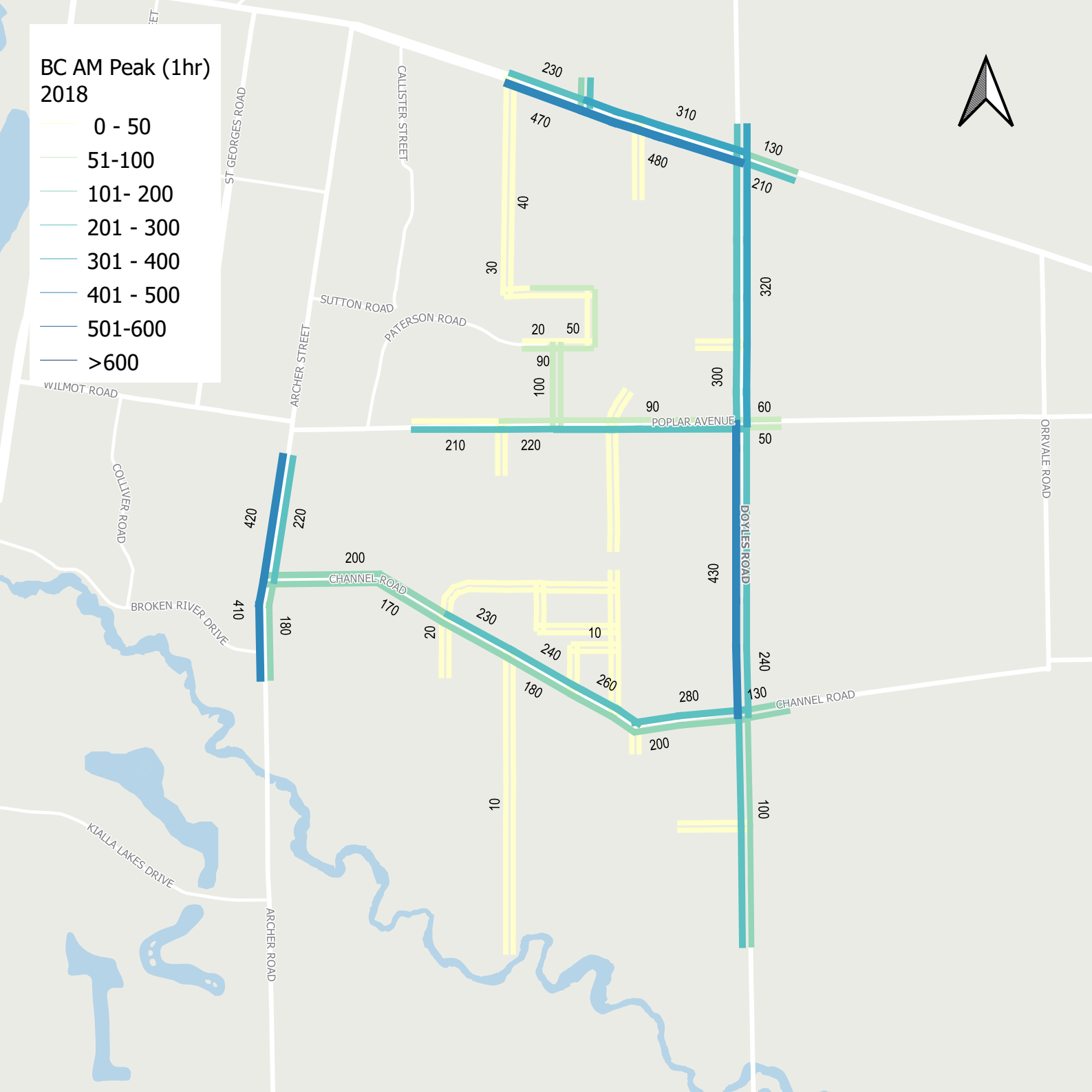
6. Conclusions

This report addresses the land use inputs, traffic demands and resulting road network layout for the purposes of the Shepparton South East Growth Corridor PSP. Based on the analysis and discussions presented within this report, the following conclusions are made:

1. The PSP will consist of predominantly residential uses but will be supported by a mix of retail and educational uses.
2. When fully built out, the PSP is anticipated to generate some additional 32,700 daily vehicle movements to the network.
3. The assessment considers the future duplication of Doyles Road as part of the Shepparton Alternative Route upgrades. Consultation with DTP (RRV) reached agreement on arrangements for the Poplar Avenue and Channel Road intersections with Doyles Road, providing:
    - a Left-In / Left-Out only movements at the Doyles Road / Poplar Avenue intersection, and
    - a roundabout controlled intersection at the Doyles Road / Channel Road intersection.
1. The intersection analysis presented in this report indicates that the proposed layouts are able to cater for the ultimate design volumes generated from the PSP, as well as any expected traffic growth in the surrounding network.
2. The existing priority controlled intersection of Doyles Road / Channel Road will be required to be upgraded after four (4) years of development of the PSP development and surrounding growth, or the equivalent of a little more than 780 lots. Noting that this assessment is based on operational performance and does not consider the safety requirements or need for such an upgrade.
3. LATM measures should be considered along Buckingham Street to manage the potential for rat running. Specifically, where the north-south shared path along the drain (aligned with McPhees Road to the south) intersecting Buckingham Street is proposed, consideration should be given to providing a raised priority crossing facility for the shared path, as indicated in Figure 9 of the VicRoads' Design Guidance for strategically important cycling corridors (Edition 1, December 2016).
4. The proposal has been assessed against the access and mobility requirements set out within Clause 56.06 of the Greater Shepparton Planning Scheme and the IDM Guidelines and is considered to be suitable, noting that further design and development work will occur at a later date.

Overall, based on the findings presented in this report, there is no traffic and transport reasons as to why the PSP should not proceed.

Appendix A. Traffic Network Modelling Inputs and Outputs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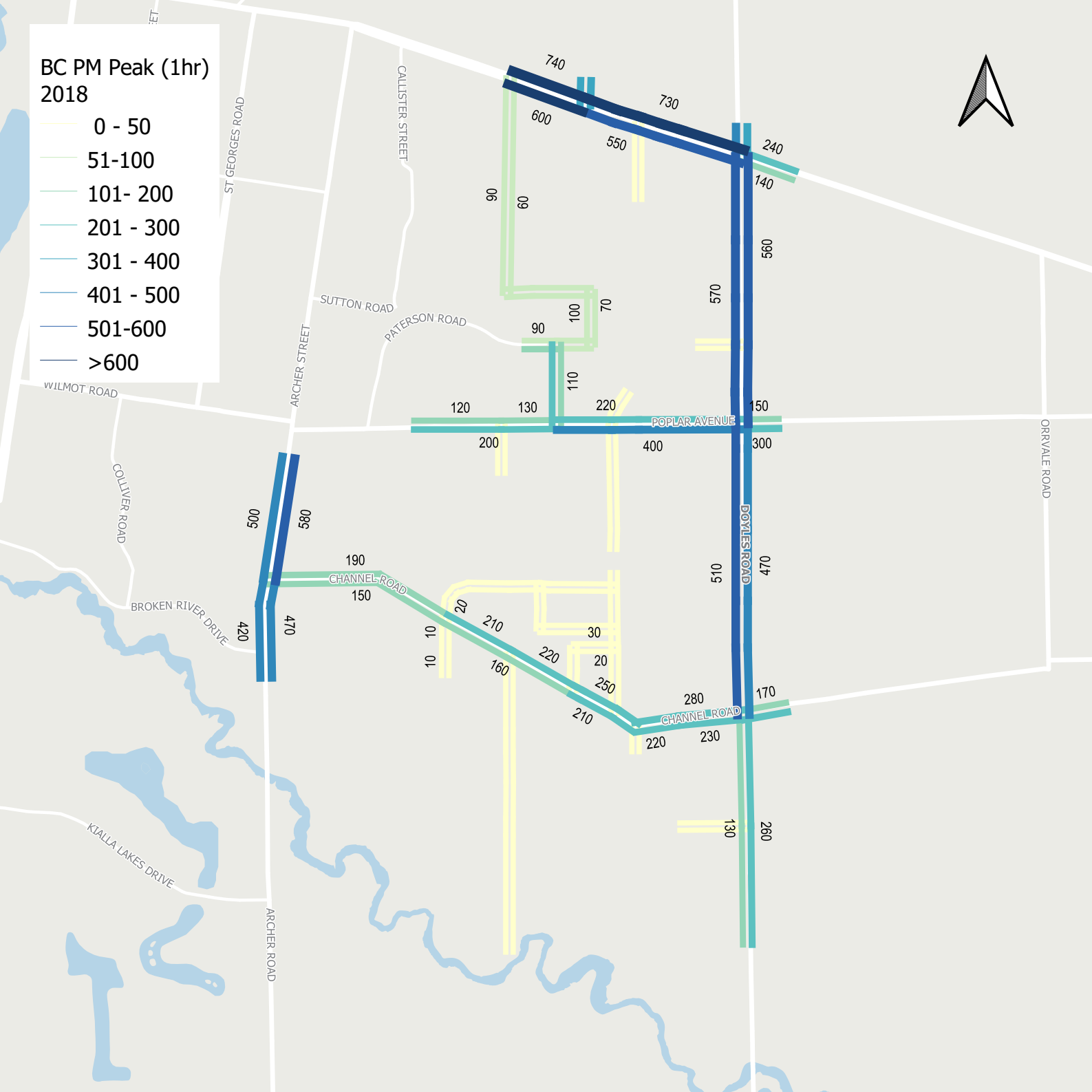
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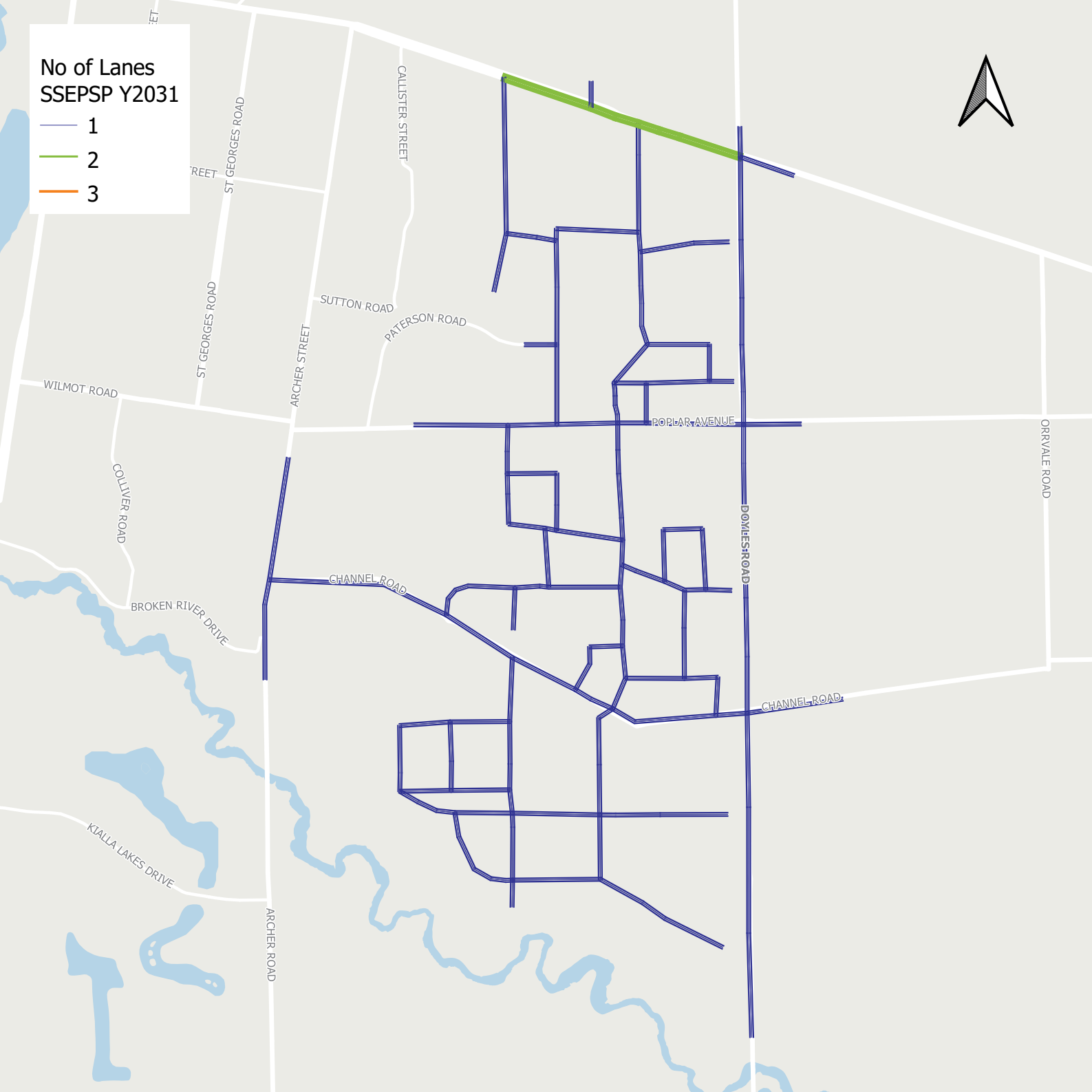
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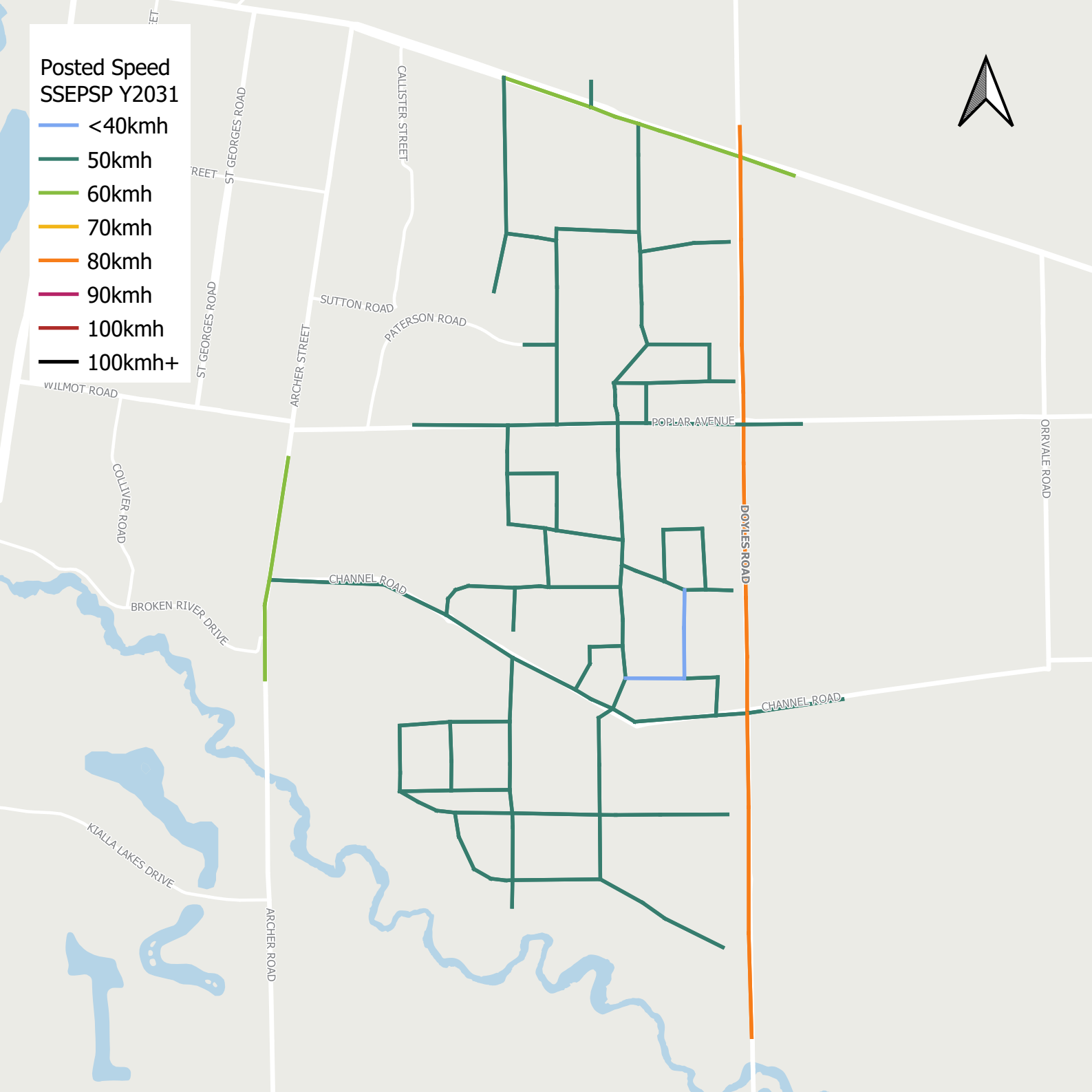
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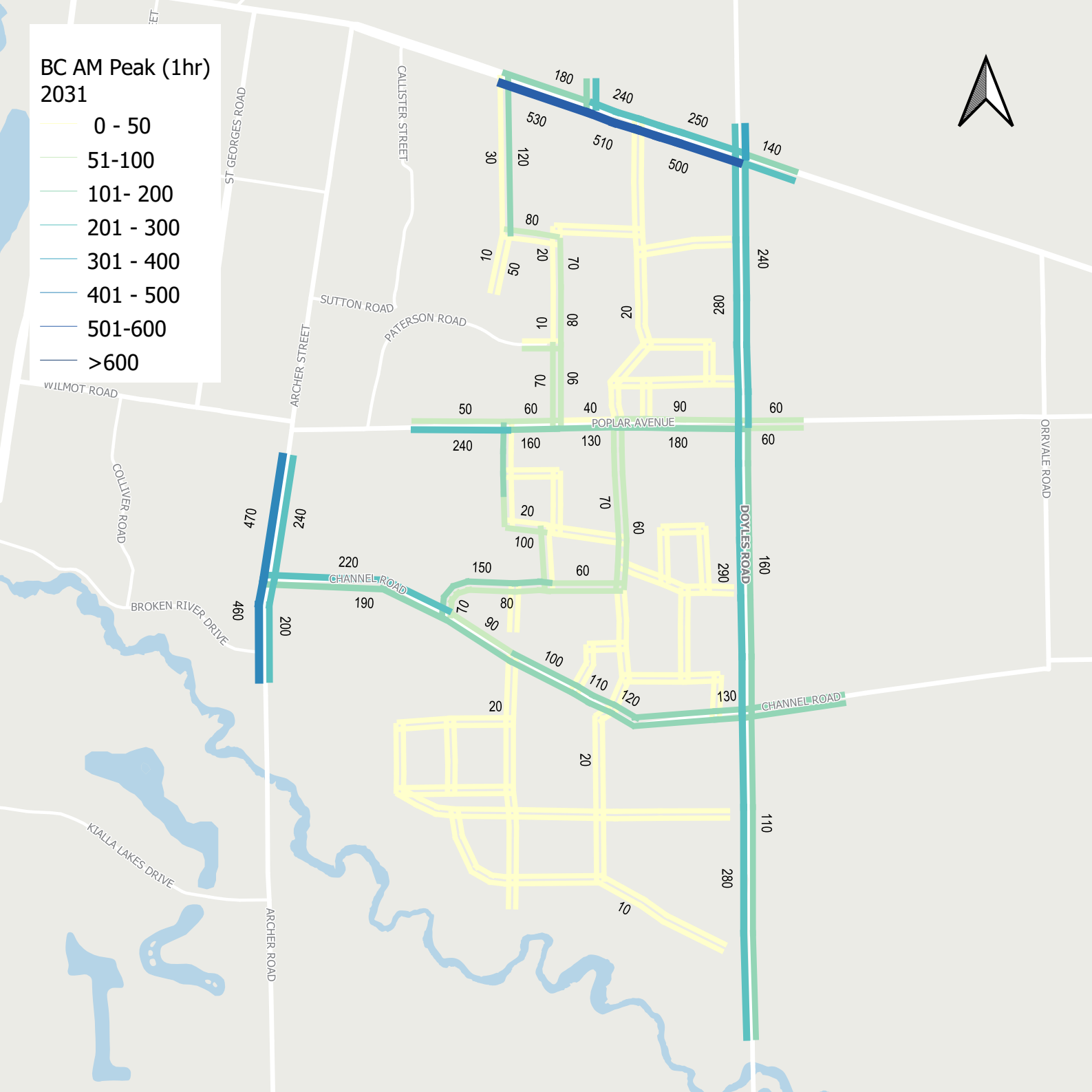
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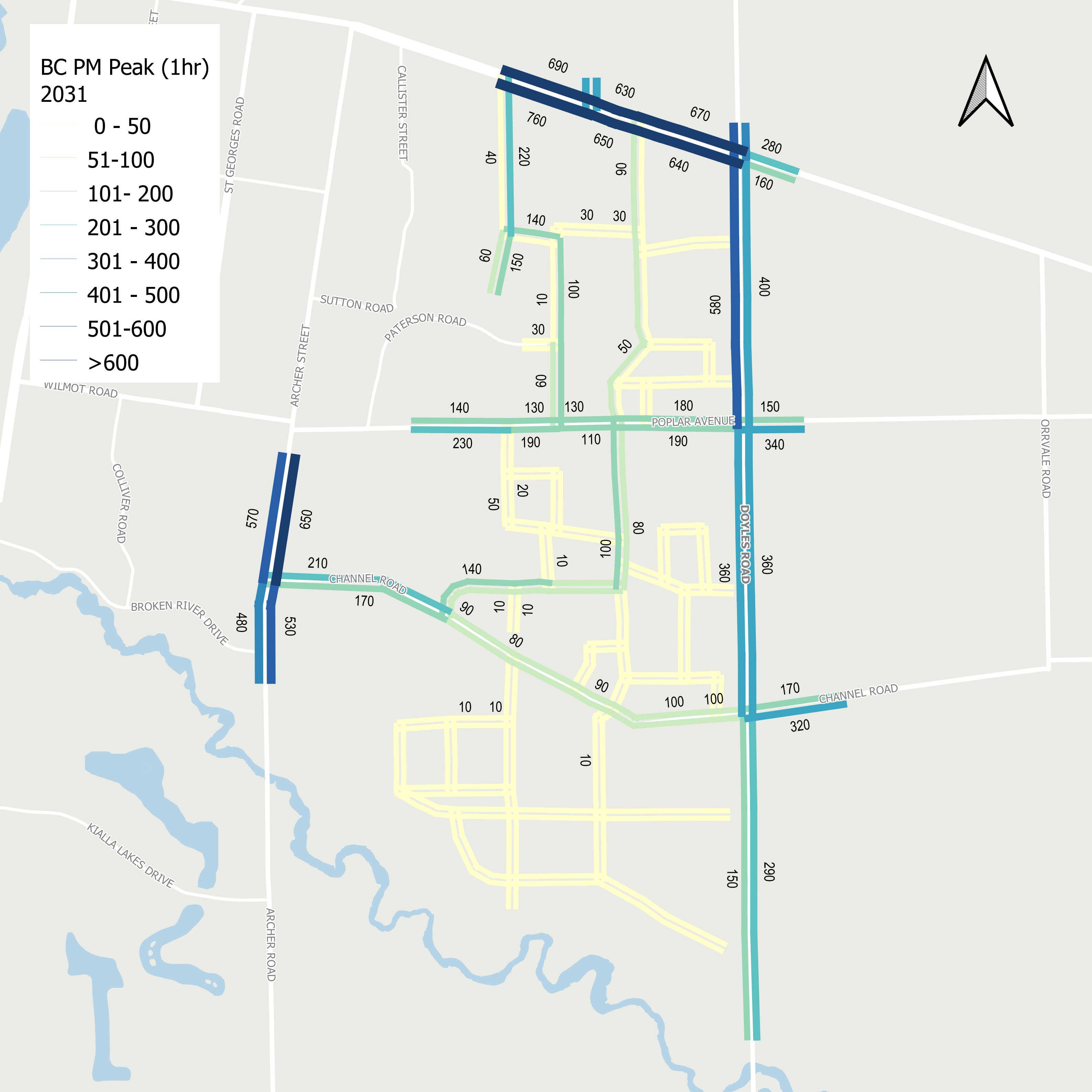
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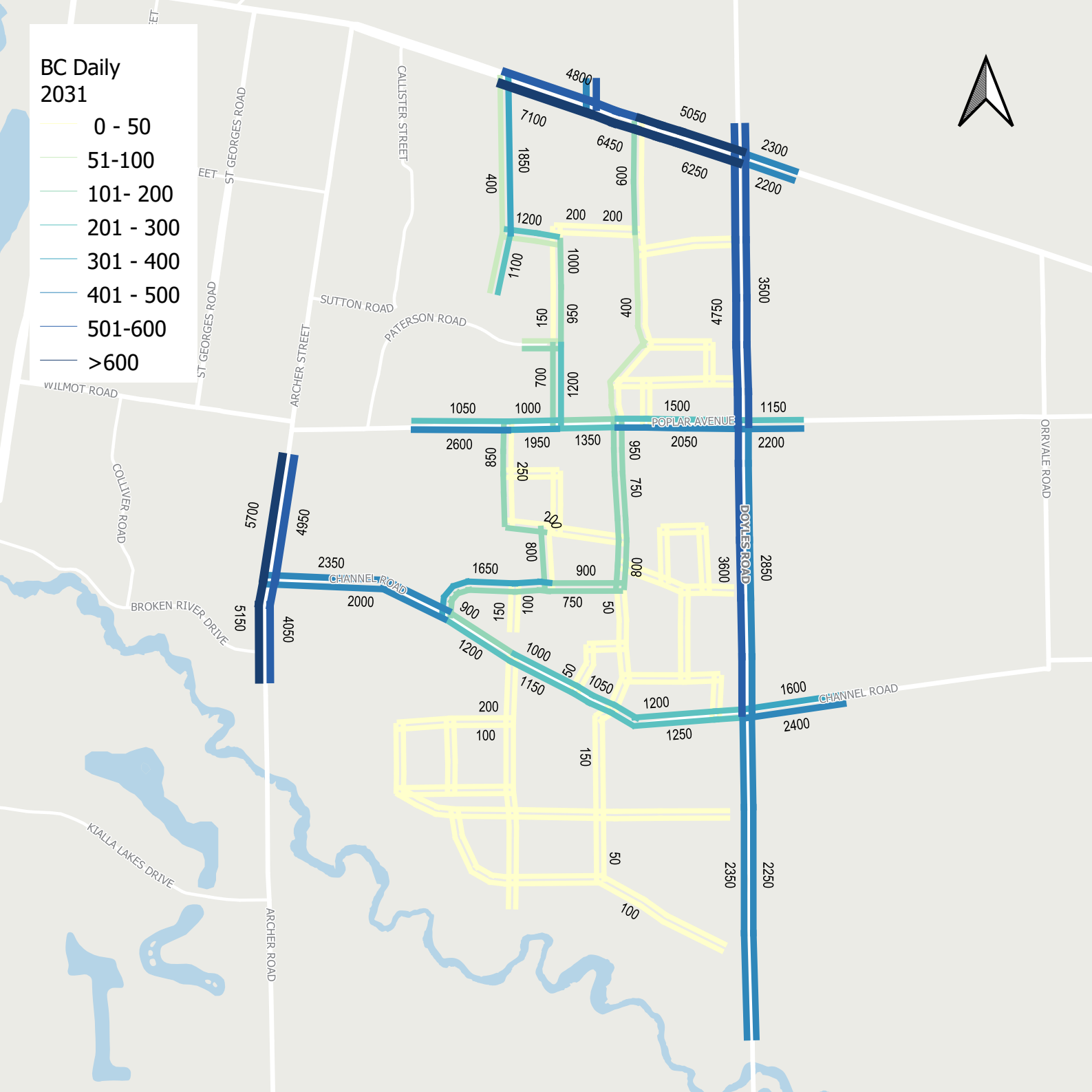
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BC AM Peak (1hr)
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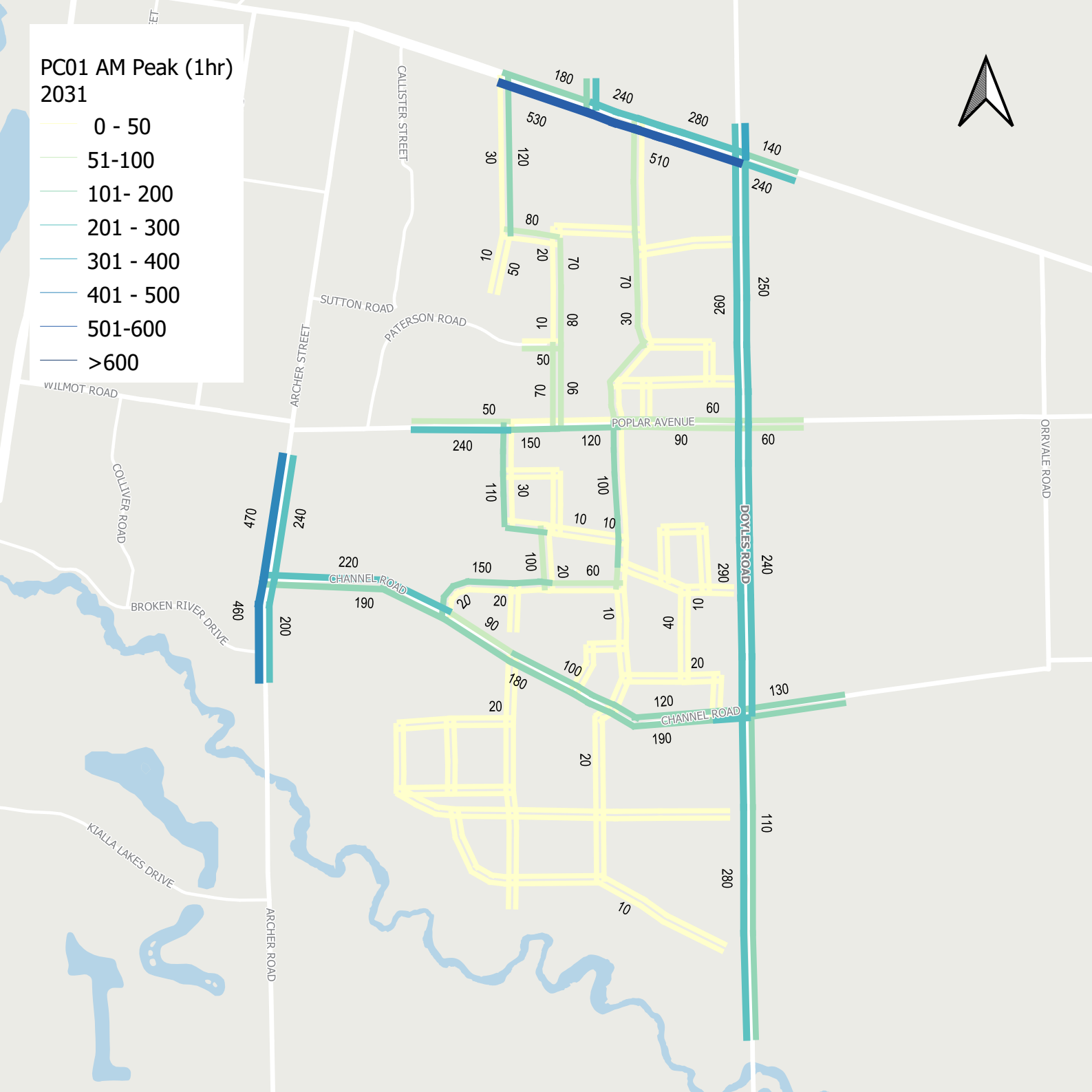
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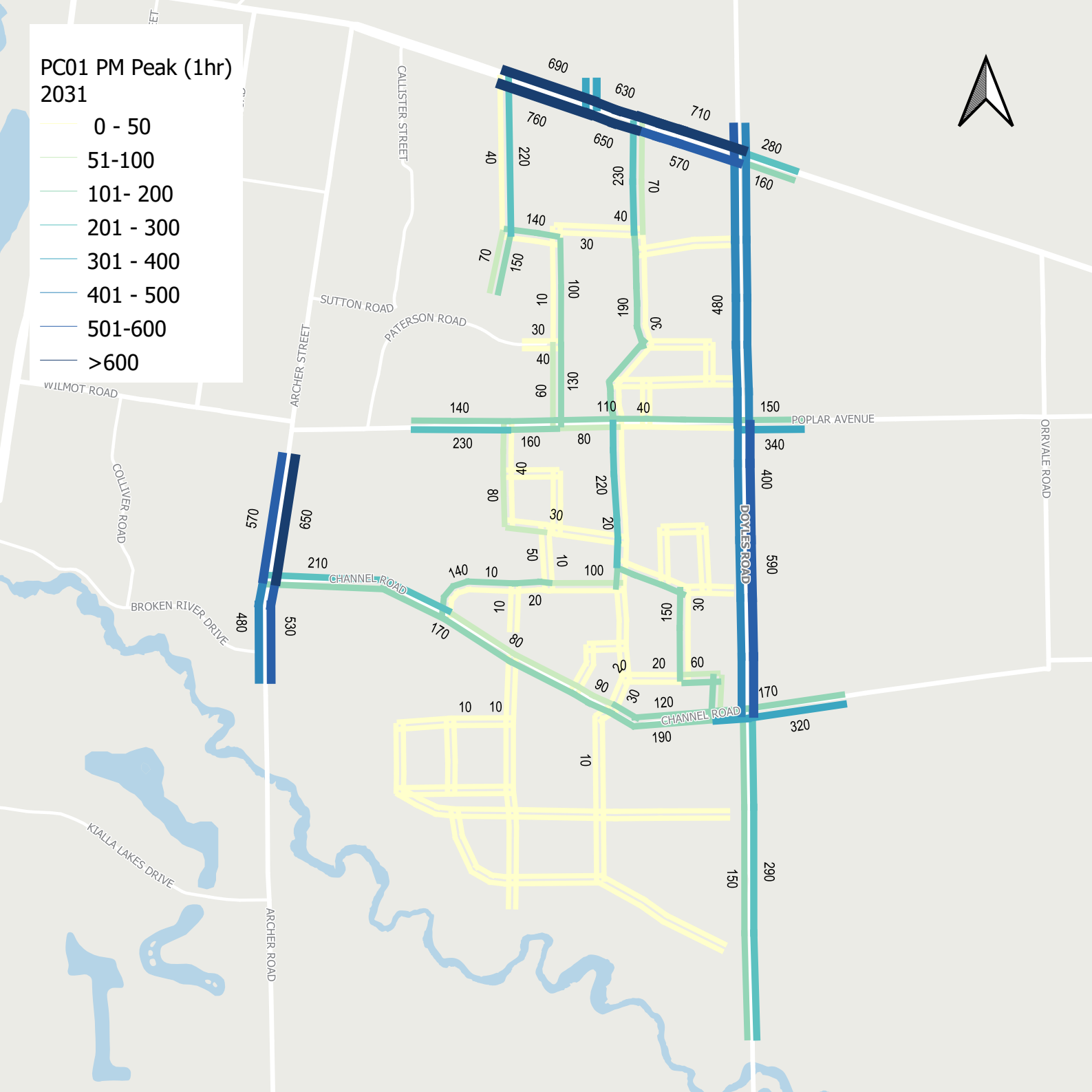
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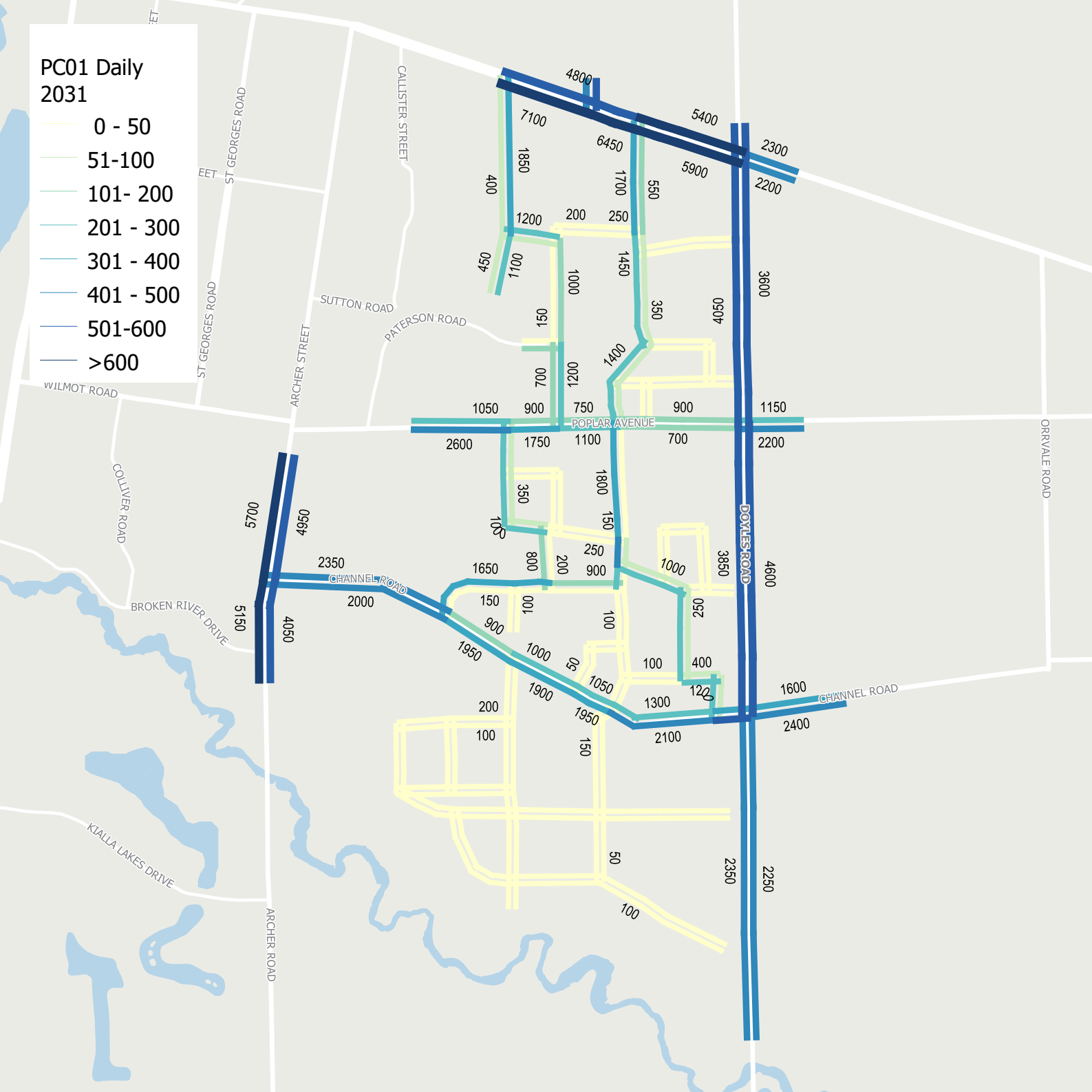
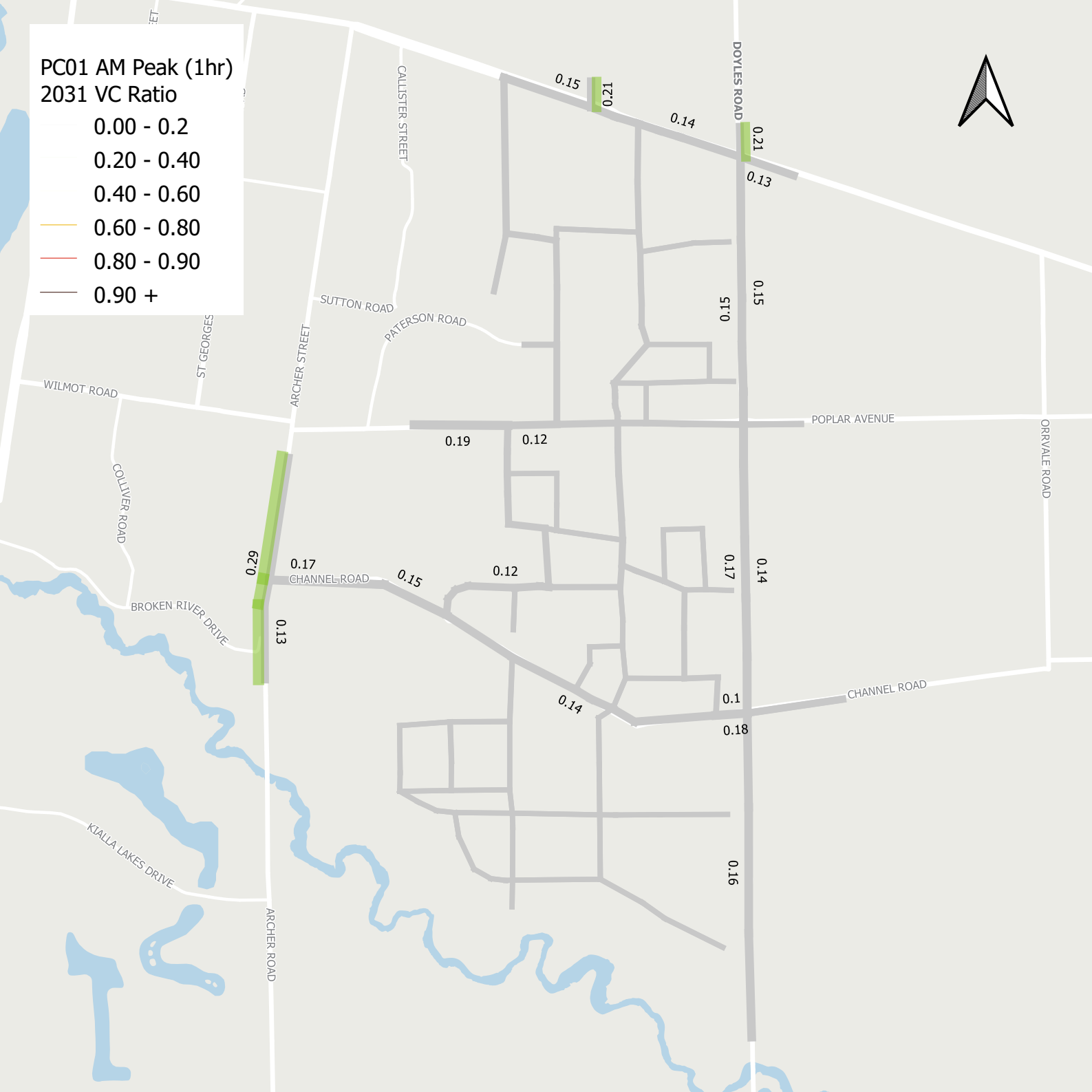
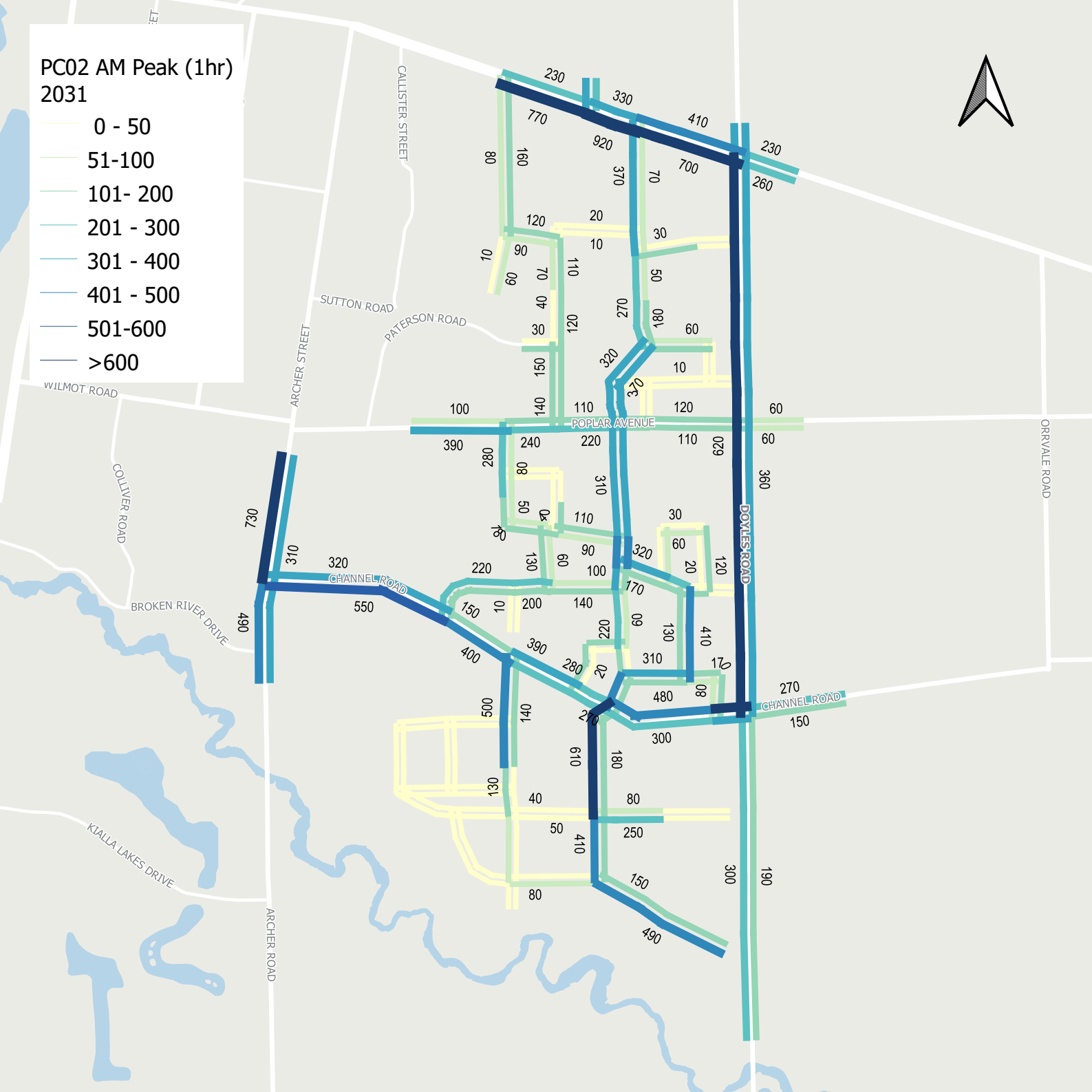
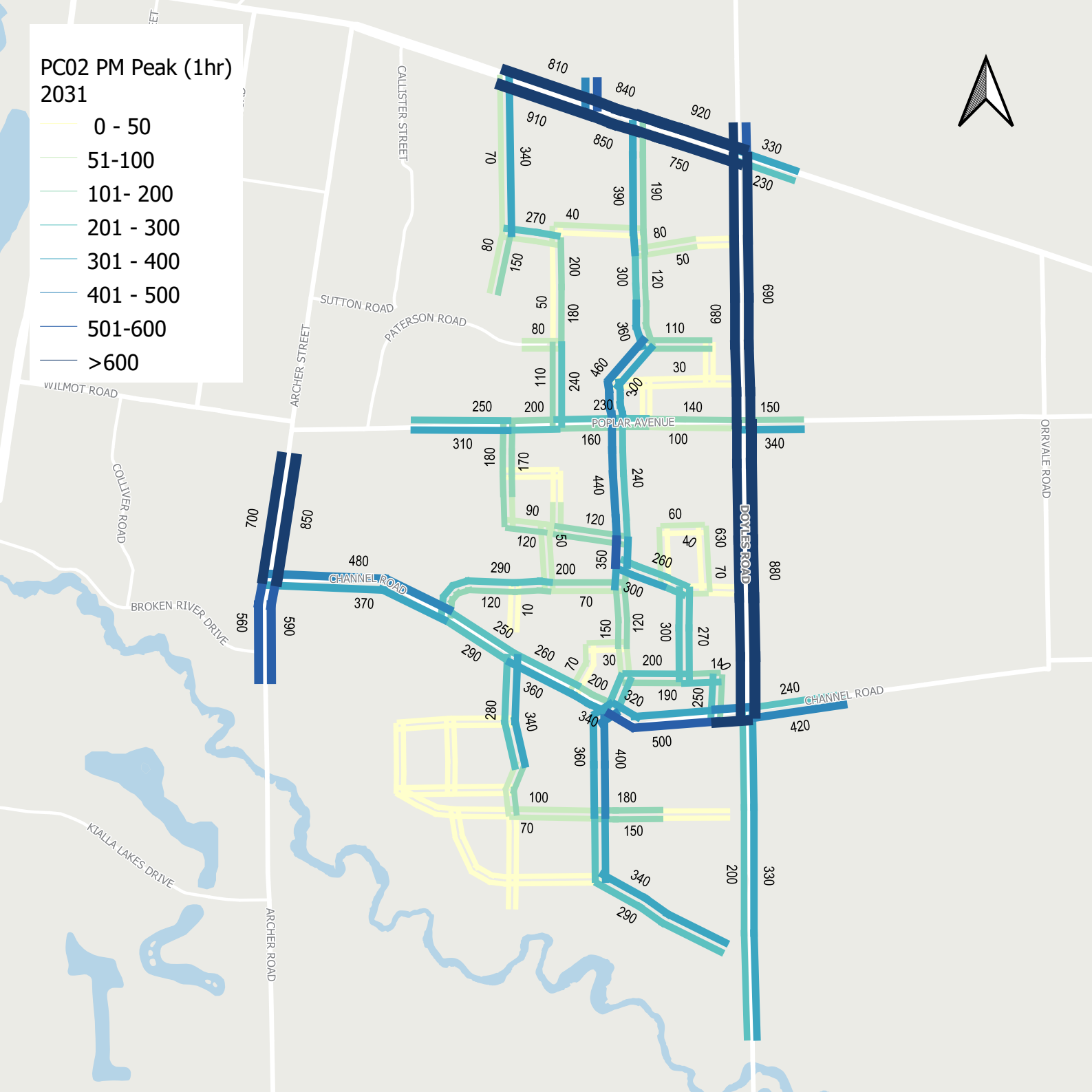
CHANNEL ROAD
POPLAR AVENUE
DOYLES ROAD
ORRVALE ROAD
KIALLA LAKES DRIVE
ARCHER ROAD

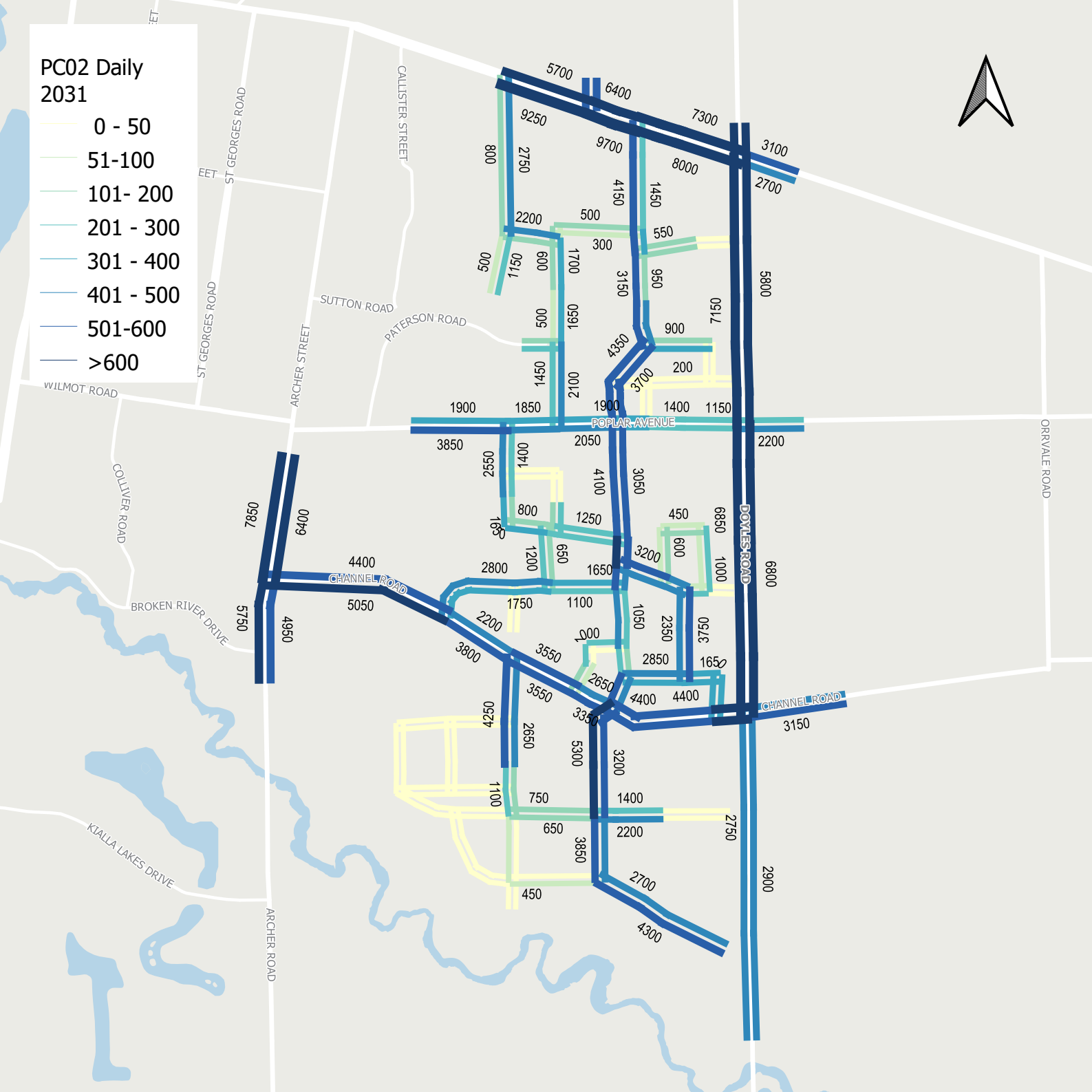

PC01 Daily
2031
0 - 50
51-100
101- 200
201 - 300
301 - 400
401 - 500
501-600
>600
ST GEORGES ROAD
CALLISTER STREET
SUTTON ROAD
PATERSON ROAD
ARCHER STREET
WILMOT ROAD
POPLAR AVENUE
DOYLES ROAD
CHANNEL ROAD
COLLIVER ROAD
BROKEN RIVER DRIVE
KIALLA LAKES DRIVE
ARCHER ROAD
ORRVALE ROAD
4800
7100
6450
5400
5900
2300
2200
1850
1700
550
400
1200
200
250
450
1100
1000
1450
3600
150
350
0904
1400
700
1200
1050
900
750
900
1150
2600
1750
1100
700
2200
1800
350
150
100
5700
4950
250
2350
800
200
900
1000
3850
4600
1650
CHANNEL ROAD
2000
150
100
100
250
5150
4050
900
1950
1000
50
100
400
1050
1900
1300
120
1600
200
1950
2400
100
150
2100
50
2350
2250
100


PC01 AM Peak (1hr)
2031 VC Ratio
0.00 - 0.2
0.20 - 0.40
0.40 - 0.60
0.60 - 0.80
0.80 - 0.90
0.90 +
DOYLES ROAD
CALLISTER STREET
SUTTON ROAD
PATERSON ROAD
ST GEORGES
ARCHER STREET
WILMOT ROAD
POPLAR AVENUE
ORRVALE ROAD
COLLIVER ROAD
CHANNEL ROAD
BROKEN RIVER DRIVE
KIALLA LAKES DRIVE
ARCHER ROAD
0.15
0.21
0.14
0.21
0.13
0.15
0.15
0.19
0.12
0.29
0.17
0.15
0.12
0.17
0.14
0.13
0.14
0.1
0.18
0.16


PC01 PM Peak (1hr)
2031 VC Ratio
0.00 - 0.2
0.20 - 0.40
0.40 - 0.60
0.60 - 0.80
0.80 - 0.90
0.90 +
DOYLES ROAD
CALLISTER STREET
SUTTON ROAD
PATERSON ROAD
ST GEORGES
ARCHER STREET
WILMOT ROAD
POPLAR AVENUE
ORRVALE ROAD
COLLIVER ROAD
CHANNEL ROAD
BROKEN RIVER DRIVE
KIALLA LAKES DRIVE
ARCHER ROAD
0.19
0.29
0.18
0.21
0.2
0.31
0.25
0.15
0.18
0.18
0.16
0.12
0.15
0.28
0.11
0.11
0.11
0.18
0.12
0.26
0.17
0.24
0.35
0.41
0.16
0.11
0.35
0.12
0.3
0.33
0.13
0.13
0.15
0.28
0.25
0.17


PC02 AM Peak (1hr)
2031
0 - 50
51-100
101- 200
201 - 300
301 - 400
401 - 500
501-600
>600
CALLISTER STREET
SUTTON ROAD
PATERSON ROAD
ARCHER STREET
WILMOT ROAD
POPLAR AVENUE
DOYLES ROAD
CHANNEL ROAD
COLLIVER ROAD
BROKEN RIVER DRIVE
KIALLA LAKES DRIVE
ARCHER ROAD
ORRVALE ROAD


PC02 PM Peak (1hr)
2031
0 - 50
51-100
101- 200
201 - 300
301 - 400
401 - 500
501-600
>600
CALLISTER STREET
SUTTON ROAD
PATERSON ROAD
ARCHER STREET
WILMOT ROAD
POPLAR AVENUE
COLLIVER ROAD
CHANNEL ROAD
DOYLES ROAD
BROKEN RIVER DRIVE
KIALLA LAKES DRIVE
ARCHER ROAD
ORRVALE ROAD


PC02 Daily
2031
0 - 50
51-100
101- 200
201 - 300
301 - 400
401 - 500
501-600
>600
ST GEORGES ROAD
CALLISTER STREET
SUTTON ROAD
PATERSON ROAD
ARCHER STREET
WILMOT ROAD
POPLAR AVENUE
DOMLES ROAD
CHANNEL ROAD
COLLIVER ROAD
BROKEN RIVER DRIVE
KIALLA LAKES DRIVE
ARCHER ROAD
ORRVALE ROAD


PC02 AM Peak (1hr)
2031 VC Ratio
0.00 - 0.2
0.20 - 0.40
0.40 - 0.60
0.60 - 0.80
0.80 - 0.90
0.90 +
DOYLES ROAD
CALLISTER STREET
SUTTON ROAD
PATERSON ROAD
ST GEORGES
ARCHER STREET
WILMOT ROAD
POPLAR AVENUE
ORRVALE ROAD
COLLIVER ROAD
CHANNEL ROAD
BROKEN RIVER DRIVE
KIALLA LAKES DRIVE
ARCHER ROAD


PC02 PM Peak (1hr)
2031 VC Ratio
0.00 - 0.2
0.20 - 0.40
0.40 - 0.60
0.60 - 0.80
0.80 - 0.90
0.90 +
DOYLES ROAD
CALLISTER STREET
SUTTON ROAD
PATERSON ROAD
ST GEORGES
ARCHER STREET
WILMOT ROAD
POPLAR AVENUE
ORRVALE ROAD
COLLIVER ROAD
CHANNEL ROAD
BROKEN RIVER DRIVE
KIALLA LAKES DRIVE
ARCHER ROAD
0.22 0.36 0.23 0.25 0.24 0.26 0.36 0.32 0.18 0.21 0.13
0.29 0.3 0.15 0.23 0.13 0.16 0.23 0.4 0.4 0.15 0.28 0.14
0.36 0.23 0.1 0.2 0.19 0.17 0.11 0.24 0.15 0.12 0.26
0.14 0.18 0.34 0.44 0.53 0.37 0.22 0.15 0.27 0.22 0.37 0.52
0.28 0.25 0.35 0.19 0.11 0.22 0.25 0.23 0.2 0.17 0.1
0.23 0.28 0.15 0.25 0.16 0.19 0.35 0.18 0.26 0.32
0.29 0.39 0.58 0.28 0.31 0.15 0.12 0.22 0.26 0.12 0.2
0.28 0.24

AM Peak Development Traffic Distribution


PM Peak Development
Traffic Distribution
HAYES STREET
ST GEORGES ROAD
CALLISTER STREET
DOYLES ROAD
SUTTON ROAD
PATERSON ROAD
ARCHER STREET
WILMOT ROAD
POPLAR AVENUE
COLLIVER ROAD
ORRVALE ROAD
BROKEN RIVER DRIVE
CHANNEL ROAD
KIALLA LAKES DRIVE
ARCHER ROAD

Appendix B. SIDRA Intersection Modelling Outputs

USER REPORT FOR SITE

All Movement Classes

Project: 230503sid-1-ZurcusLane_SchoolAccess_AccessStreet

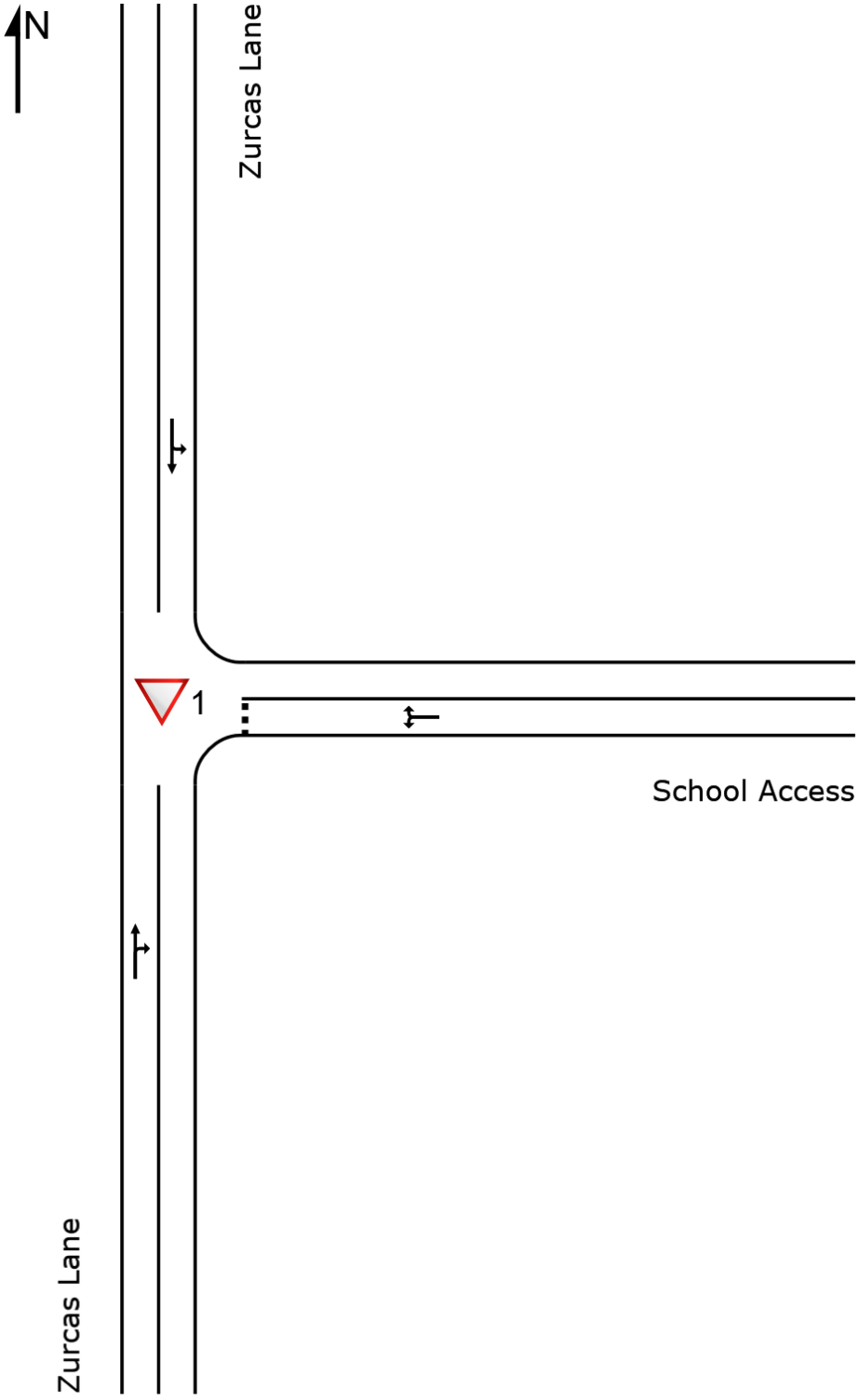
Template: Site Report

Site: 1 [AM Peak (Future) - Updated - 230718 (Site Folder: General)]

1
Site Category: (None)
Give-Way (Two-Way)

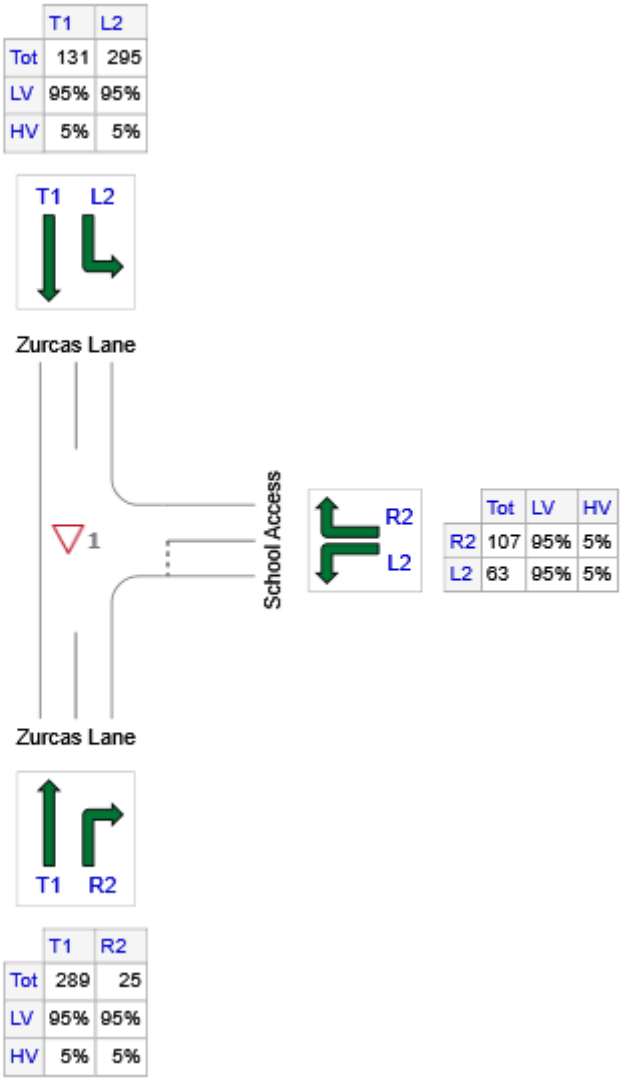
Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Input Volumes

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: Zurcas Lane	314	298	16
E: School Access	170	162	9
N: Zurcas Lane	426	405	21
Total	910	865	46

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Zurcas Lane													
Lane 1	331	5.0	1779	0.186	100	0.7	LOS A	0.3	2.2	Full	500	0.0	0.0
Approach	331	5.0		0.186		0.7	NA	0.3	2.2				
East: School Access													
Lane 1	179	5.0	826	0.217	100	6.0	LOS A	0.8	5.8	Full	500	0.0	0.0
Approach	179	5.0		0.217		6.0	LOS A	0.8	5.8				
North: Zurcas Lane													
Lane 1	448	5.0	1822	0.246	100	2.5	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	448	5.0		0.246		2.5	NA	0.0	0.0				
Intersection	958	5.0		0.246		2.5	NA	0.8	5.8				

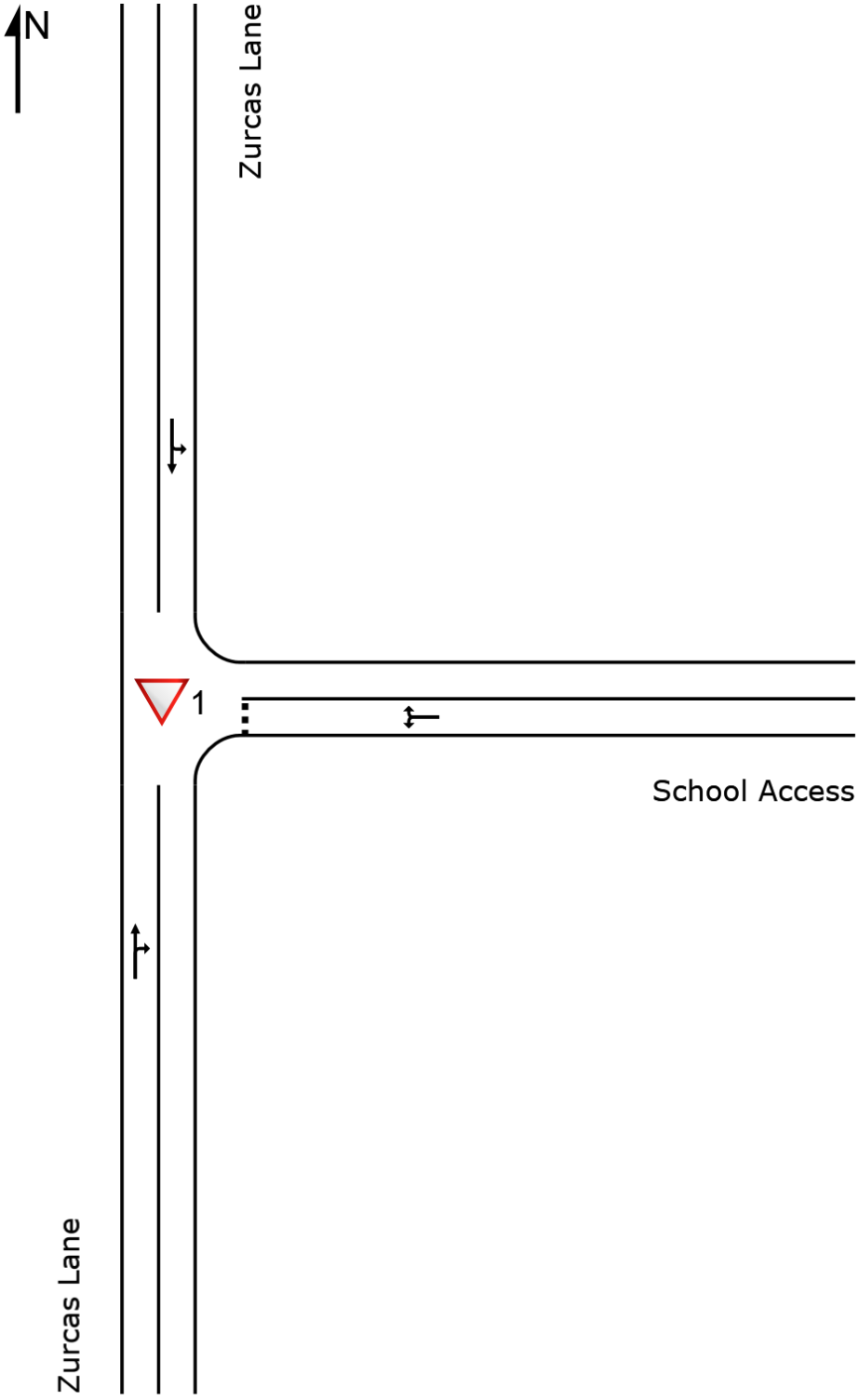
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 1 [PM Peak (Future) - Updated - 230718 (Site Folder: General)]

1
Site Category: (None)
Give-Way (Two-Way)

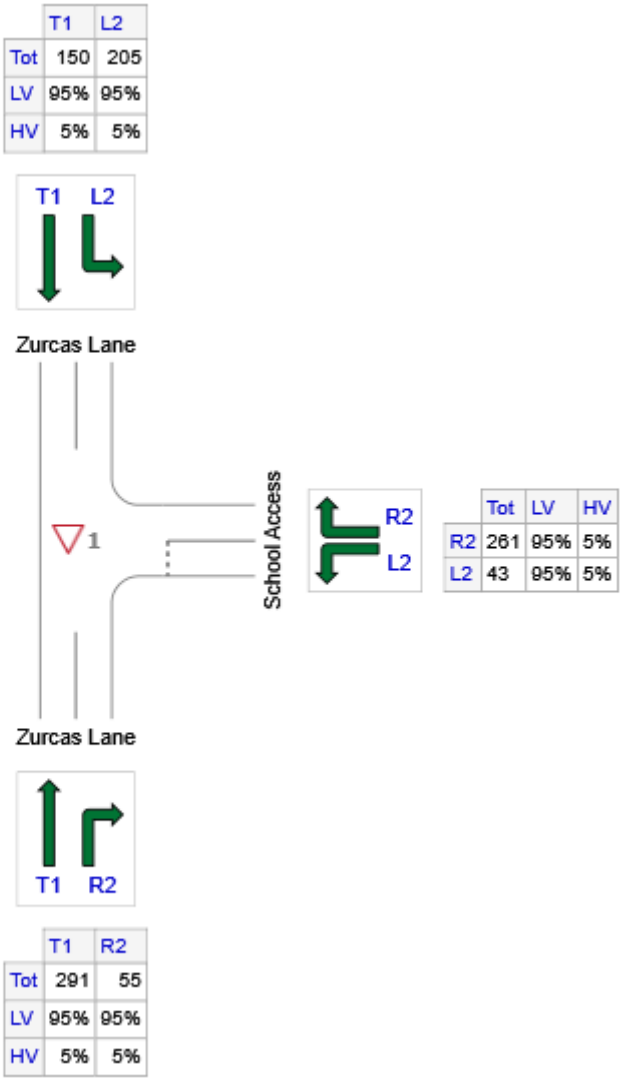
Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Input Volumes

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: Zurcas Lane	346	329	17
E: School Access	304	289	15
N: Zurcas Lane	355	337	18
Total	1005	955	50

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Zurcas Lane													
Lane 1	364	5.0	1720	0.212	100	1.2	LOS A	0.6	4.2	Full	500	0.0	0.0
Approach	364	5.0		0.212		1.2	NA	0.6	4.2				
East: School Access													
Lane 1	320	5.0	708	0.452	100	8.5	LOS A	2.4	17.3	Full	500	0.0	0.0
Approach	320	5.0		0.452		8.5	LOS A	2.4	17.3				
North: Zurcas Lane													
Lane 1	374	5.0	1832	0.204	100	2.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	374	5.0		0.204		2.1	NA	0.0	0.0				
Intersection	1058	5.0		0.452		3.7	NA	2.4	17.3				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

USER REPORT FOR SITE

All Movement Classes

Project: 230503sid-2-ZurcasLane_FeiglinRoad_PoplarAvenue

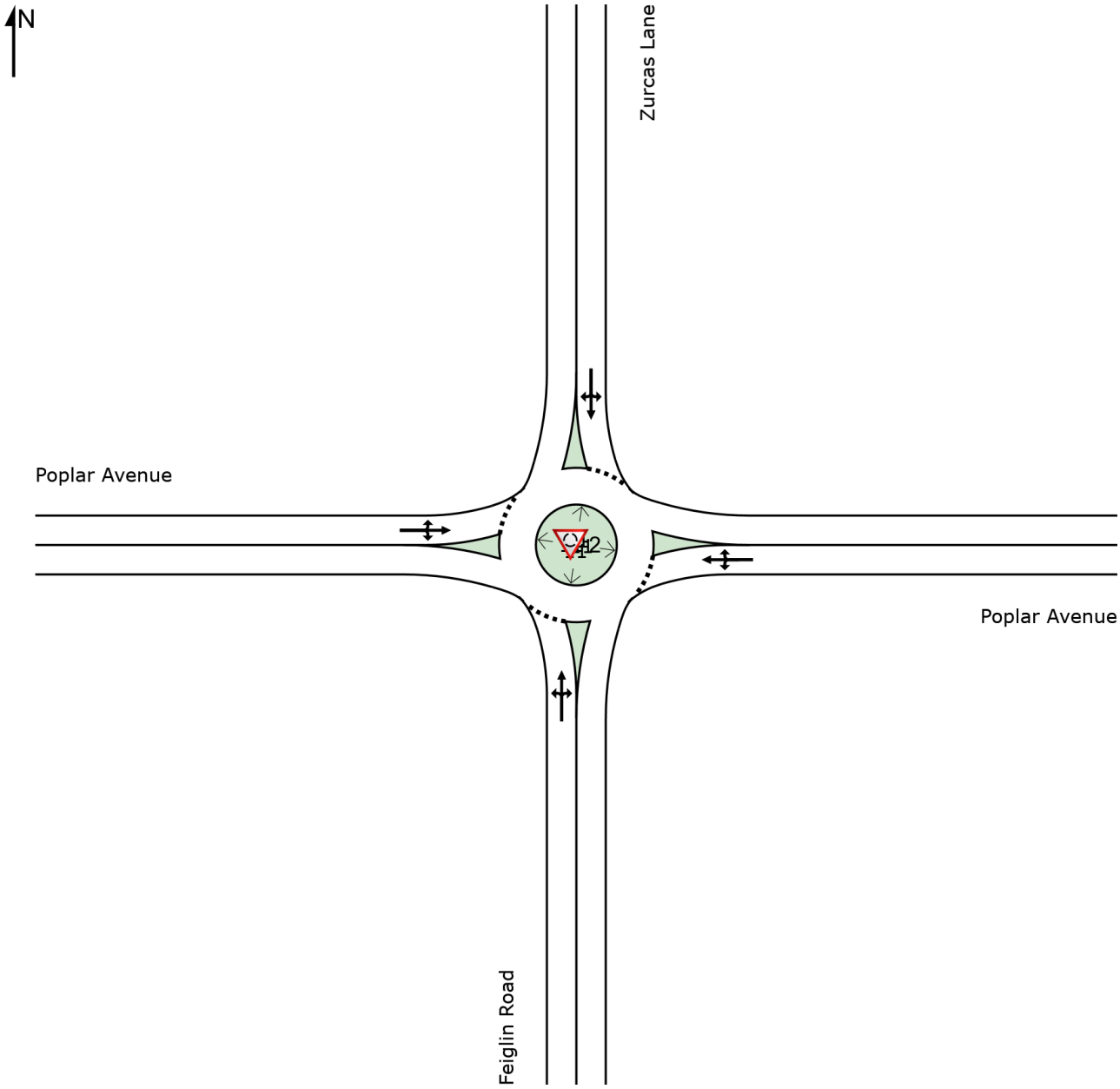
Template: Site Report

Site: 2 [AM Peak (Future) - Updated - 230718 (Site Folder: General)]

2
Site Category: (None)
Roundabout

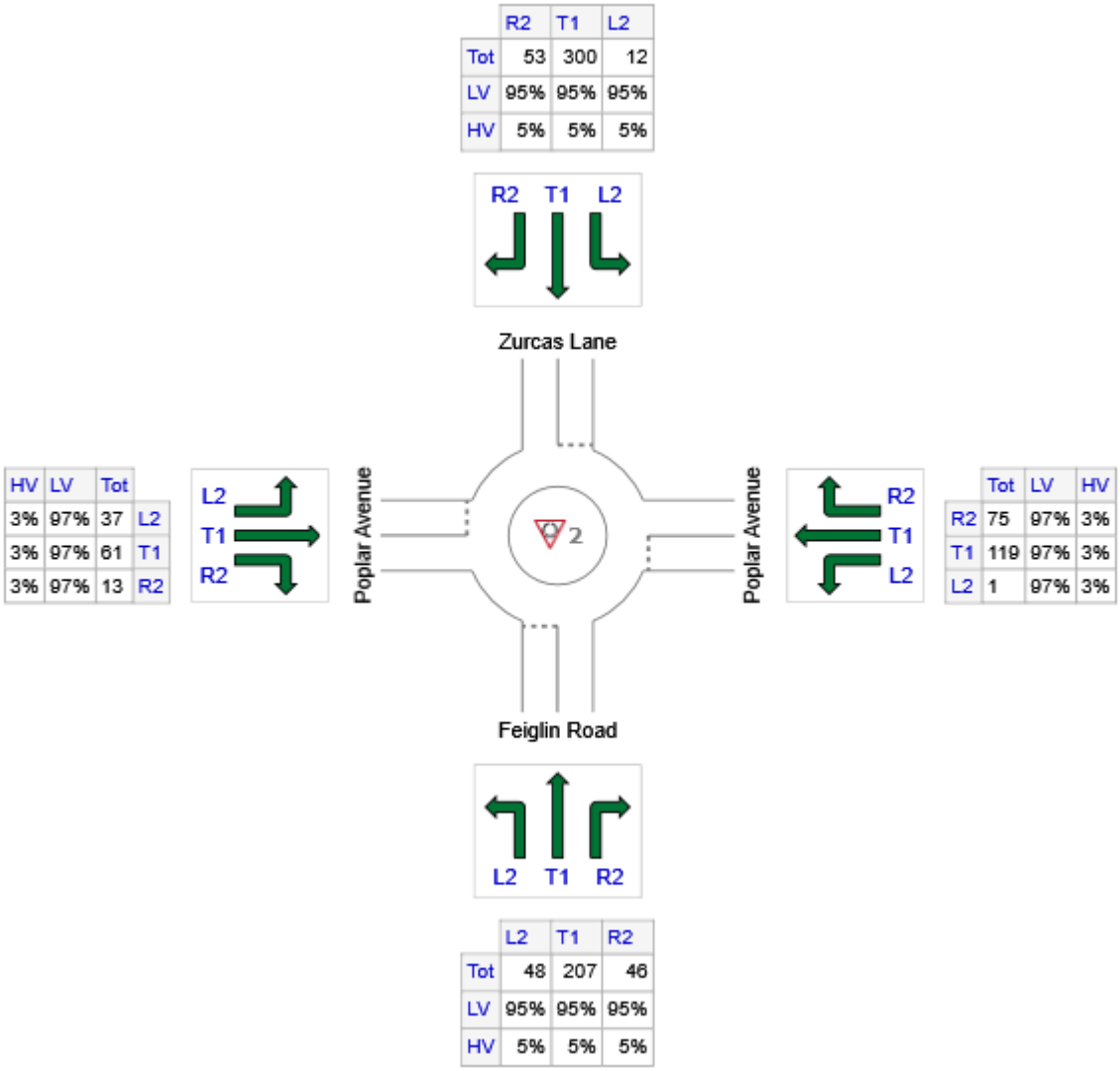
Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Input Volumes

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: Feiglin Road	301	286	15
E: Poplar Avenue	195	189	6
N: Zurcas Lane	365	347	18
W: Poplar Avenue	111	108	3
Total	972	930	42

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Feiglin Road													
Lane 1[d]	317	5.0	998	0.318	100	5.9	LOS A	2.0	14.7	Full	500	0.0	0.0
Approach	317	5.0		0.318		5.9	LOS A	2.0	14.7				
East: Poplar Avenue													
Lane 1[d]	205	3.0	907	0.226	100	7.3	LOS A	1.3	9.4	Full	500	0.0	0.0
Approach	205	3.0		0.226		7.3	LOS A	1.3	9.4				
North: Zurcas Lane													
Lane 1[d]	384	5.0	1199	0.320	100	4.9	LOS A	2.1	15.0	Full	500	0.0	0.0
Approach	384	5.0		0.320		4.9	LOS A	2.1	15.0				
West: Poplar Avenue													
Lane 1[d]	117	3.0	935	0.125	100	5.9	LOS A	0.7	4.9	Full	500	0.0	0.0
Approach	117	3.0		0.125		5.9	LOS A	0.7	4.9				
Intersection	1023	4.4		0.320		5.8	LOS A	2.1	15.0				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

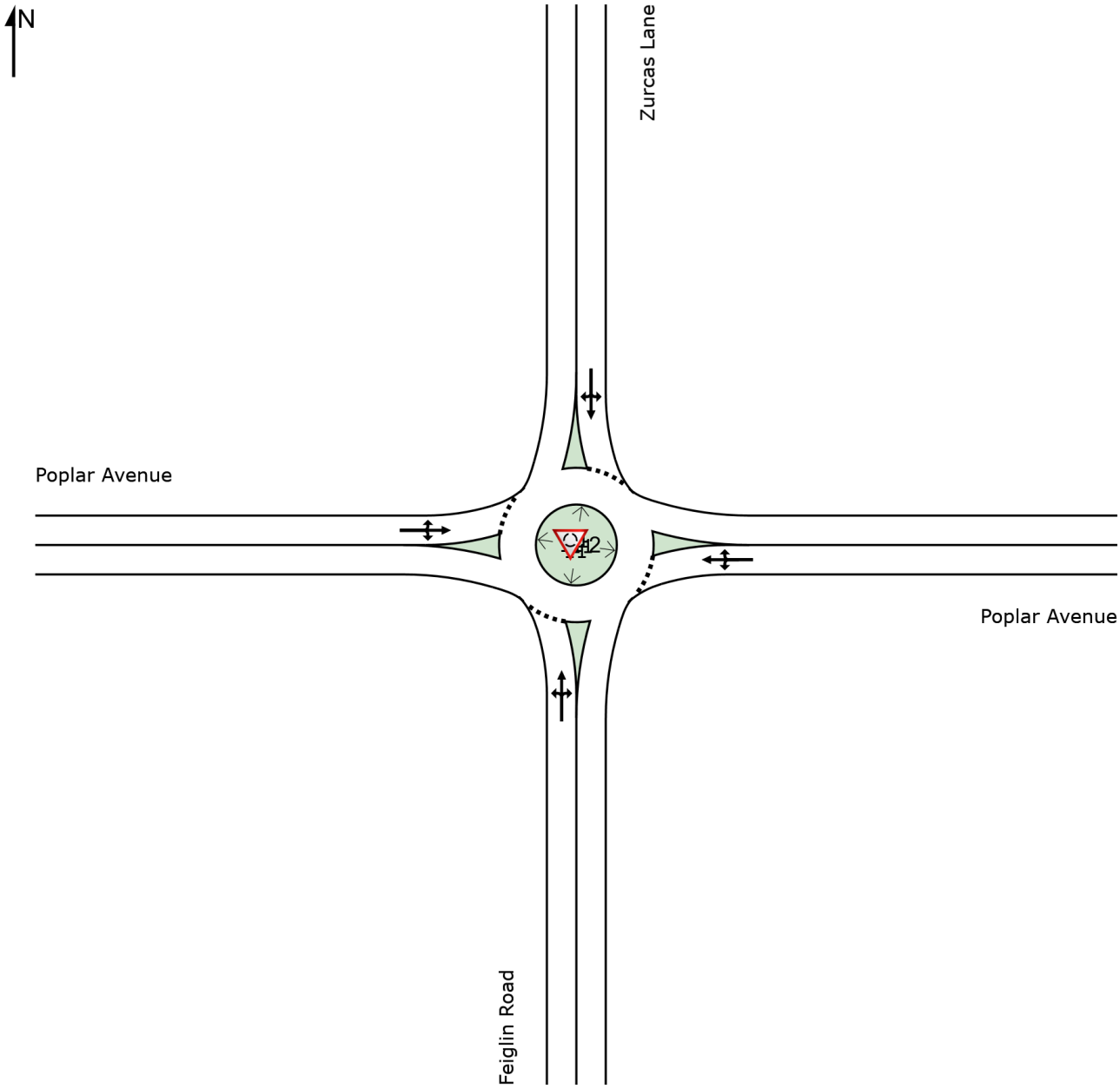
d Dominant lane on roundabout approach

Site: 2 [PM Peak (Future) - Updated - 230718 (Site Folder: General)]

2
Site Category: (None)
Roundabout

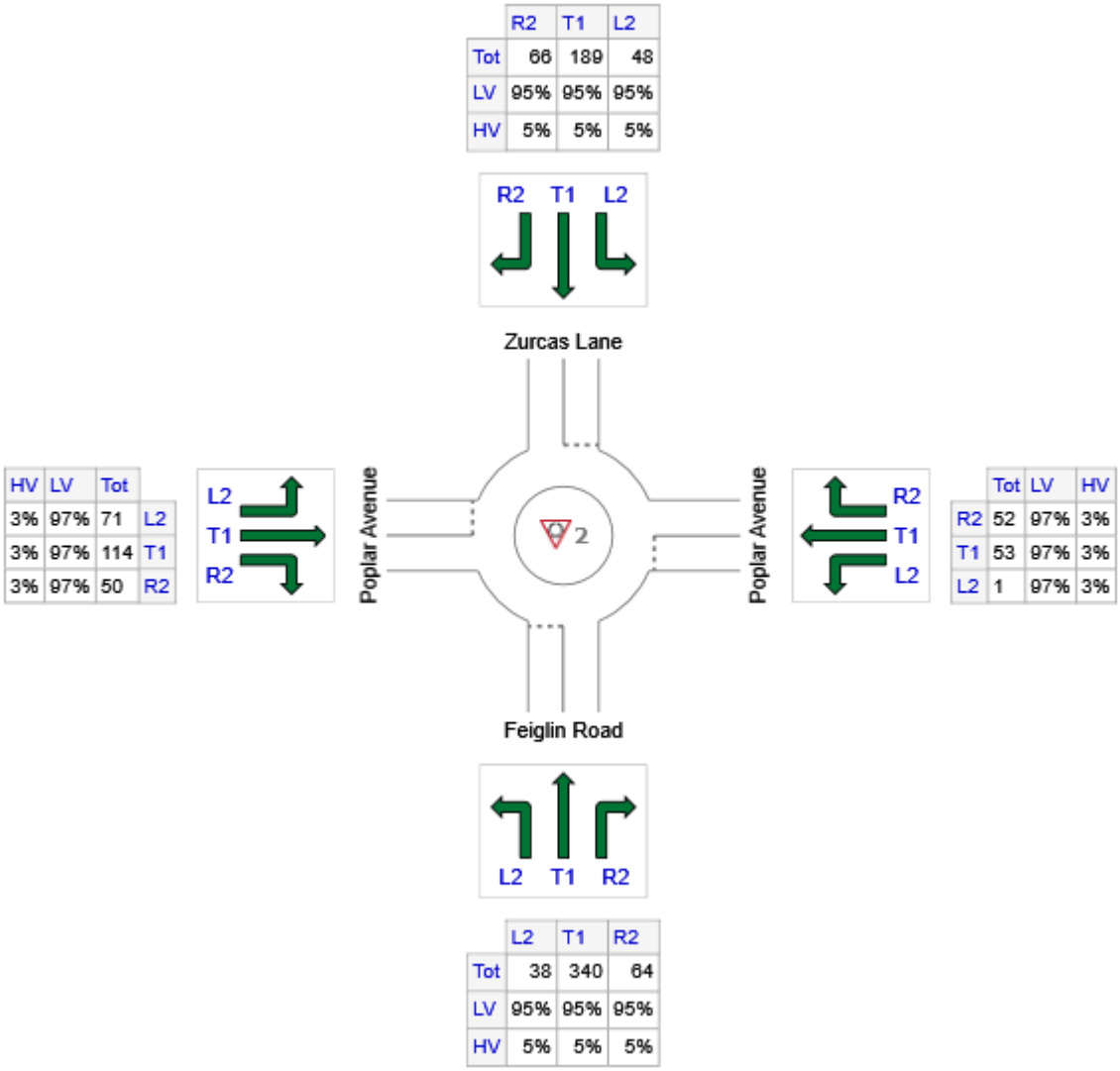
Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Input Volumes

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: Feiglin Road	442	420	22
E: Poplar Avenue	106	103	3
N: Zurcas Lane	303	288	15
W: Poplar Avenue	235	228	7
Total	1086	1039	47

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Feiglin Road													
Lane 1[d]	465	5.0	1131	0.411	100	5.4	LOS A	2.9	20.8	Full	500	0.0	0.0
Approach	465	5.0		0.411		5.4	LOS A	2.9	20.8				
East: Poplar Avenue													
Lane 1[d]	112	3.0	953	0.117	100	7.0	LOS A	0.6	4.6	Full	500	0.0	0.0
Approach	112	3.0		0.117		7.0	LOS A	0.6	4.6				
North: Zurcas Lane													
Lane 1[d]	319	5.0	1018	0.313	100	6.0	LOS A	2.0	14.6	Full	500	0.0	0.0
Approach	319	5.0		0.313		6.0	LOS A	2.0	14.6				
West: Poplar Avenue													
Lane 1[d]	247	3.0	830	0.298	100	7.6	LOS A	1.9	13.3	Full	500	0.0	0.0
Approach	247	3.0		0.298		7.6	LOS A	1.9	13.3				
Intersection	1143	4.4		0.411		6.2	LOS A	2.9	20.8				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

USER REPORT FOR SITE

All Movement Classes

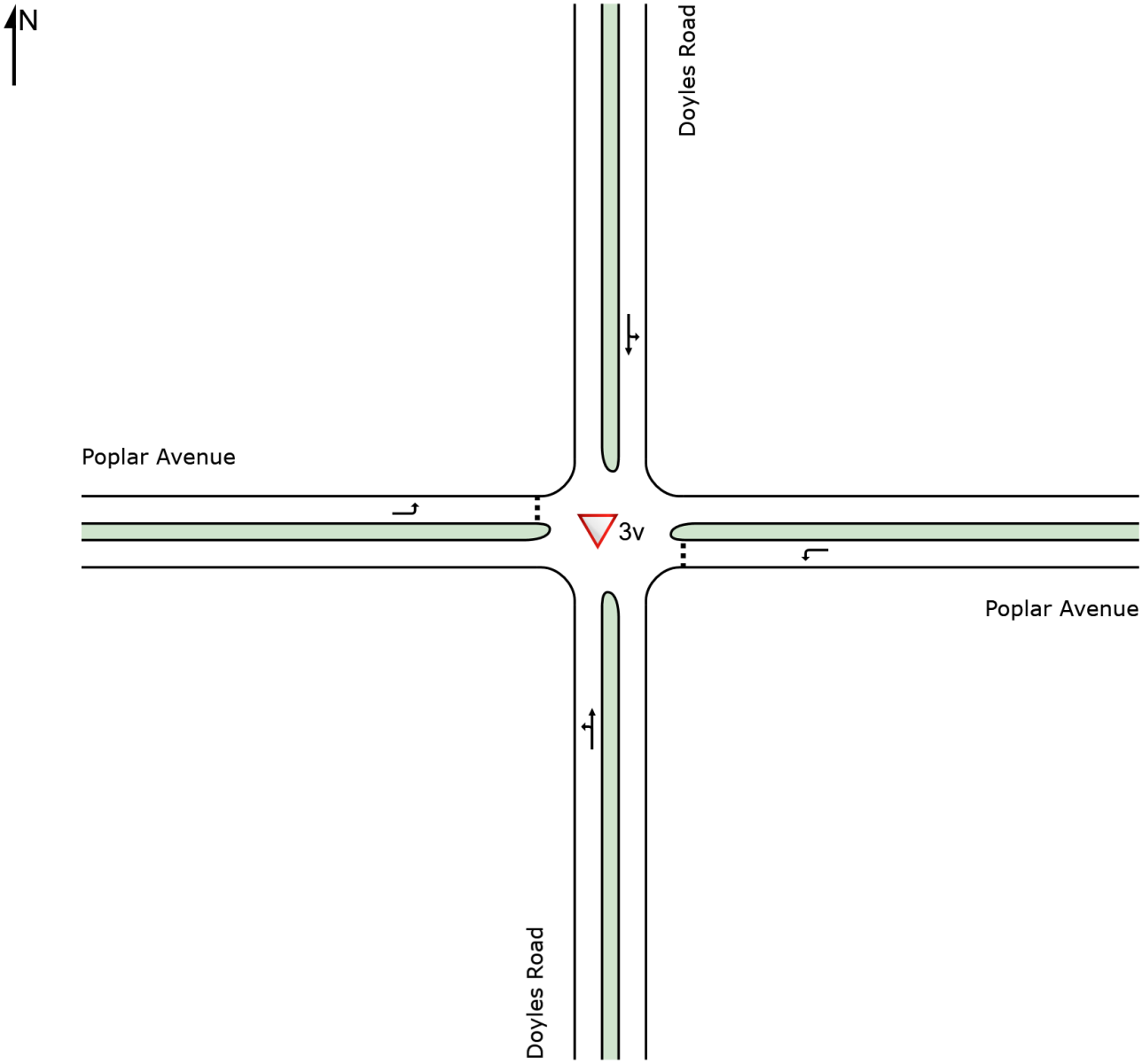
Project: 230503sid-3-DoylesRoad_PoplarAvenue **Template: Site Report**

Site: 3v [AM Peak (Future) - Updated - 230718 (Site Folder: General)]

3
Site Category: (None)
Give-Way (Two-Way)

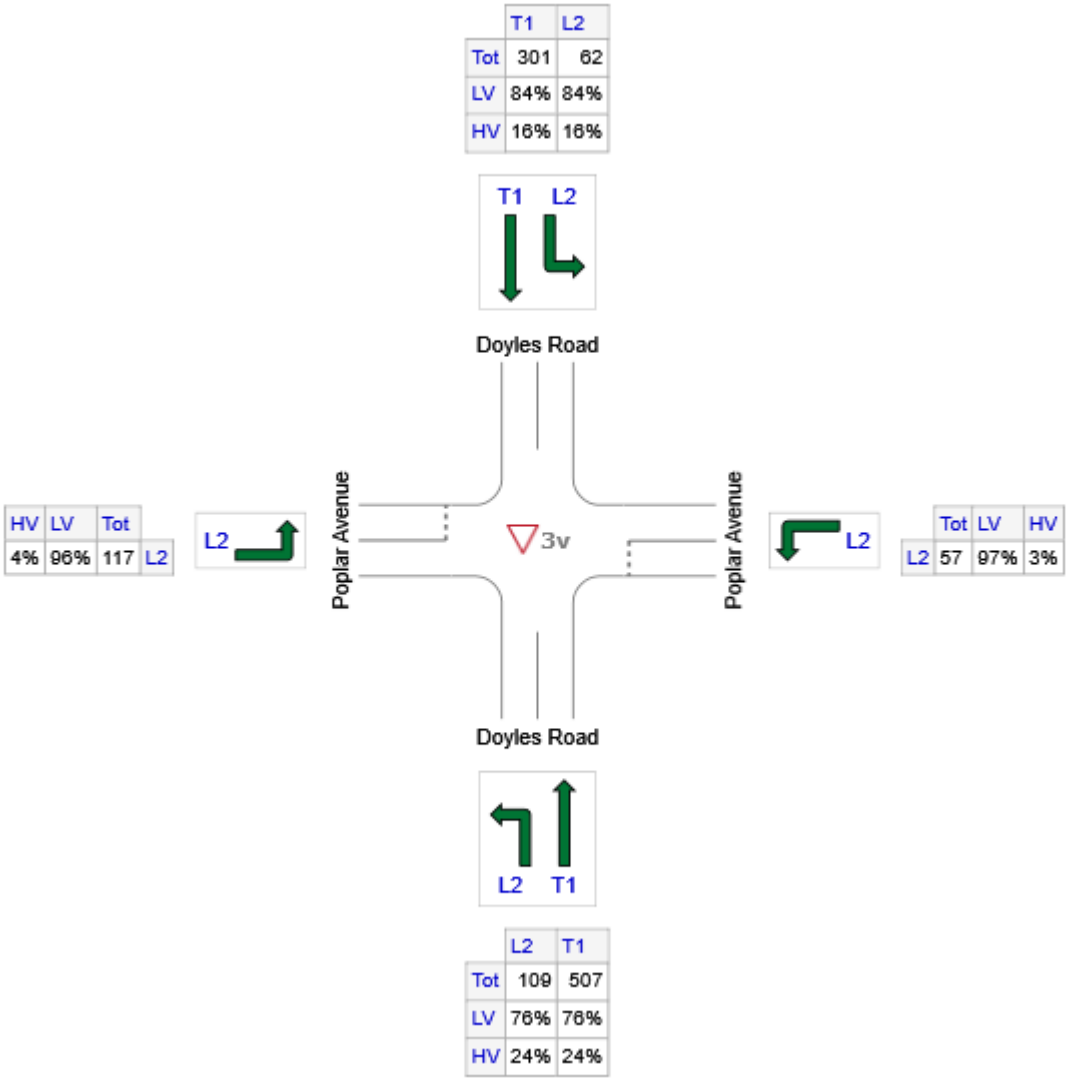
Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Input Volumes

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: Doyles Road	616	468	148
E: Poplar Avenue	57	55	2
N: Doyles Road	363	305	58
W: Poplar Avenue	117	112	5
Total	1153	941	212

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Doyles Road													
Lane 1	648	24.0	1668	0.389	100	1.4	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	648	24.0		0.389		1.4	NA	0.0	0.0				
East: Poplar Avenue													
Lane 1	60	3.0	1170	0.051	100	5.8	LOS A	0.2	1.4	Full	500	0.0	0.0
Approach	60	3.0		0.051		5.8	LOS A	0.2	1.4				
North: Doyles Road													
Lane 1	382	16.0	1749	0.219	100	1.3	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	382	16.0		0.219		1.3	NA	0.0	0.0				
West: Poplar Avenue													
Lane 1	123	4.0	851	0.145	100	7.5	LOS A	0.6	4.0	Full	500	0.0	0.0
Approach	123	4.0		0.145		7.5	LOS A	0.6	4.0				
Intersection	1214	18.4		0.389		2.2	NA	0.6	4.0				

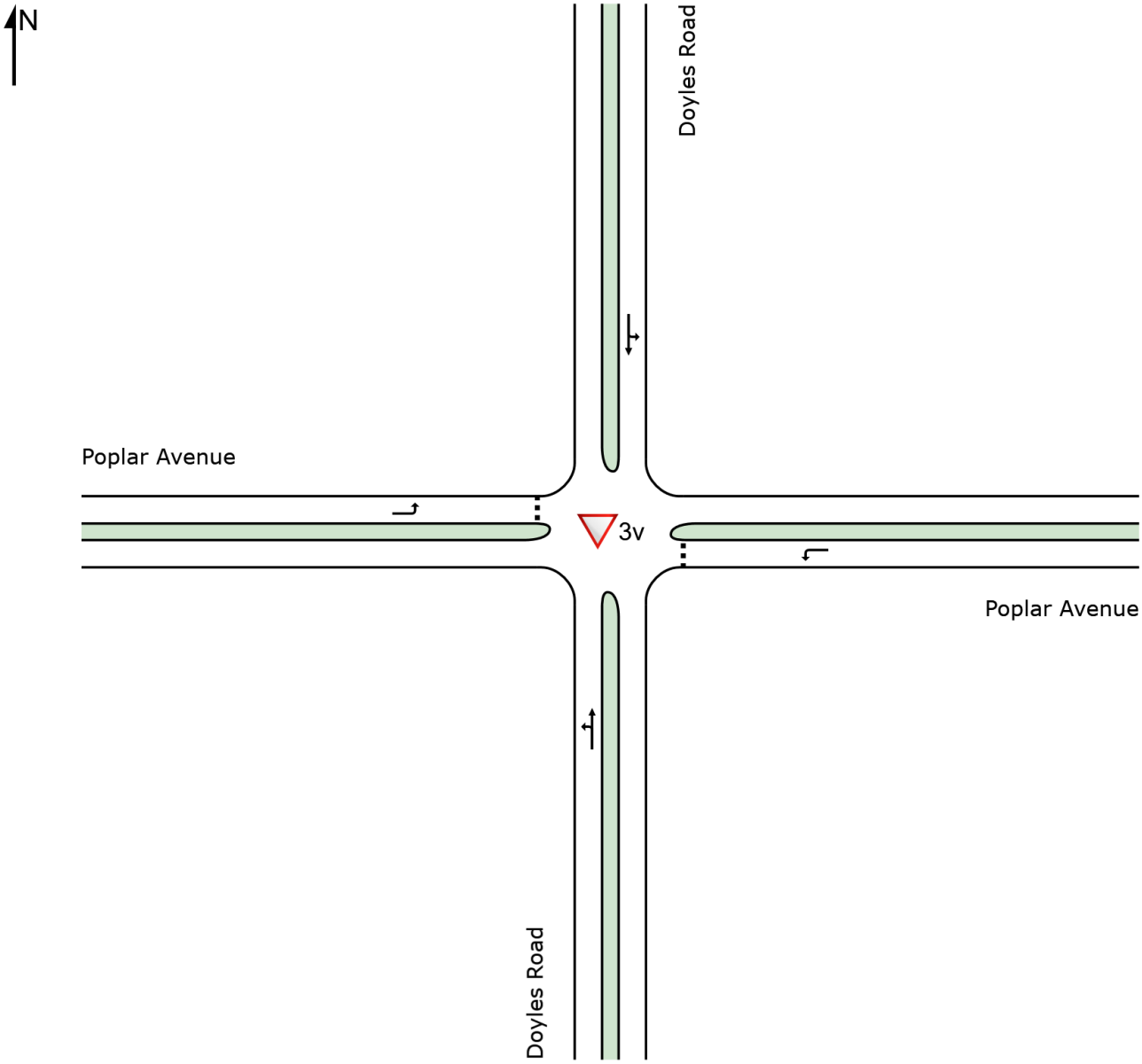
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 3v [PM Peak (Future) - Updated - 230718 (Site Folder: General)]

3
Site Category: (None)
Give-Way (Two-Way)

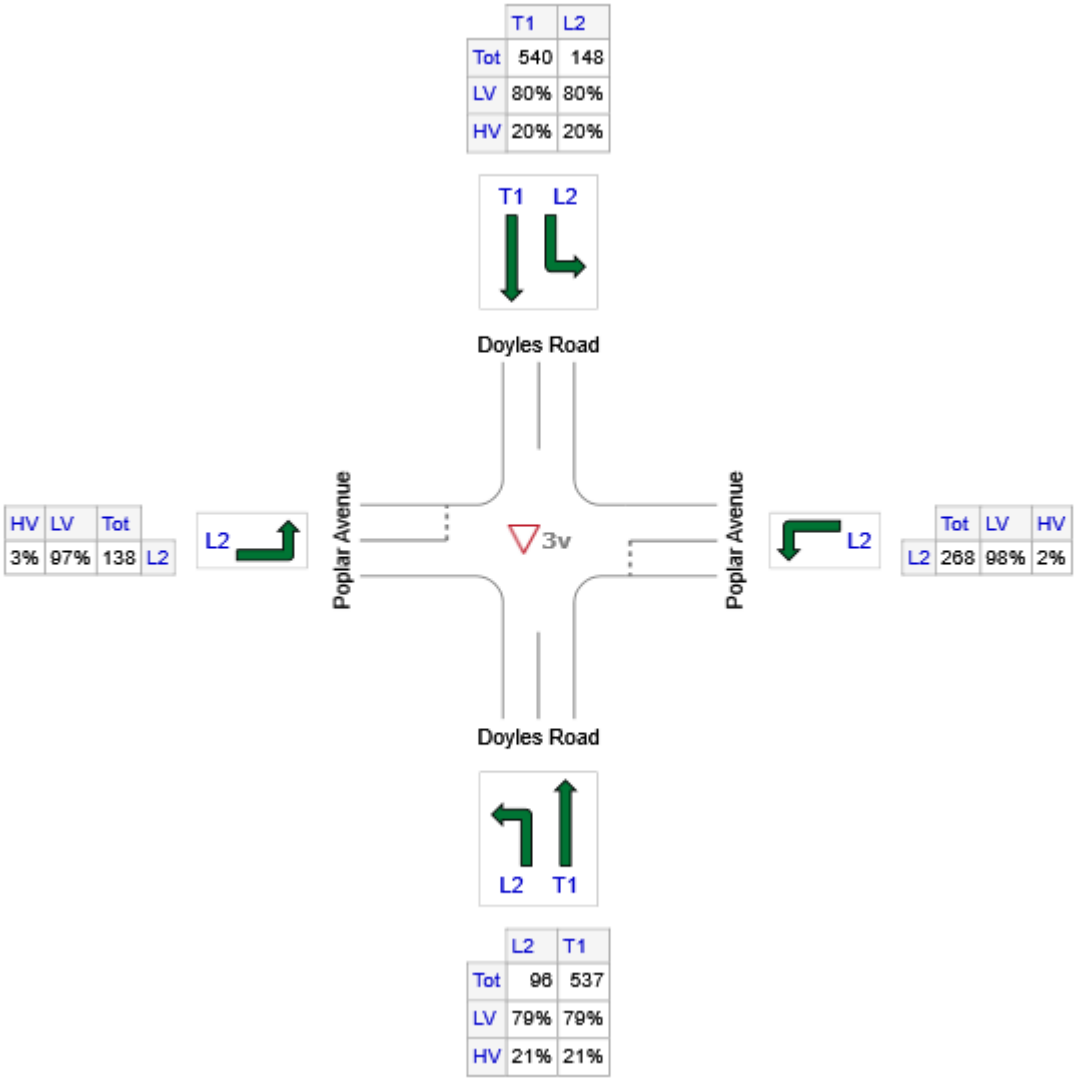
Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Input Volumes

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: Doyles Road	633	500	133
E: Poplar Avenue	268	263	5
N: Doyles Road	688	550	138
W: Poplar Avenue	138	134	4
Total	1727	1447	280

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Doyles Road													
Lane 1	666	21.0	1700	0.392	100	1.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	666	21.0		0.392		1.2	NA	0.0	0.0				
East: Poplar Avenue													
Lane 1	282	2.0	833	0.338	100	8.5	LOS A	1.6	11.6	Full	500	0.0	0.0
Approach	282	2.0		0.338		8.5	LOS A	1.6	11.6				
North: Doyles Road													
Lane 1	724	20.0	1703	0.425	100	1.7	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	724	20.0		0.425		1.7	NA	0.0	0.0				
West: Poplar Avenue													
Lane 1	145	3.0	827	0.176	100	7.7	LOS A	0.7	4.8	Full	500	0.0	0.0
Approach	145	3.0		0.176		7.7	LOS A	0.7	4.8				
Intersection	1818	16.2		0.425		3.0	NA	1.6	11.6				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

USER REPORT FOR SITE

All Movement Classes

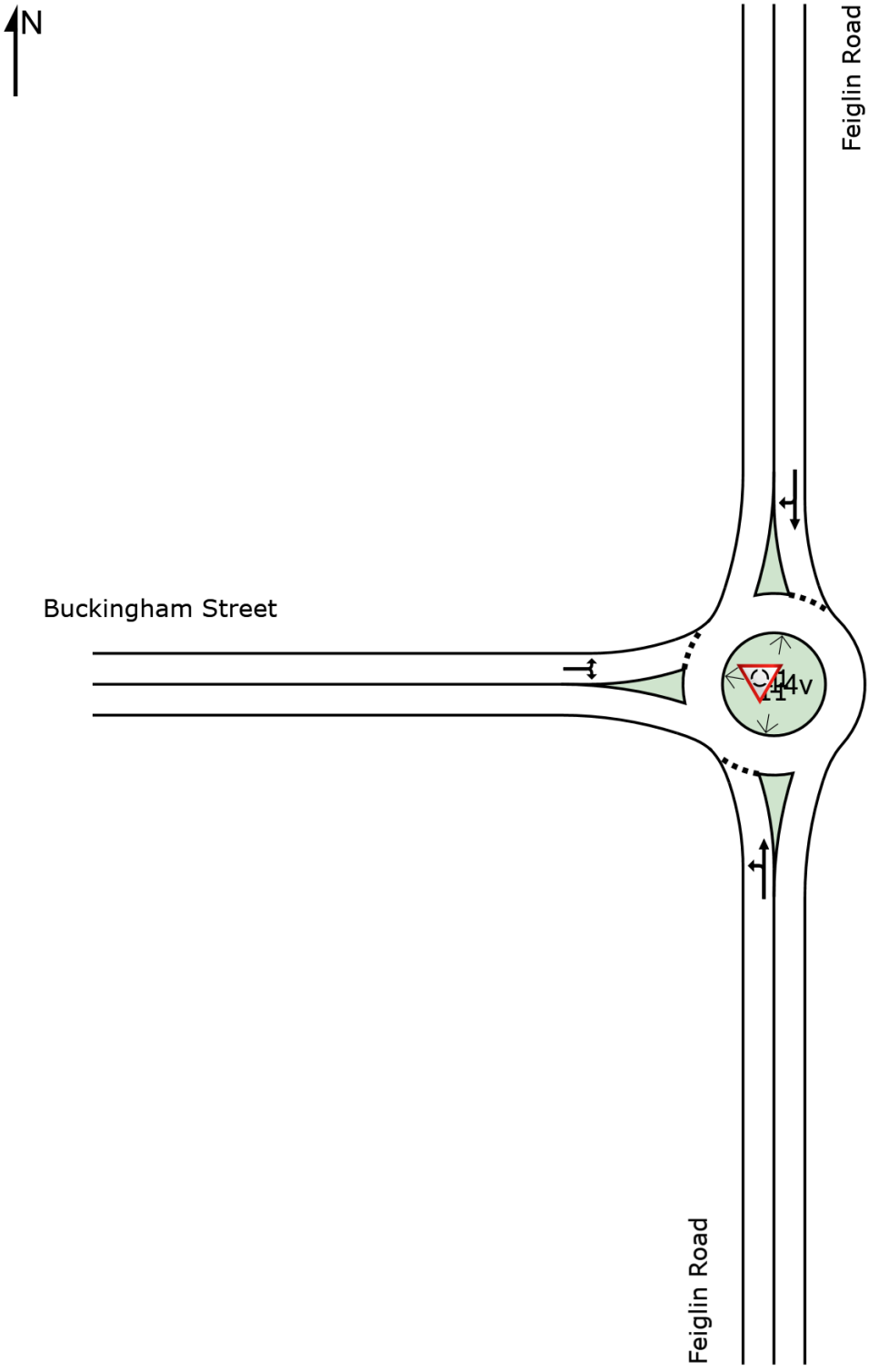
Project: 230503sid-4-FeiglinRoad_BuckinghamStreet **Template: Site Report**

Site: 4v [AM Peak (Future) - Roundabout - Updated - 230718 (Site Folder: General)]

4
Site Category: (None)
Roundabout

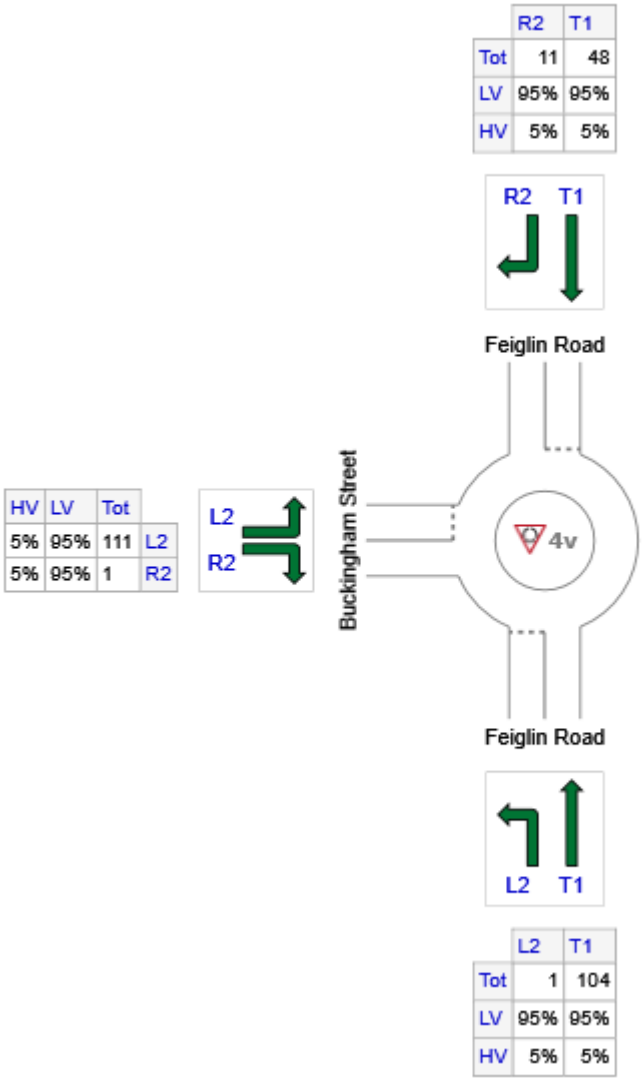
Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Input Volumes

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: Feiglin Road	105	100	5
N: Feiglin Road	59	56	3
W: Buckingham Street	112	106	6
Total	276	262	14

Lane Use and Performance													
	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Feiglin Road													
Lane 1[d]	111	5.0	1439	0.077	100	2.2	LOS A	0.4	3.1	Full	500	0.0	0.0
Approach	111	5.0		0.077		2.2	LOS A	0.4	3.1				
North: Feiglin Road													
Lane 1[d]	62	5.0	1601	0.039	100	2.8	LOS A	0.2	1.6	Full	500	0.0	0.0
Approach	62	5.0		0.039		2.8	LOS A	0.2	1.6				
West: Buckingham Street													
Lane 1[d]	118	5.0	1134	0.104	100	3.2	LOS A	0.6	4.3	Full	500	0.0	0.0
Approach	118	5.0		0.104		3.2	LOS A	0.6	4.3				
Intersection	291	5.0		0.104		2.7	LOS A	0.6	4.3				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

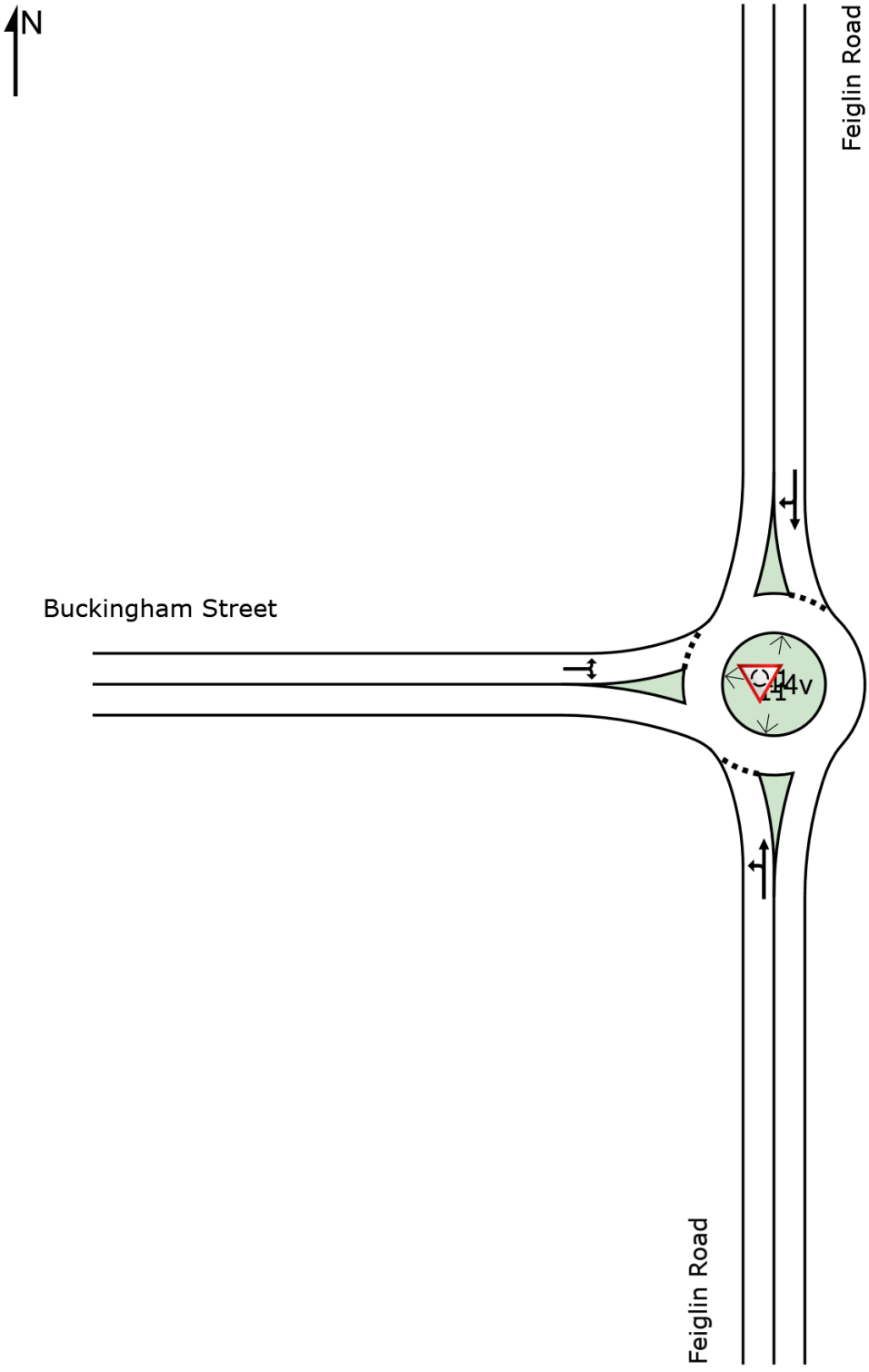
d Dominant lane on roundabout approach

Site: 4v [PM Peak (Future) - Roundabout - Updated - 230718 (Site Folder: General)]

4
Site Category: (None)
Roundabout

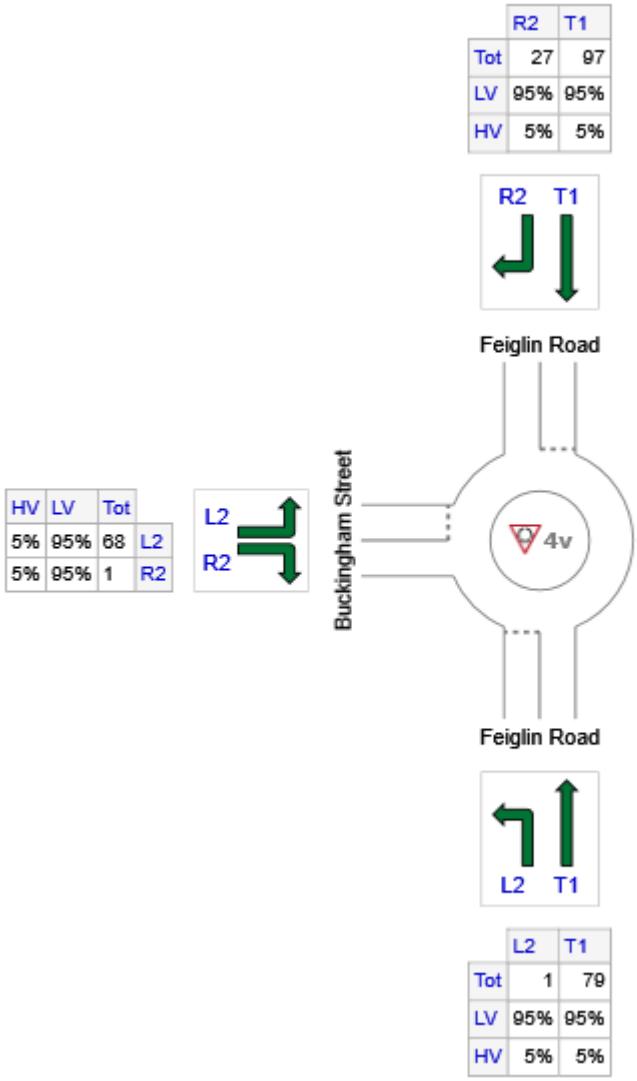
Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Input Volumes

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: Feiglin Road	80	76	4
N: Feiglin Road	124	118	6
W: Buckingham Street	69	66	3
Total	273	259	14

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Feiglin Road													
Lane 1[d]	84	5.0	1315	0.064	100	2.3	LOS A	0.3	2.5	Full	500	0.0	0.0
Approach	84	5.0		0.064		2.3	LOS A	0.3	2.5				
North: Feiglin Road													
Lane 1[d]	131	5.0	1636	0.080	100	2.9	LOS A	0.5	3.5	Full	500	0.0	0.0
Approach	131	5.0		0.080		2.9	LOS A	0.5	3.5				
West: Buckingham Street													
Lane 1[d]	73	5.0	1166	0.062	100	3.0	LOS A	0.3	2.5	Full	500	0.0	0.0
Approach	73	5.0		0.062		3.0	LOS A	0.3	2.5				
Intersection	287	5.0		0.080		2.7	LOS A	0.5	3.5				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

USER REPORT FOR SITE

All Movement Classes

Project: 230503sid-5-ArcherStreet_ChannelRoad **Template: Site Report**

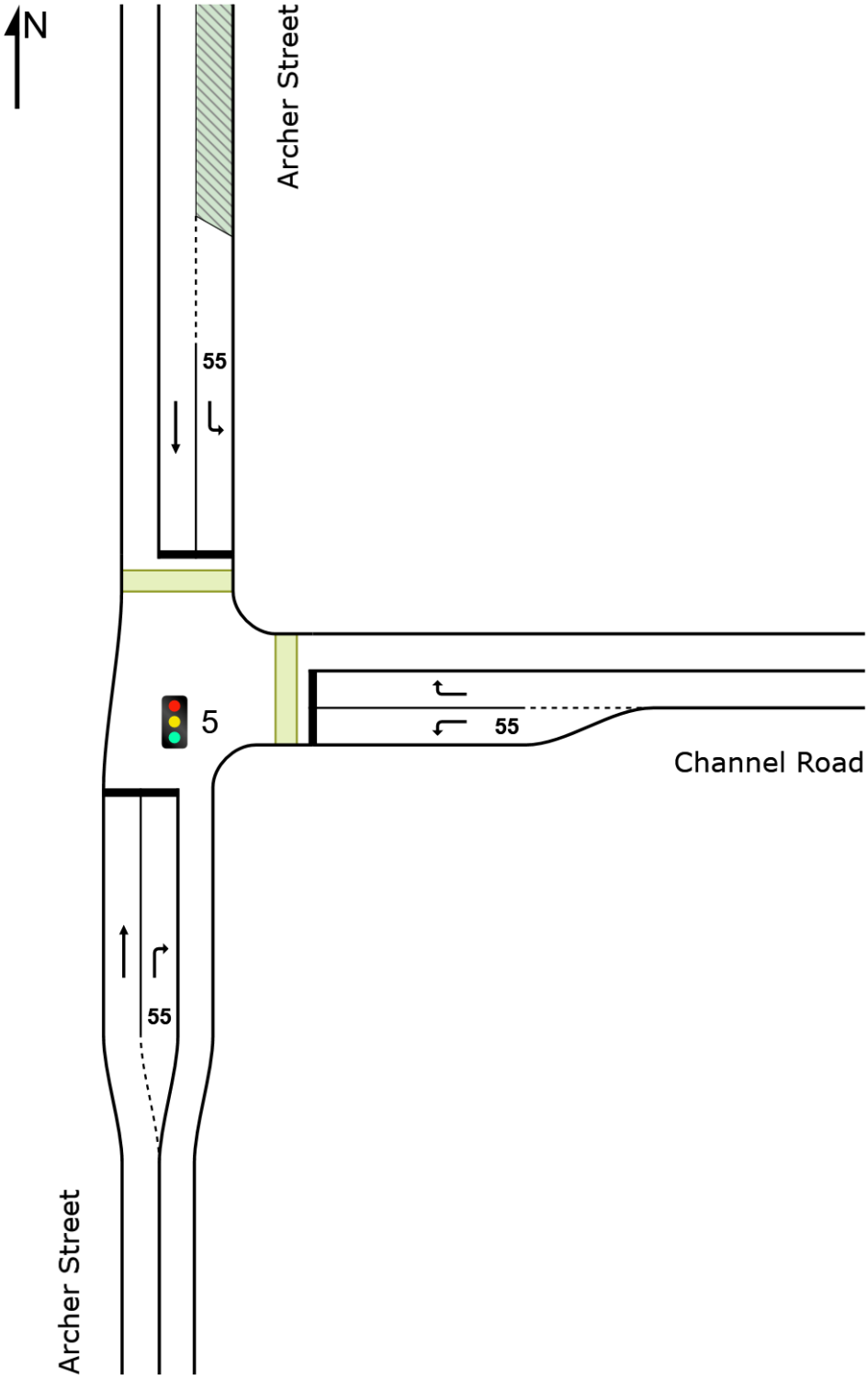
Site: 5 [AM Peak (Future) - Updated - 230517 (Site Folder: General)]

5
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 70 seconds (Site Practical Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Two-Phase
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

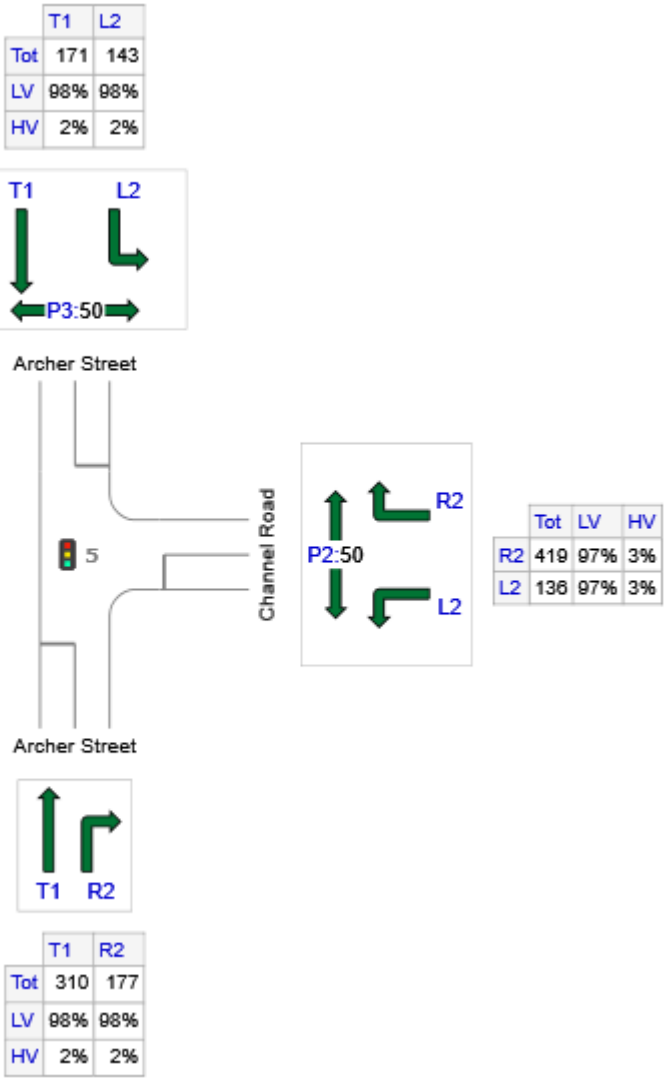
Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Input Volumes

Volume Display Method: Total and %



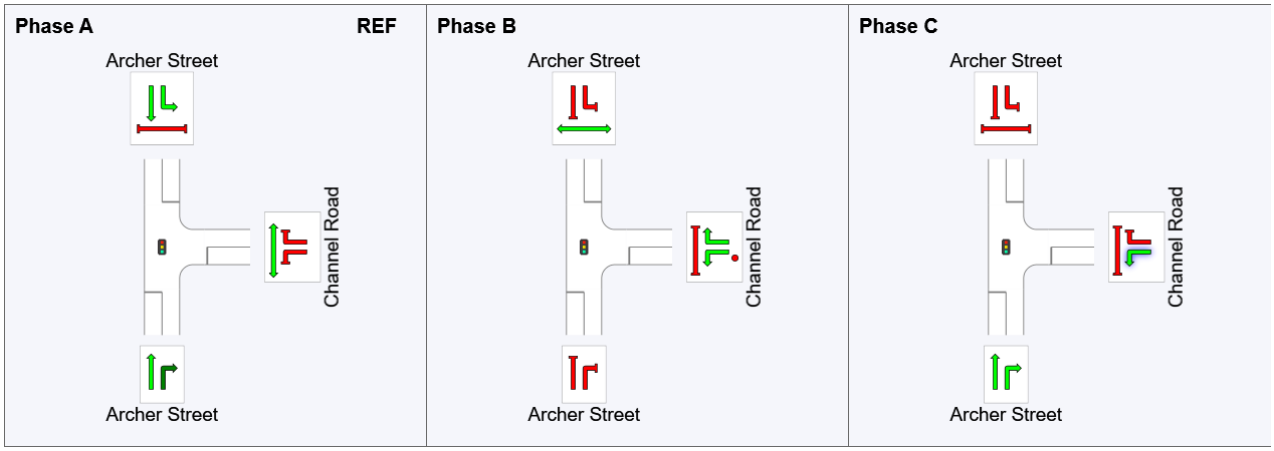
	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: Archer Street	487	477	10
E: Channel Road	555	538	17
N: Archer Street	314	308	6
Total	1356	1323	33

Phase Timing Summary

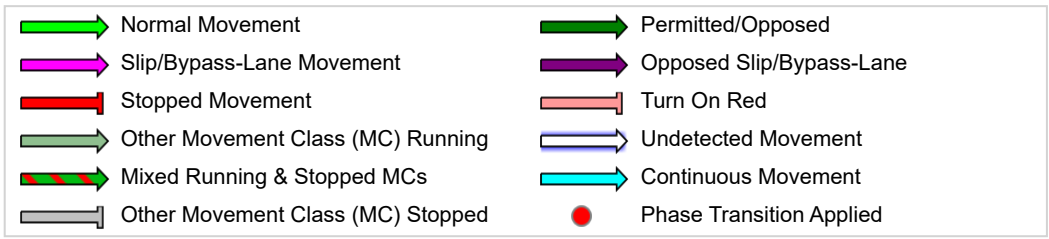
Phase	A	B	C
Phase Change Time (sec)	0	20	54
Green Time (sec)	14	28	10
Phase Time (sec)	20	34	16
Phase Split	29%	49%	23%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Archer Street													
Lane 1	326	2.0	834	0.391	100	14.9	LOS B	7.7	54.8	Full	500	0.0	0.0
Lane 2	186	2.0	431	0.432	100	21.6	LOS C	4.3	30.5	Short	55	0.0	NA
Approach	513	2.0		0.432		17.3	LOS B	7.7	54.8				
East: Channel Road													
Lane 1	143	3.0	997	0.144	100	10.6	LOS B	2.0	14.2	Short	55	0.0	NA
Lane 2	441	3.0	604	0.731	100	28.9	LOS C	14.2	101.7	Full	500	0.0	0.0
Approach	584	3.0		0.731		24.4	LOS C	14.2	101.7				
North: Archer Street													
Lane 1	151	2.0	317	0.475	100	35.0	LOS D	4.8	34.5	Short (P)	55	0.0	NA
Lane 2	180	2.0	389	0.463	100	27.5	LOS C	5.6	40.0	Full	500	0.0	0.0
Approach	331	2.0		0.475		30.9	LOS C	5.6	40.0				
Intersection	1427	2.4		0.731		23.4	LOS C	14.2	101.7				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

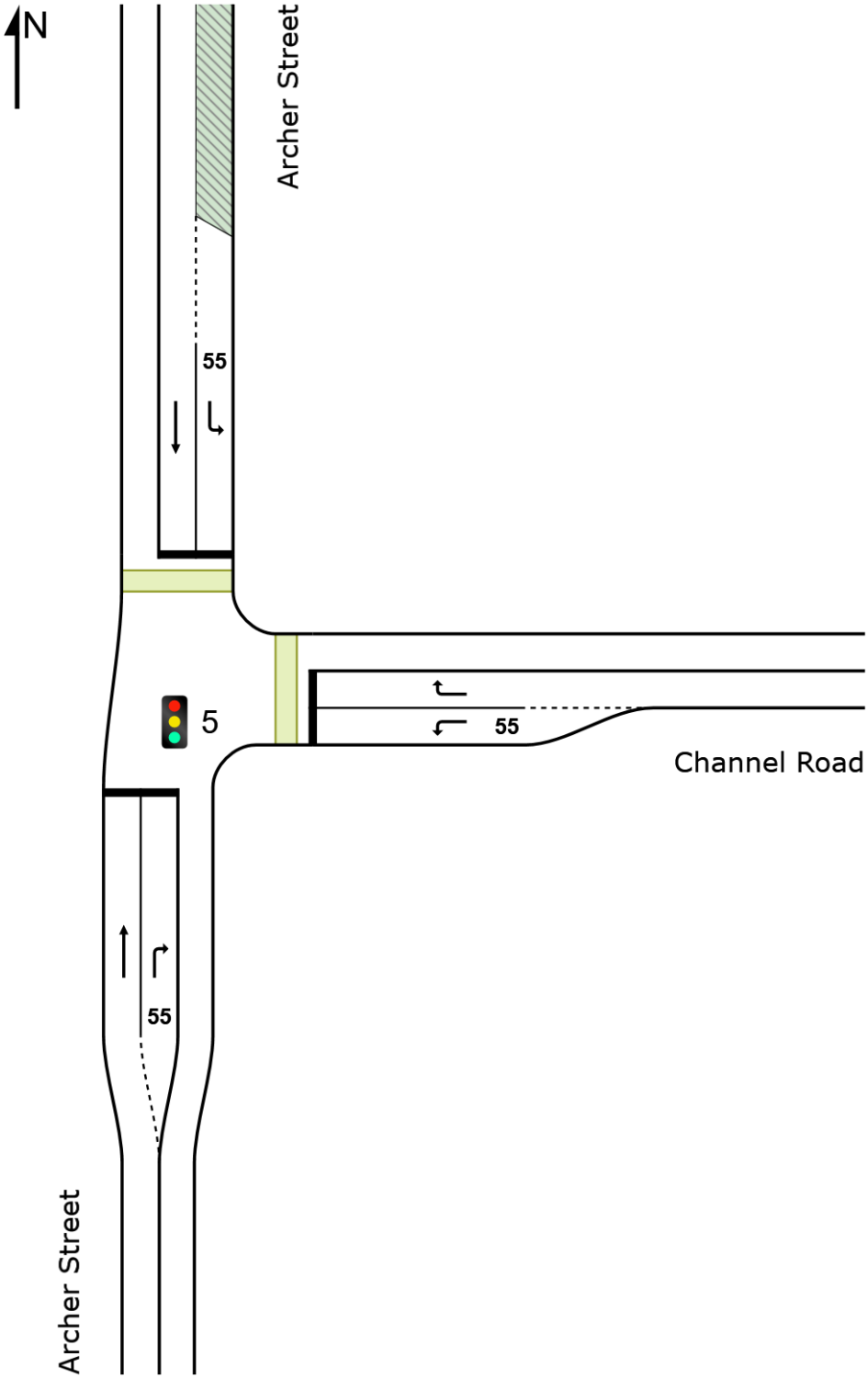
Site: 5 [PM Peak (Future) - Updated - 230517 (Site Folder: General)]

5
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 70 seconds (Site Practical Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Two-Phase
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

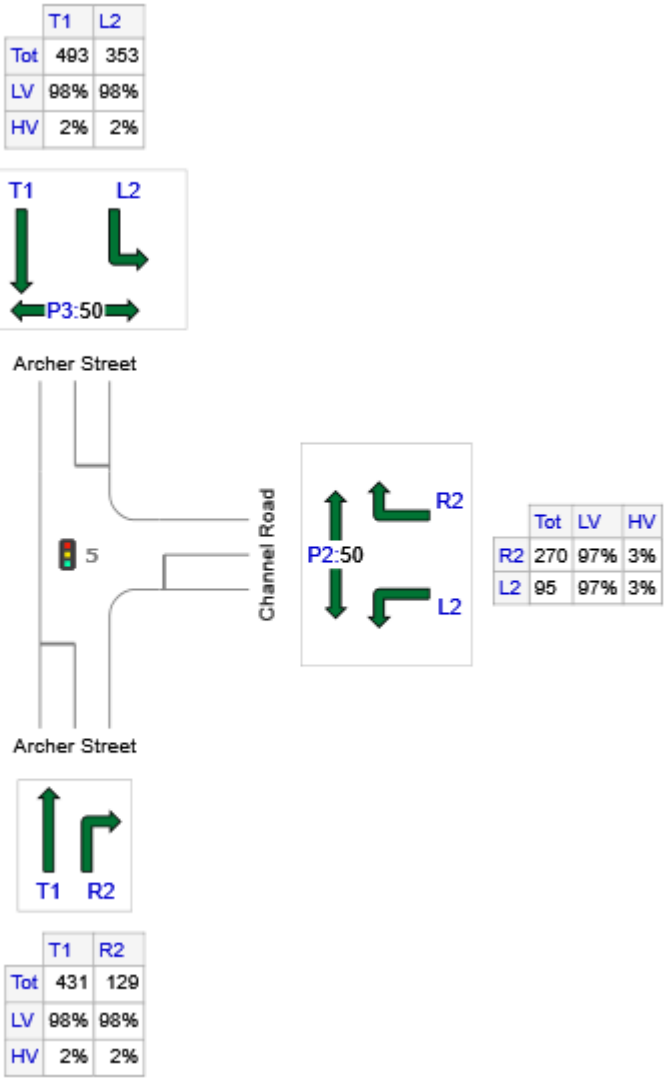
Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Input Volumes

Volume Display Method: Total and %



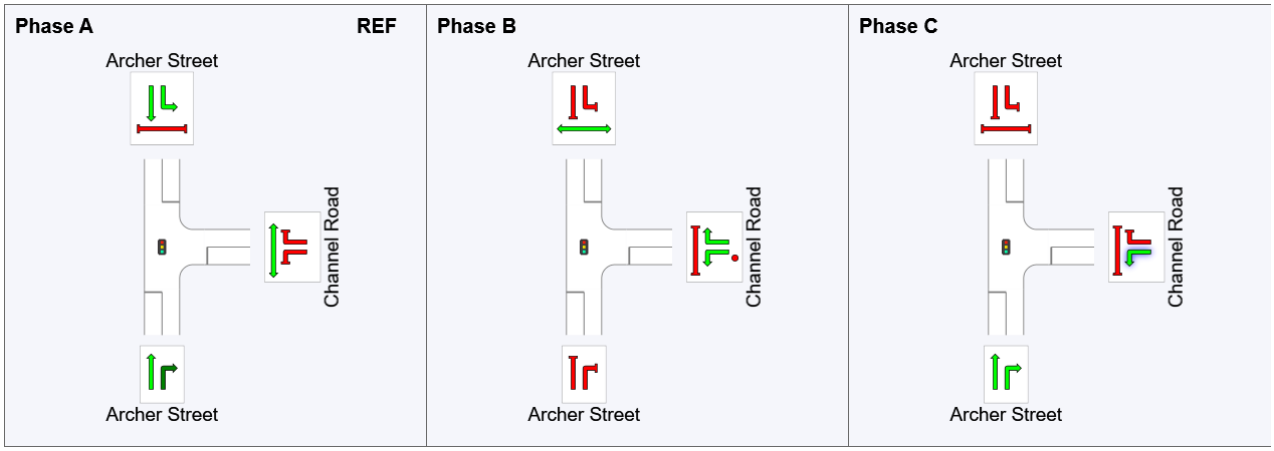
	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: Archer Street	560	549	11
E: Channel Road	365	354	11
N: Archer Street	846	829	17
Total	1771	1732	39

Phase Timing Summary

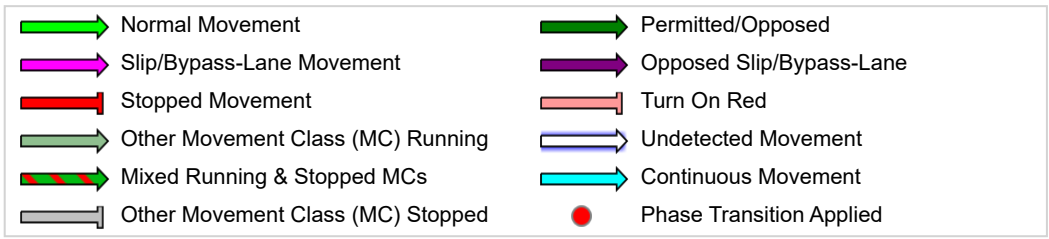
Phase	A	B	C
Phase Change Time (sec)	0	33	58
Green Time (sec)	27	19	6
Phase Time (sec)	33	25	12
Phase Split	47%	36%	17%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Archer Street													
Lane 1	454	2.0	1084	0.419	100	9.6	LOS A	8.9	63.7	Full	500	0.0	0.0
Lane 2	136	2.0	328	0.414	100	18.6	LOS B	2.4	17.2	Short	55	0.0	NA
Approach	589	2.0		0.419		11.7	LOS B	8.9	63.7				
East: Channel Road													
Lane 1	100	3.0	656	0.152	100	17.5	LOS B	2.0	14.7	Short	55	0.0	NA
Lane 2	284	3.0	367	0.774	100	37.3	LOS D	10.2	73.5	Full	500	0.0	0.0
Approach	384	3.0		0.774		32.1	LOS C	10.2	73.5				
North: Archer Street													
Lane 1	372	2.0	661	0.562	100	25.4	LOS C	10.4	74.0	Short (P)	55	0.0	NA
Lane 2	519	2.0	686[1]	0.756	100	21.7	LOS C	16.0	113.9	Full	500	0.0	0.0
Approach	891	2.0		0.756		23.2	LOS C	16.0	113.9				
Intersection	1864	2.2		0.774		21.4	LOS C	16.0	113.9				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

USER REPORT FOR SITE

All Movement Classes

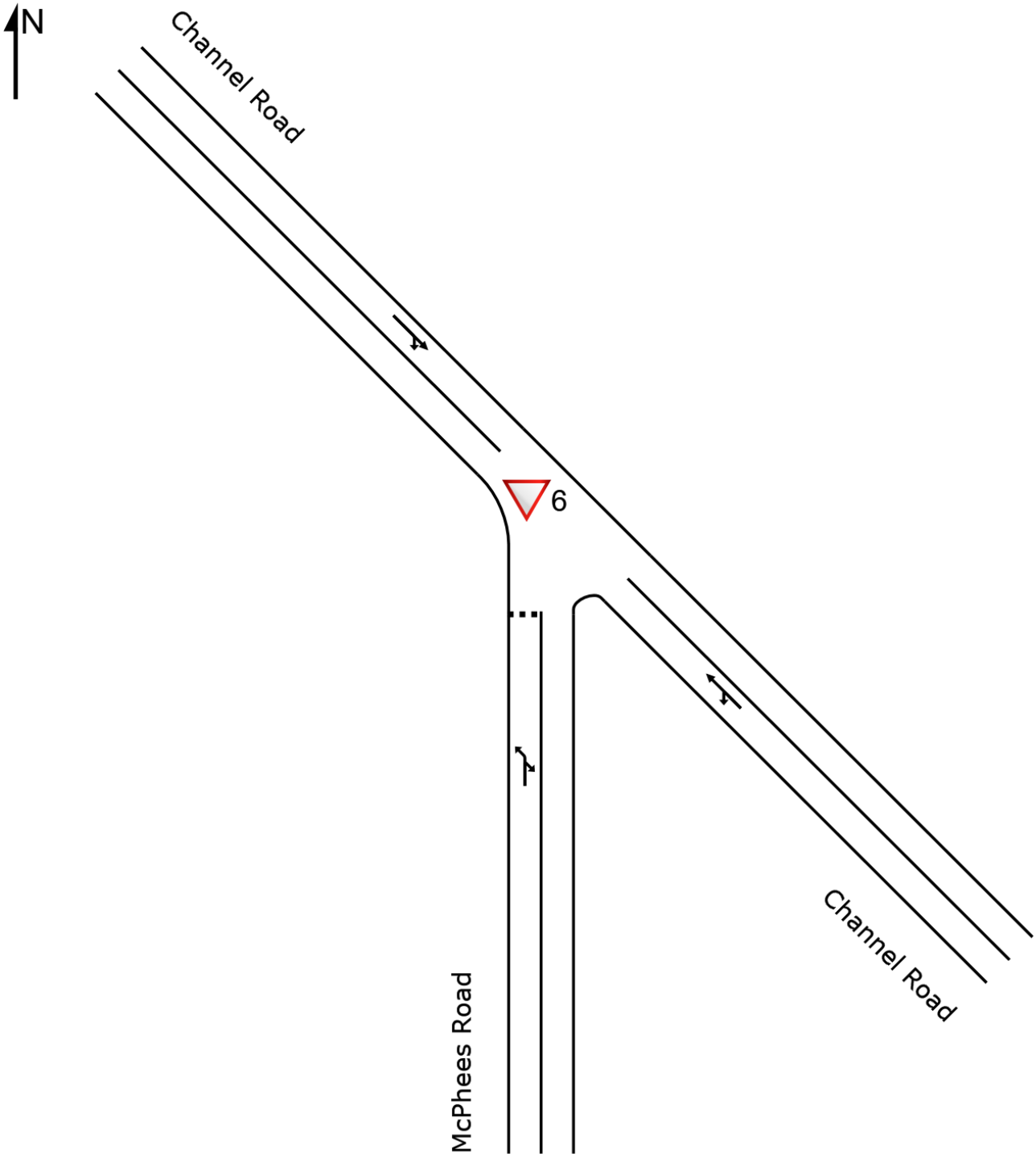
Project: 230503sid-6-ChannelRoad_McPheesRoad **Template: Site Report**

Site: 6 [AM Peak (Future) - Updated - 230718 (Site Folder: General)]

6
Site Category: (None)
Give-Way (Two-Way)

Site Layout

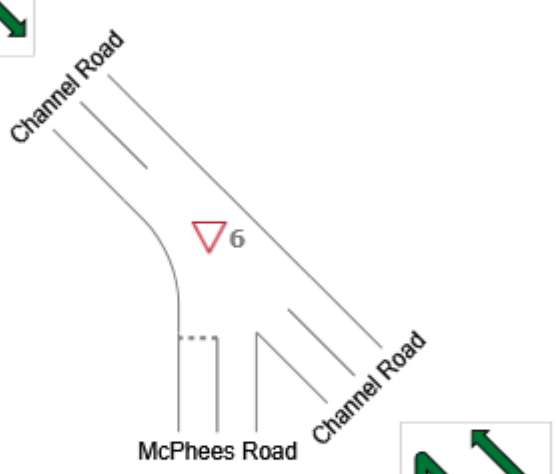
Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



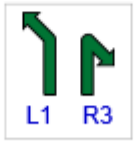
Input Volumes

Volume Display Method: Total and %

	R1	T1
Tot	57	101
LV	95%	95%
HV	5%	5%



	L3	T1
Tot	79	195
LV	95%	95%
HV	5%	5%



	L1	R3
Tot	210	288
LV	95%	95%
HV	5%	5%

	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: McPhees Road	498	473	25
SE: Channel Road	274	260	14
NW: Channel Road	158	150	8
Total	930	884	47

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: McPhees Road													
Lane 1	524	5.0	995	0.527	100	8.1	LOS A	3.8	28.0	Full	500	0.0	0.0
Approach	524	5.0		0.527		8.1	LOS A	3.8	28.0				
SouthEast: Channel Road													
Lane 1	288	5.0	1786	0.162	100	1.6	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	288	5.0		0.162		1.6	NA	0.0	0.0				
NorthWest: Channel Road													
Lane 1	166	5.0	1629	0.102	100	2.1	LOS A	0.4	3.1	Full	500	0.0	0.0
Approach	166	5.0		0.102		2.1	NA	0.4	3.1				
Intersection	979	5.0		0.527		5.2	NA	3.8	28.0				

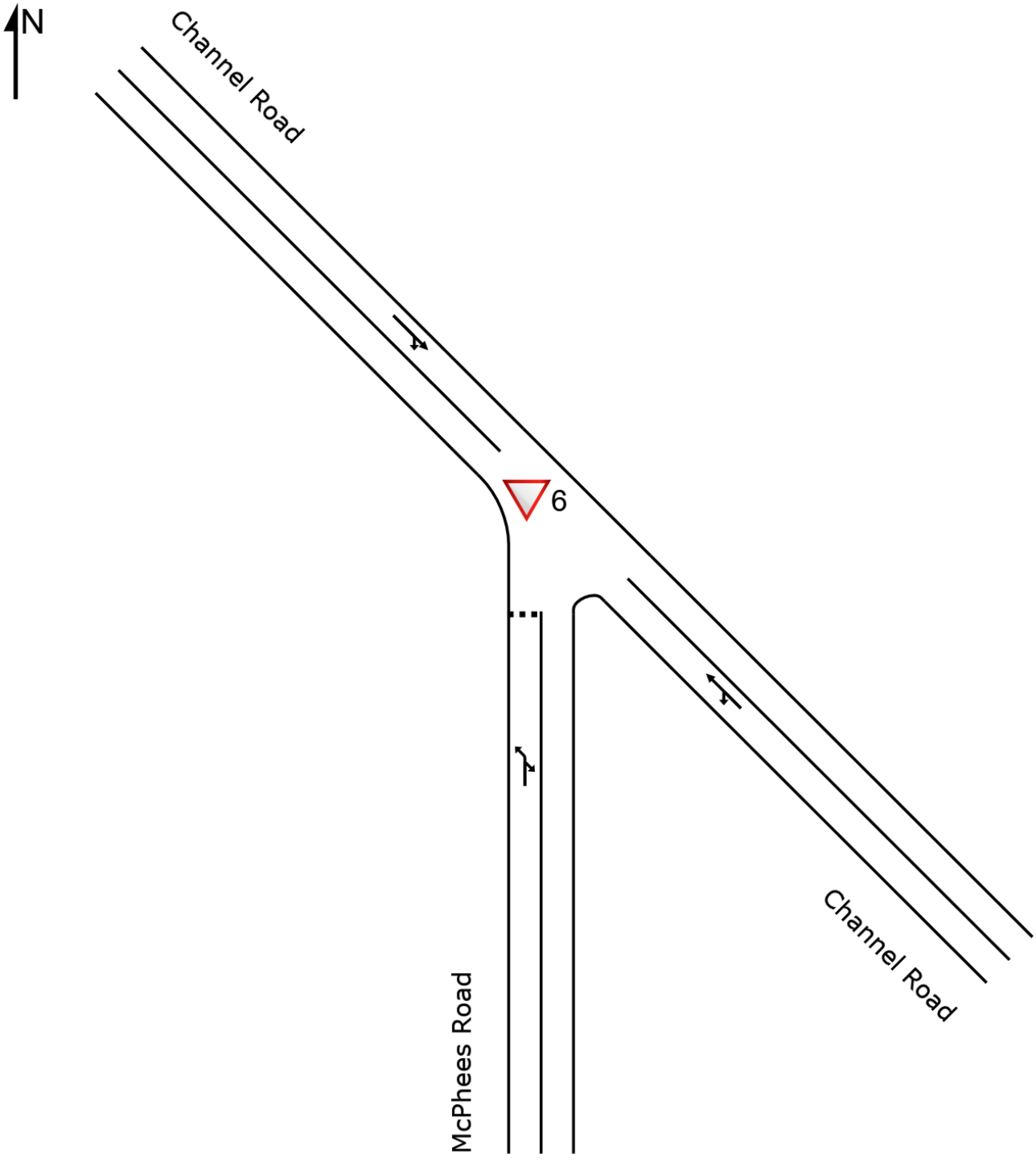
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 6 [PM Peak (Future) - Updated - 230718 (Site Folder: General)]

6
Site Category: (None)
Give-Way (Two-Way)

Site Layout

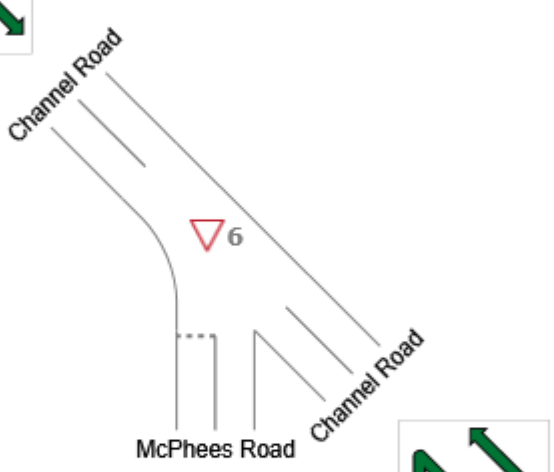
Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



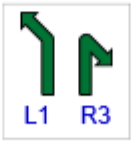
Input Volumes

Volume Display Method: Total and %

	R1	T1
Tot	159	88
LV	95%	95%
HV	5%	5%



	L3	T1
Tot	184	181
LV	95%	95%
HV	5%	5%



	L1	R3
Tot	109	168
LV	95%	95%
HV	5%	5%

	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: McPhees Road	277	263	14
SE: Channel Road	365	347	18
NW: Channel Road	247	235	12
Total	889	845	44

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: McPhees Road													
Lane 1	292	5.0	888	0.329	100	7.5	LOS A	1.5	10.8	Full	500	0.0	0.0
Approach	292	5.0		0.329		7.5	LOS A	1.5	10.8				
SouthEast: Channel Road													
Lane 1	384	5.0	1716	0.224	100	2.8	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	384	5.0		0.224		2.8	NA	0.0	0.0				
NorthWest: Channel Road													
Lane 1	260	5.0	1362	0.191	100	4.0	LOS A	1.0	7.3	Full	500	0.0	0.0
Approach	260	5.0		0.191		4.0	NA	1.0	7.3				
Intersection	936	5.0		0.329		4.6	NA	1.5	10.8				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

USER REPORT FOR SITE

All Movement Classes

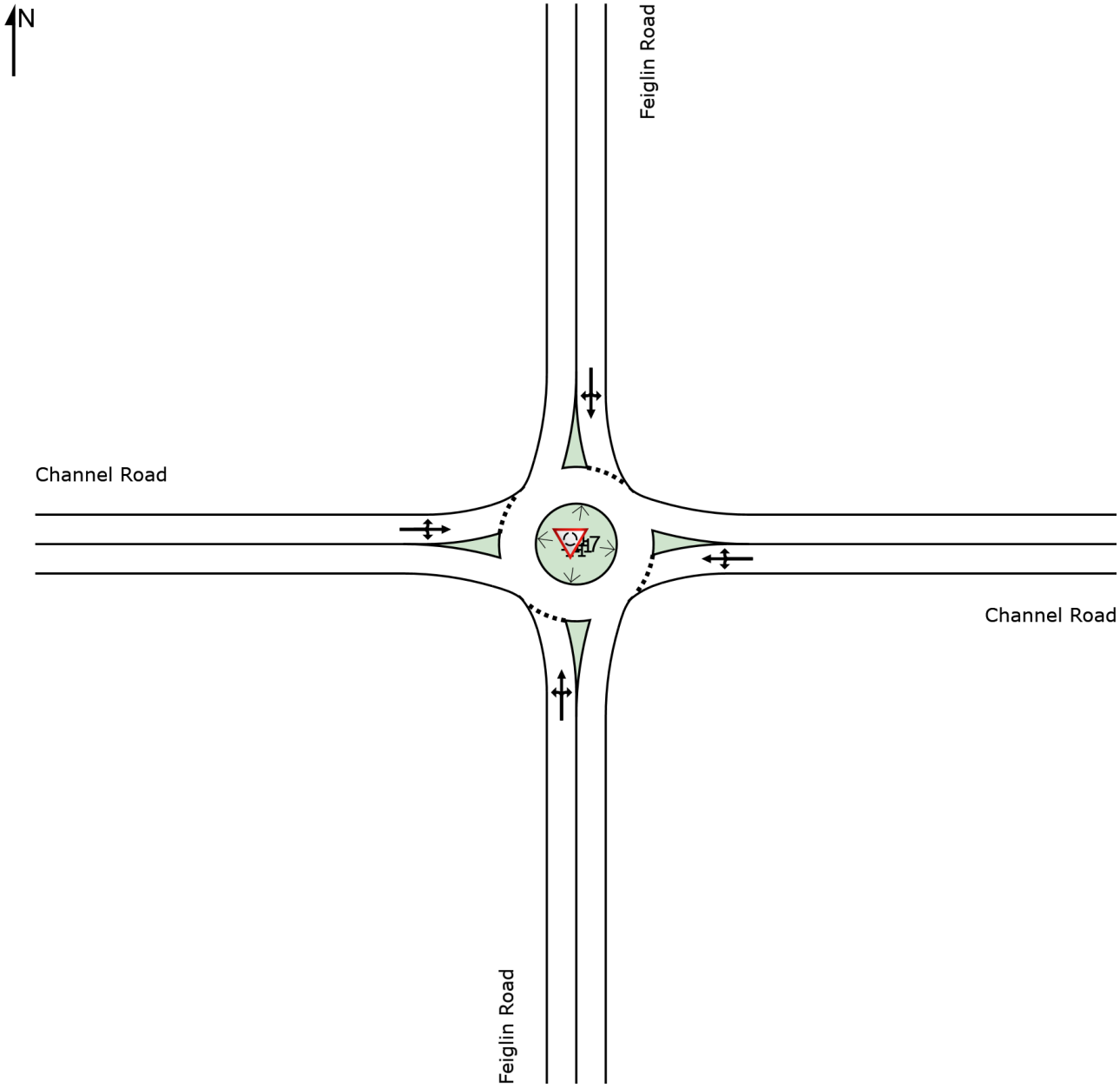
Project: 230503sid-7-FeiglinRoad_ChannelRoad **Template: Site Report**

Site: 7 [AM Peak (Future) - Updated - 230718 (Site Folder: General)]

7
Site Category: (None)
Roundabout

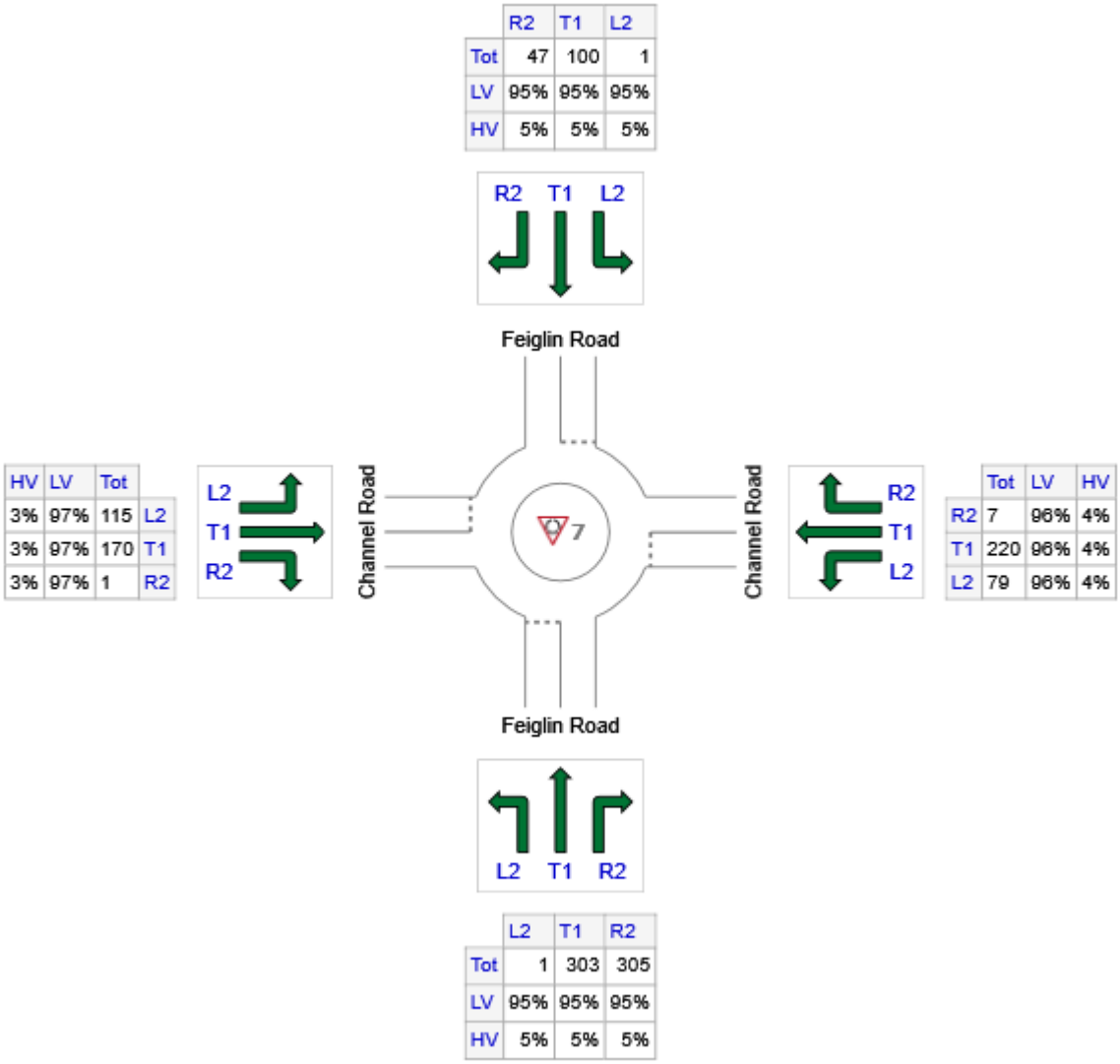
Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Input Volumes

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: Feiglin Road	609	579	30
E: Channel Road	306	294	12
N: Feiglin Road	148	141	7
W: Channel Road	286	277	9
Total	1349	1290	59

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Feiglin Road													
Lane 1[d]	641	5.0	1020	0.628	100	8.9	LOS A	6.1	44.2	Full	500	0.0	0.0
Approach	641	5.0		0.628		8.9	LOS A	6.1	44.2				
East: Channel Road													
Lane 1[d]	322	4.0	1127	0.286	100	4.7	LOS A	1.9	13.6	Full	500	0.0	0.0
Approach	322	4.0		0.286		4.7	LOS A	1.9	13.6				
North: Feiglin Road													
Lane 1[d]	156	5.0	801	0.195	100	7.8	LOS A	1.1	8.3	Full	500	0.0	0.0
Approach	156	5.0		0.195		7.8	LOS A	1.1	8.3				
West: Channel Road													
Lane 1[d]	301	3.0	657	0.458	100	9.6	LOS A	3.6	25.6	Full	500	0.0	0.0
Approach	301	3.0		0.458		9.6	LOS A	3.6	25.6				
Intersection	1420	4.3		0.628		7.9	LOS A	6.1	44.2				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

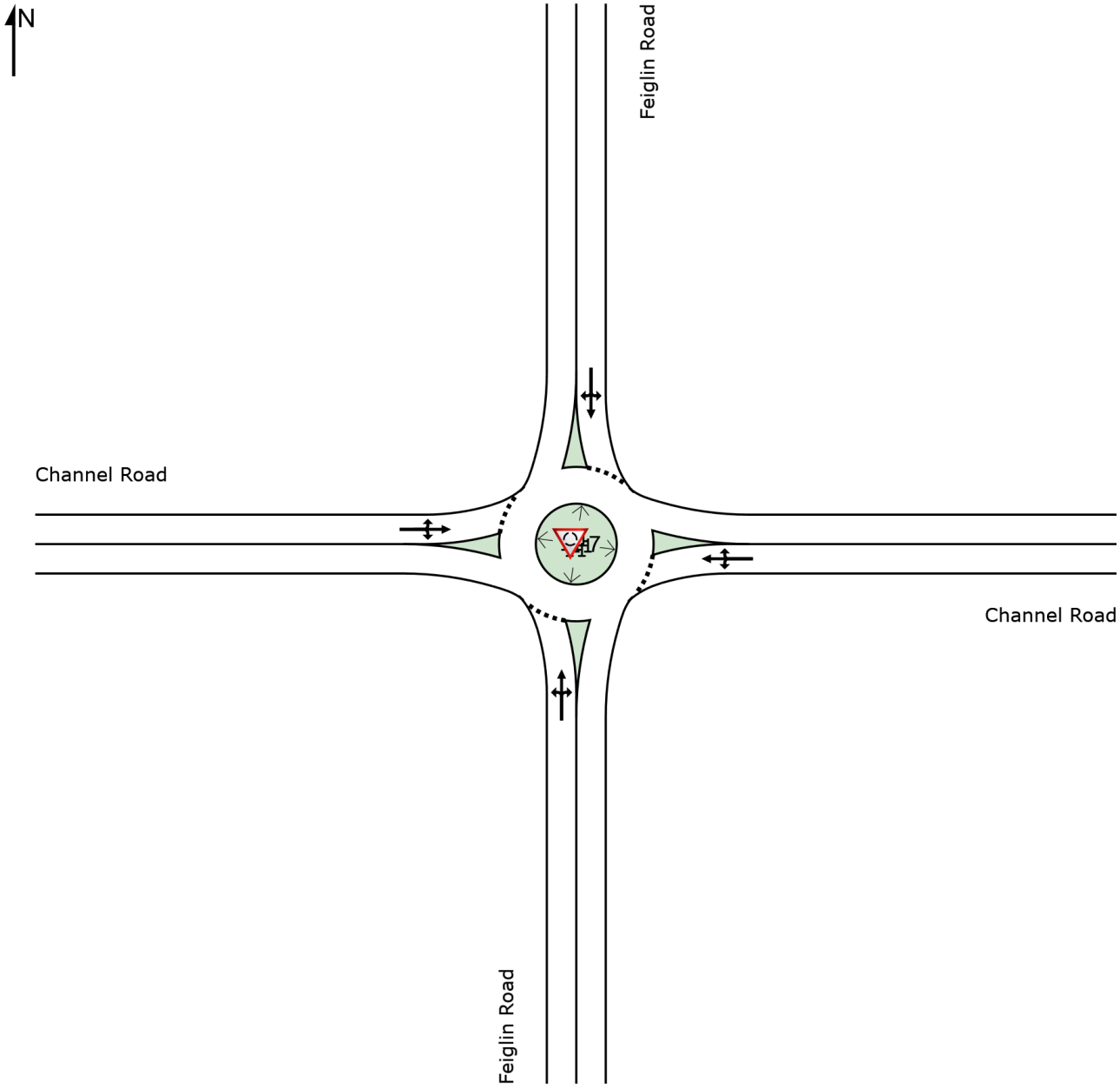
d Dominant lane on roundabout approach

Site: 7 [PM Peak (Future) - Updated - 230718 (Site Folder: General)]

7
Site Category: (None)
Roundabout

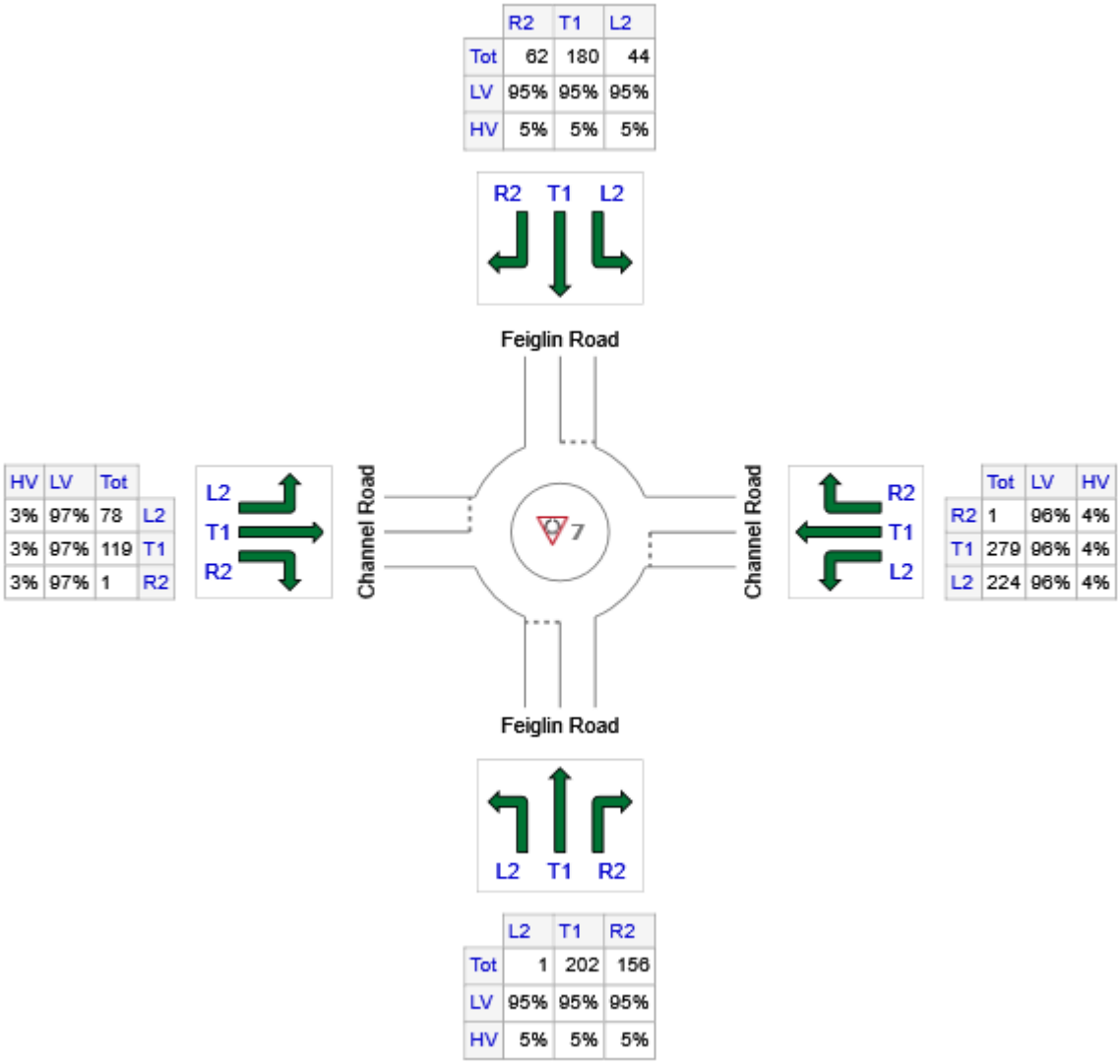
Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Input Volumes

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: Feiglin Road	359	341	18
E: Channel Road	504	484	20
N: Feiglin Road	286	272	14
W: Channel Road	198	192	6
Total	1347	1289	58

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Feiglin Road													
Lane 1[d]	378	5.0	911	0.415	100	7.8	LOS A	2.9	20.8	Full	500	0.0	0.0
Approach	378	5.0		0.415		7.8	LOS A	2.9	20.8				
East: Channel Road													
Lane 1[d]	531	4.0	1033	0.513	100	5.7	LOS A	4.0	29.2	Full	500	0.0	0.0
Approach	531	4.0		0.513		5.7	LOS A	4.0	29.2				
North: Feiglin Road													
Lane 1[d]	301	5.0	979	0.308	100	6.3	LOS A	1.9	13.9	Full	500	0.0	0.0
Approach	301	5.0		0.308		6.3	LOS A	1.9	13.9				
West: Channel Road													
Lane 1[d]	208	3.0	889	0.235	100	5.9	LOS A	1.4	10.4	Full	500	0.0	0.0
Approach	208	3.0		0.235		5.9	LOS A	1.4	10.4				
Intersection	1418	4.3		0.513		6.4	LOS A	4.0	29.2				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

USER REPORT FOR SITE

All Movement Classes

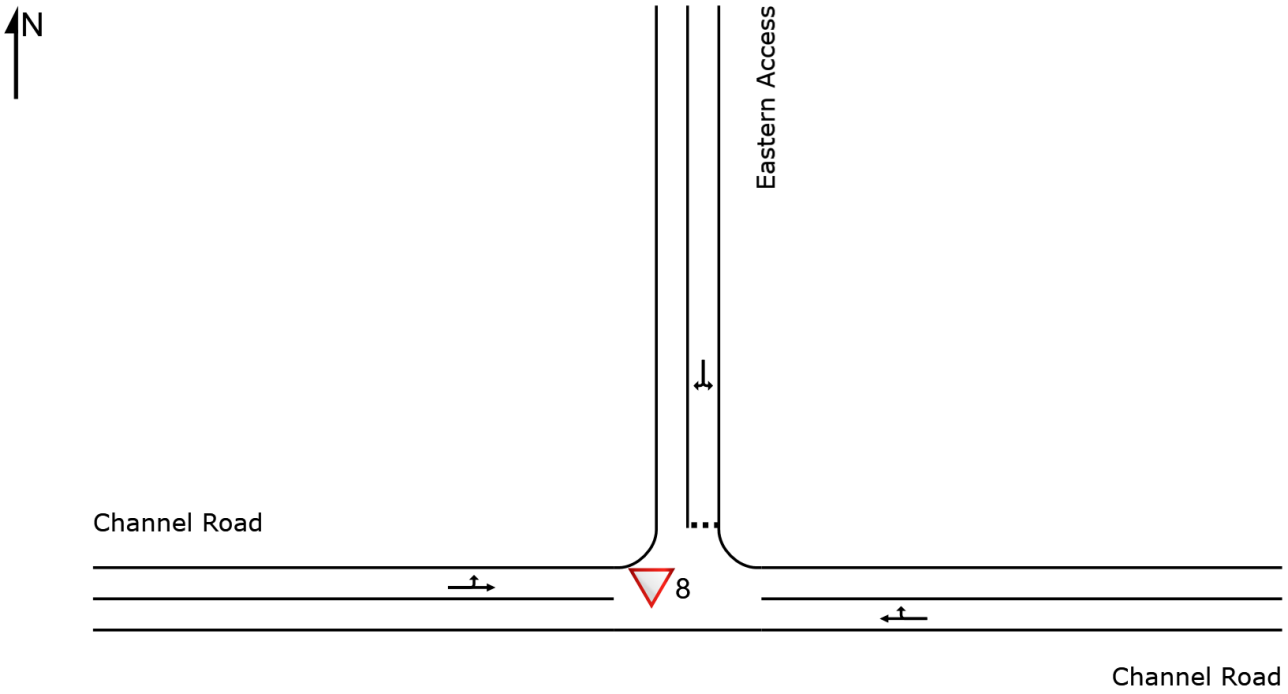
Project: 230503sid-8-ChannelRoad_EasternAccessStreet **Template: Site Report**

Site: 8 [AM Peak (Future) - Updated - 230718 (Site Folder: General)]

8
Site Category: (None)
Give-Way (Two-Way)

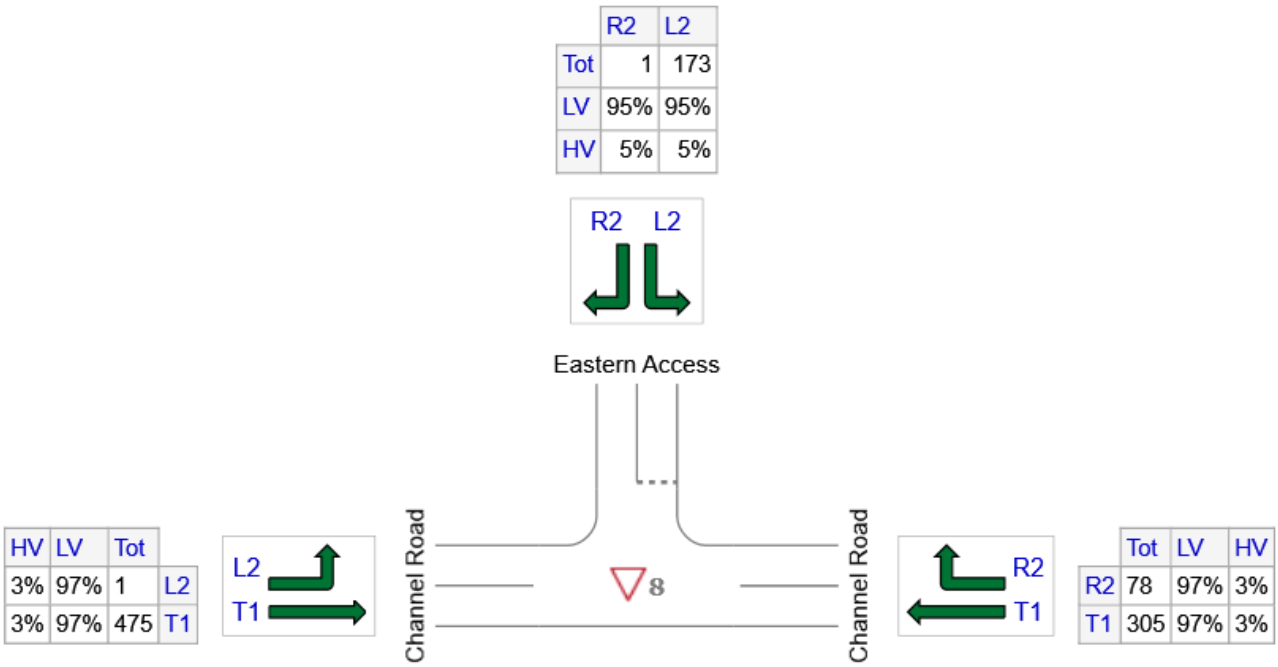
Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Input Volumes

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
E: Channel Road	383	372	11
N: Eastern Access	174	165	9
W: Channel Road	476	462	14
Total	1033	999	34

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
East: Channel Road													
Lane 1	403	3.0	1624	0.248	100	2.4	LOS A	0.9	6.7	Full	500	0.0	0.0
Approach	403	3.0		0.248		2.4	NA	0.9	6.7				
North: Eastern Access													
Lane 1	183	5.0	946	0.194	100	7.0	LOS A	0.8	5.7	Full	500	0.0	0.0
Approach	183	5.0		0.194		7.0	LOS A	0.8	5.7				
West: Channel Road													
Lane 1	501	3.0	1912	0.262	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	501	3.0		0.262		0.1	NA	0.0	0.0				
Intersection	1087	3.3		0.262		2.1	NA	0.9	6.7				

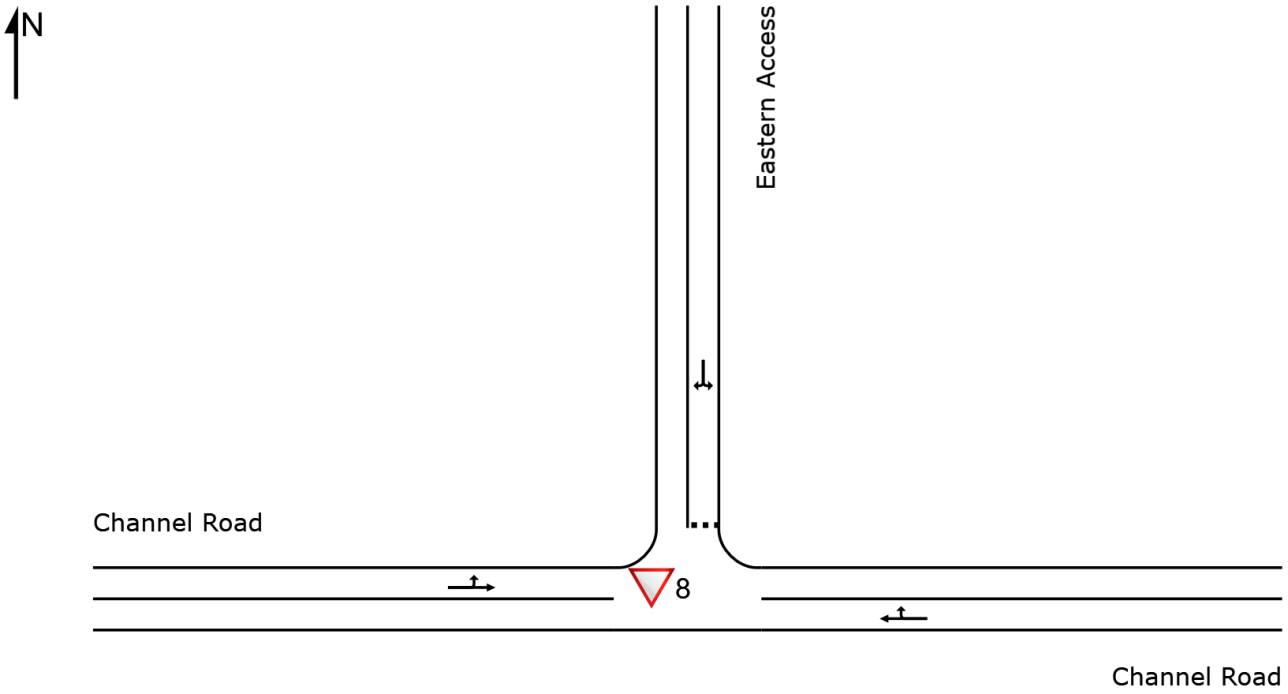
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 8 [PM Peak (Future) - Updated - 230718 (Site Folder: General)]

8
Site Category: (None)
Give-Way (Two-Way)

Site Layout

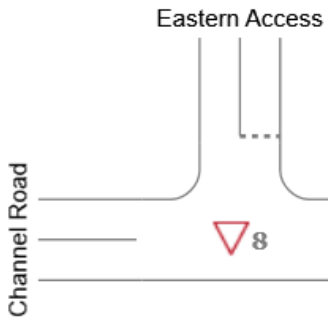
Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



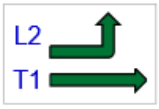
Input Volumes

Volume Display Method: Total and %

	R2	L2
Tot	1	135
LV	95%	95%
HV	5%	5%



HV	LV	Tot	
3%	97%	1	L2
3%	97%	319	T1



	Tot	LV	HV
R2	249	97%	3%
T1	504	97%	3%

	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
E: Channel Road	753	730	23
N: Eastern Access	136	129	7
W: Channel Road	320	310	10
Total	1209	1170	39

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
East: Channel Road													
Lane 1	793	3.0	1625	0.488	100	3.7	LOS A	3.8	27.5	Full	500	0.0	0.0
Approach	793	3.0		0.488		3.7	NA	3.8	27.5				
North: Eastern Access													
Lane 1	143	5.0	1133	0.126	100	6.0	LOS A	0.5	3.7	Full	500	0.0	0.0
Approach	143	5.0		0.126		6.0	LOS A	0.5	3.7				
West: Channel Road													
Lane 1	337	3.0	1912	0.176	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	337	3.0		0.176		0.1	NA	0.0	0.0				
Intersection	1273	3.2		0.488		3.0	NA	3.8	27.5				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

USER REPORT FOR SITE

All Movement Classes

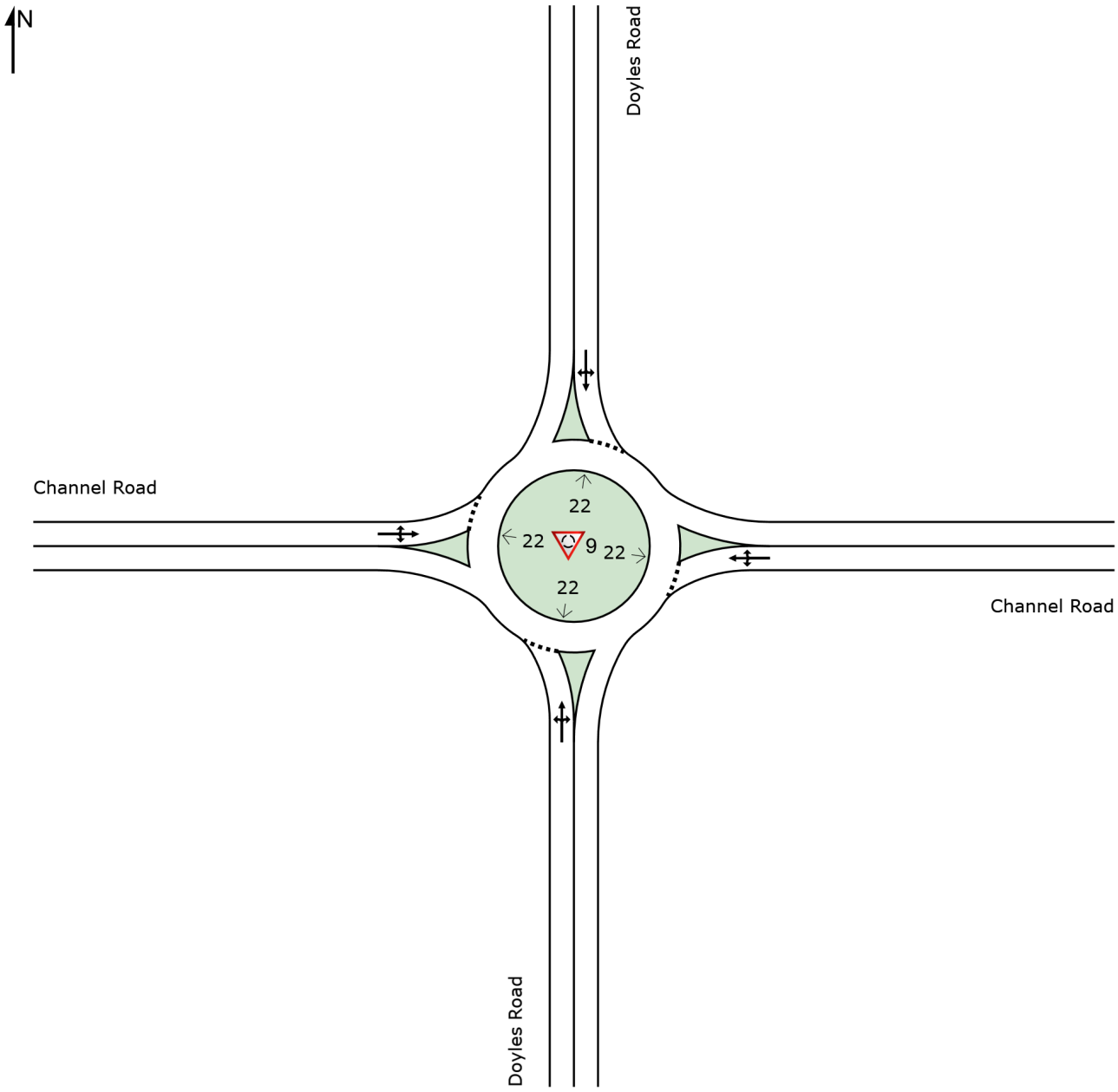
Project: 230503sid-9-DoylesRoad_ChannelRoad-3 **Template: Site Report**

Site: 9 [AM Peak (Future) - updated - 230718 (Site Folder: General)]

9
Site Category: (None)
Roundabout

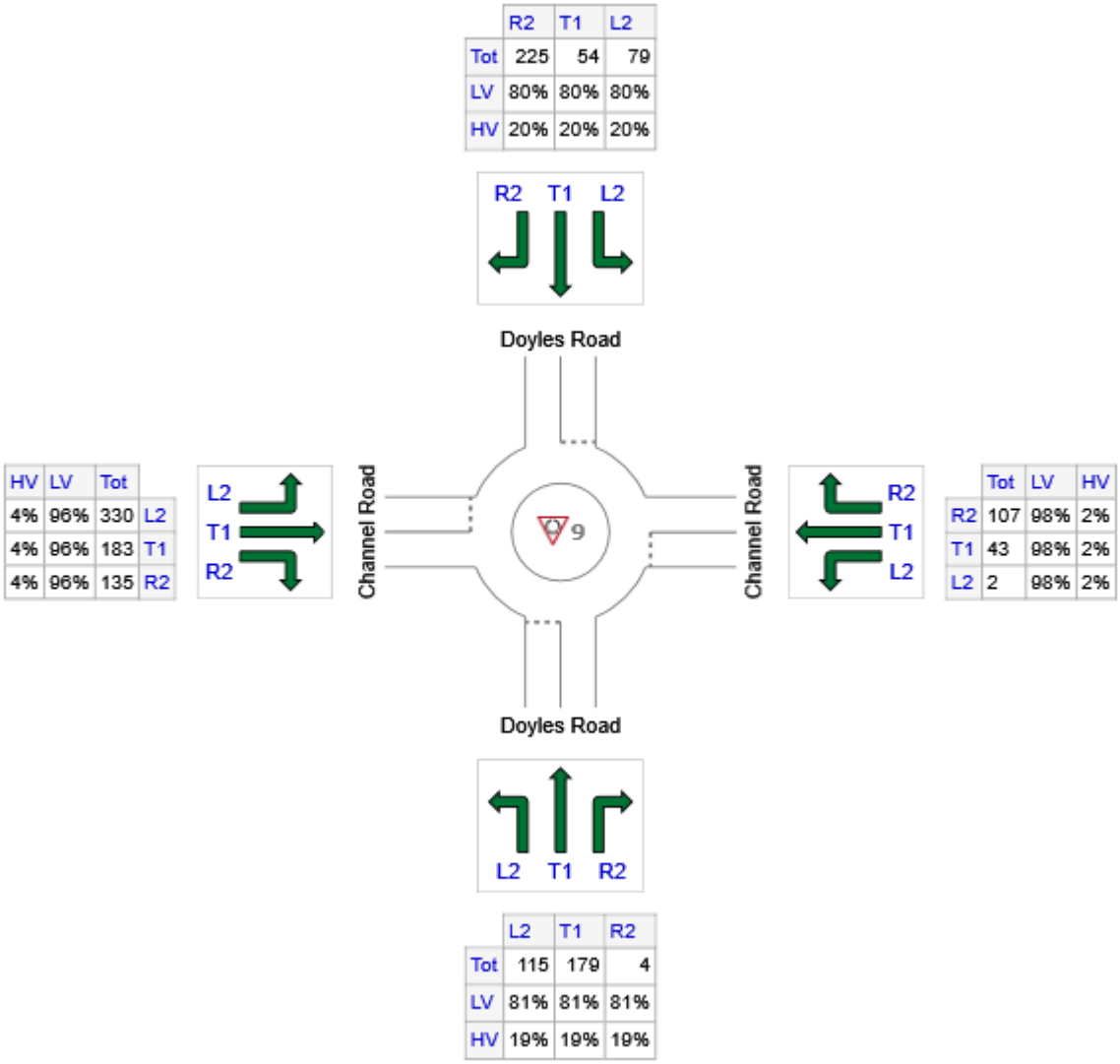
Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Input Volumes

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: Doyles Road	298	241	57
E: Channel Road	152	149	3
N: Doyles Road	358	286	72
W: Channel Road	648	622	26
Total	1456	1299	157

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Doyles Road													
Lane 1[d]	314	19.0	844	0.372	100	7.6	LOS A	2.6	20.9	Full	500	0.0	0.0
Approach	314	19.0		0.372		7.6	LOS A	2.6	20.9				
East: Channel Road													
Lane 1[d]	160	2.0	897	0.178	100	10.3	LOS B	1.1	8.1	Full	500	0.0	0.0
Approach	160	2.0		0.178		10.3	LOS B	1.1	8.1				
North: Doyles Road													
Lane 1[d]	377	20.0	873	0.432	100	10.0	LOS B	3.3	27.2	Full	100	0.0	0.0
Approach	377	20.0		0.432		10.0	LOS B	3.3	27.2				
West: Channel Road													
Lane 1[d]	682	4.0	1042	0.655	100	9.4	LOS A	7.3	53.2	Full	500	0.0	0.0
Approach	682	4.0		0.655		9.4	LOS A	7.3	53.2				
Intersection	1533	10.8		0.655		9.3	LOS A	7.3	53.2				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

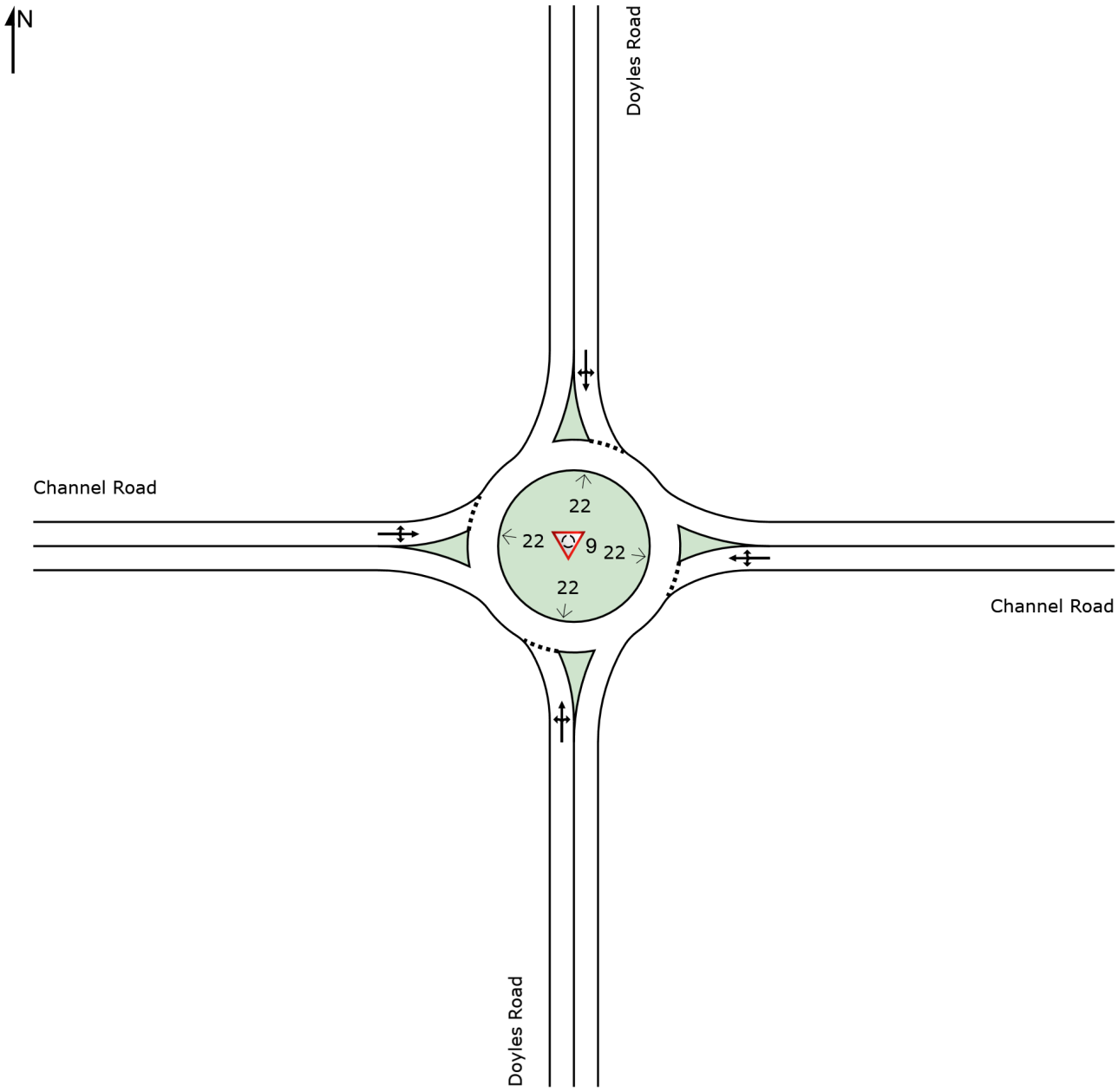
d Dominant lane on roundabout approach

Site: 9 [PM Peak (Future) - updated - 230718 (Site Folder: General)]

9
Site Category: (None)
Roundabout

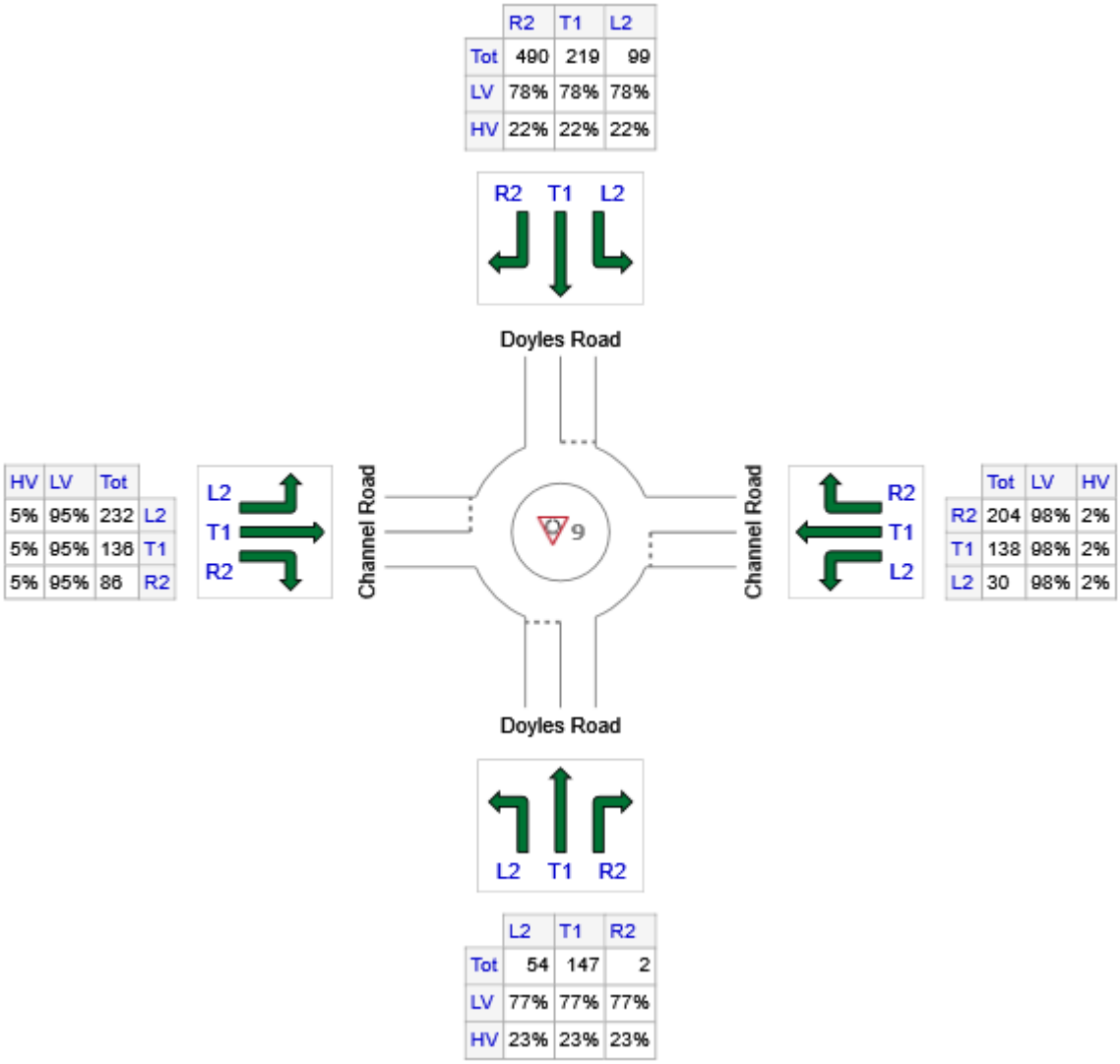
Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Input Volumes

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: Doyles Road	203	156	47
E: Channel Road	372	365	7
N: Doyles Road	808	630	178
W: Channel Road	454	431	23
Total	1837	1582	255

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Doyles Road													
Lane 1[d]	214	23.0	444	0.481	100	17.1	LOS B	4.0	33.5	Full	500	0.0	0.0
Approach	214	23.0		0.481		17.1	LOS B	4.0	33.5				
East: Channel Road													
Lane 1[d]	392	2.0	463	0.845	100	41.2	LOS D	13.7	97.8	Full	500	0.0	0.0
Approach	392	2.0		0.845		41.2	LOS D	13.7	97.8				
North: Doyles Road													
Lane 1[d]	851	22.0	1023	0.832	100	14.9	LOS B	15.9	132.2	Full	100	0.0	14.0
Approach	851	22.0		0.832		14.9	LOS B	15.9	132.2				
West: Channel Road													
Lane 1[d]	478	5.0	937	0.510	100	8.3	LOS A	4.2	30.8	Full	500	0.0	0.0
Approach	478	5.0		0.510		8.3	LOS A	4.2	30.8				
Intersection	1934	13.9		0.845		18.9	LOS B	15.9	132.2				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

USER REPORT FOR SITE

All Movement Classes

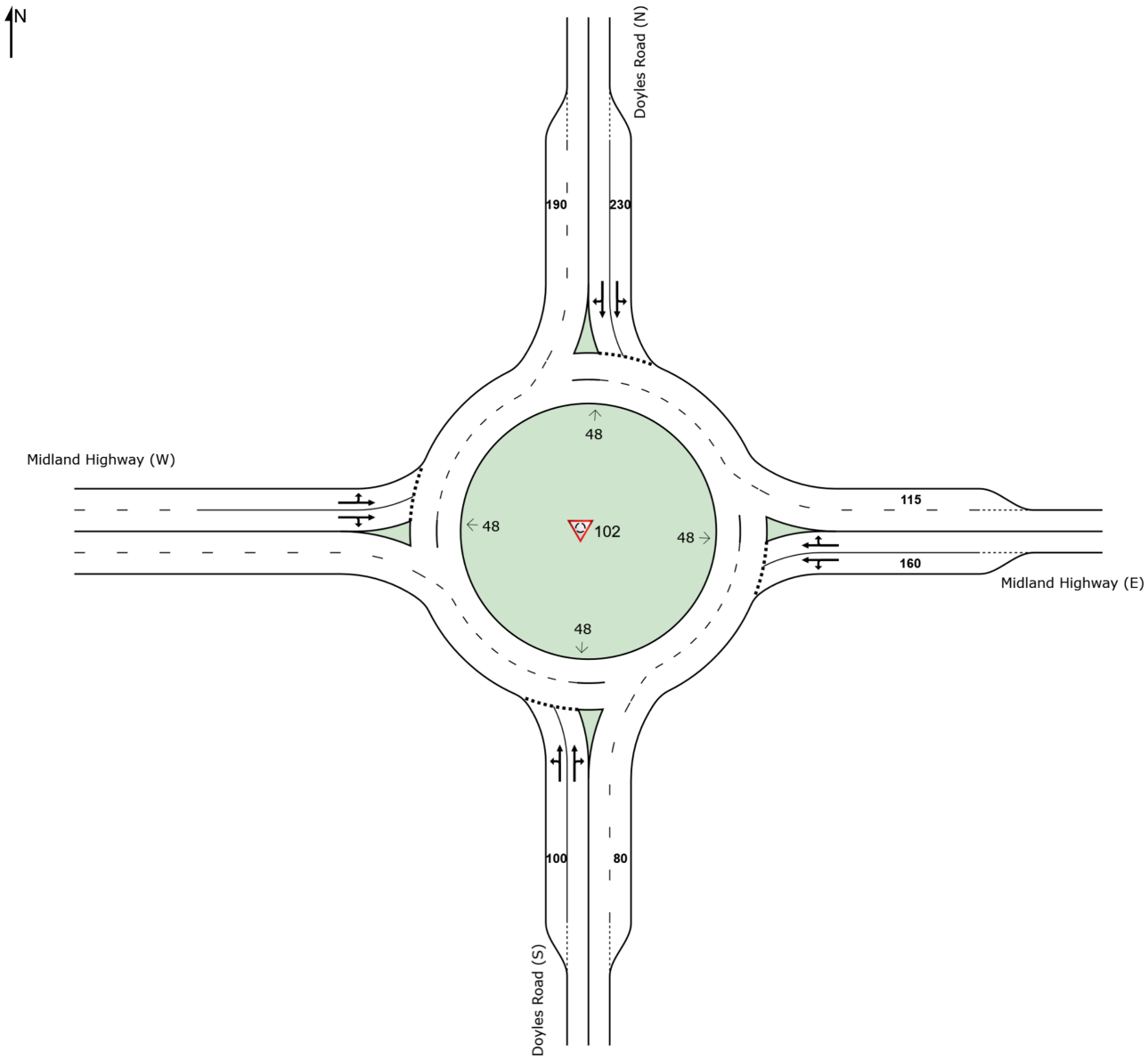
Project: 230503sid-10-MidlandHighway_DoylesRoad **Template: Site Report**

Site: 102 [AM (Future) - Updated - 230718 (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

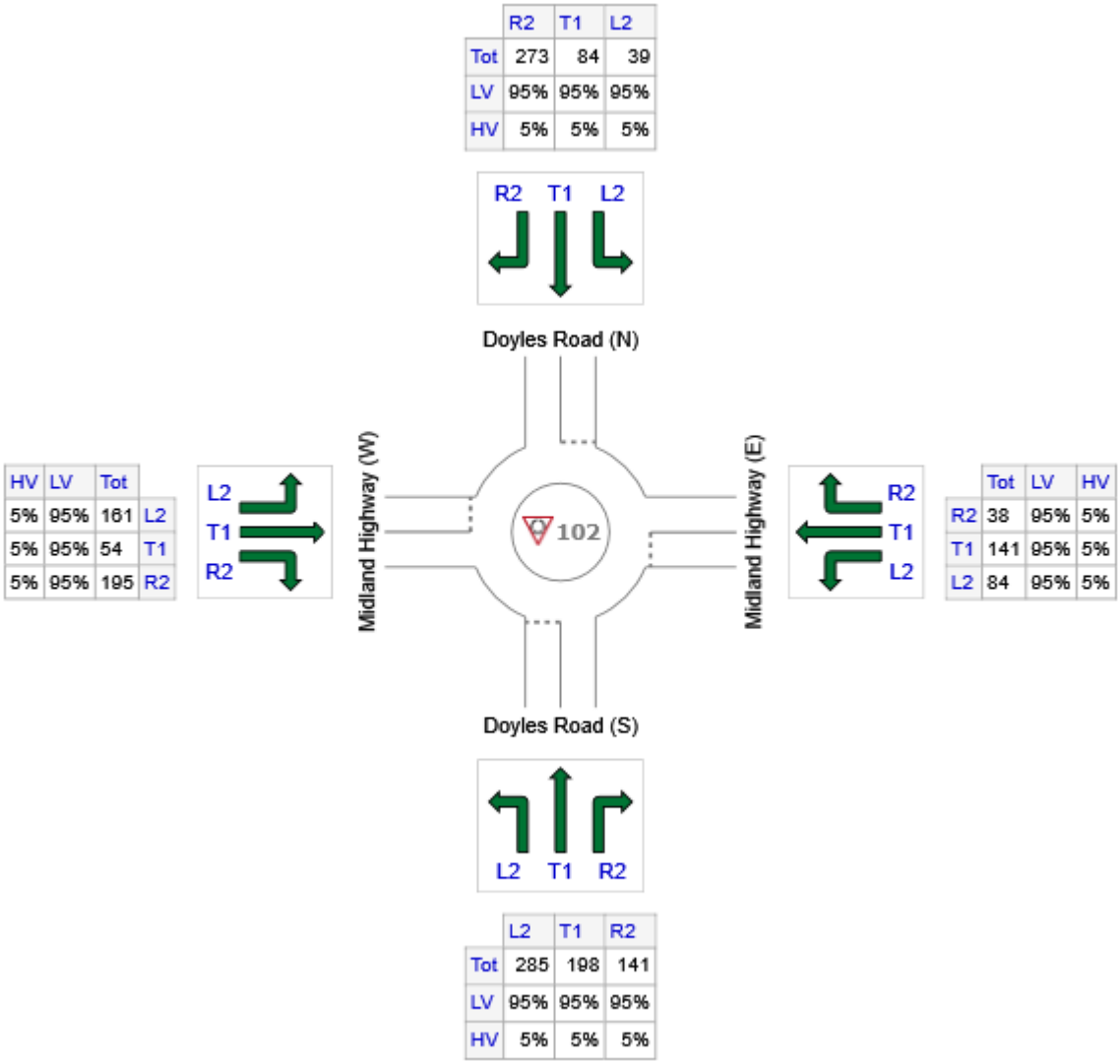
Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Input Volumes

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: Doyles Road (S)	624	593	31
E: Midland Highway (E)	263	250	13
N: Doyles Road (N)	396	376	20
W: Midland Highway (W)	410	390	21
Total	1693	1608	85

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Doyles Road (S)													
Lane 1[d]	360	5.0	1259	0.286	100	4.3	LOS A	1.5	10.7	Short	100	0.0	NA
Lane 2	297	5.0	1041	0.286	100	7.8	LOS A	1.4	10.3	Full	500	0.0	0.0
Approach	657	5.0		0.286		5.9	LOS A	1.5	10.7				
East: Midland Highway (E)													
Lane 1[d]	153	5.0	1204	0.127	100	4.4	LOS A	0.6	4.4	Short	160	0.0	NA
Lane 2	124	5.0	976	0.127	100	6.6	LOS A	0.6	4.1	Full	500	0.0	0.0
Approach	277	5.0		0.127		5.4	LOS A	0.6	4.4				
North: Doyles Road (N)													
Lane 1	129	5.0	982	0.132	59[5]	4.6	LOS A	0.6	4.3	Short	230	0.0	NA
Lane 2[d]	287	5.0	1286	0.223	100	10.9	LOS A	1.1	8.3	Full	500	0.0	0.0
Approach	417	5.0		0.223		8.9	LOS A	1.1	8.3				
West: Midland Highway (W)													
Lane 1	183	5.0	1064	0.172	89[6]	4.6	LOS A	0.8	5.9	Full	500	0.0	0.0
Lane 2[d]	249	5.0	1287	0.193	100	9.4	LOS A	1.0	7.0	Full	500	0.0	0.0
Approach	432	5.0		0.193		7.4	LOS A	1.0	7.0				
Intersection	1782	5.0		0.286		6.9	LOS A	1.5	10.7				

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

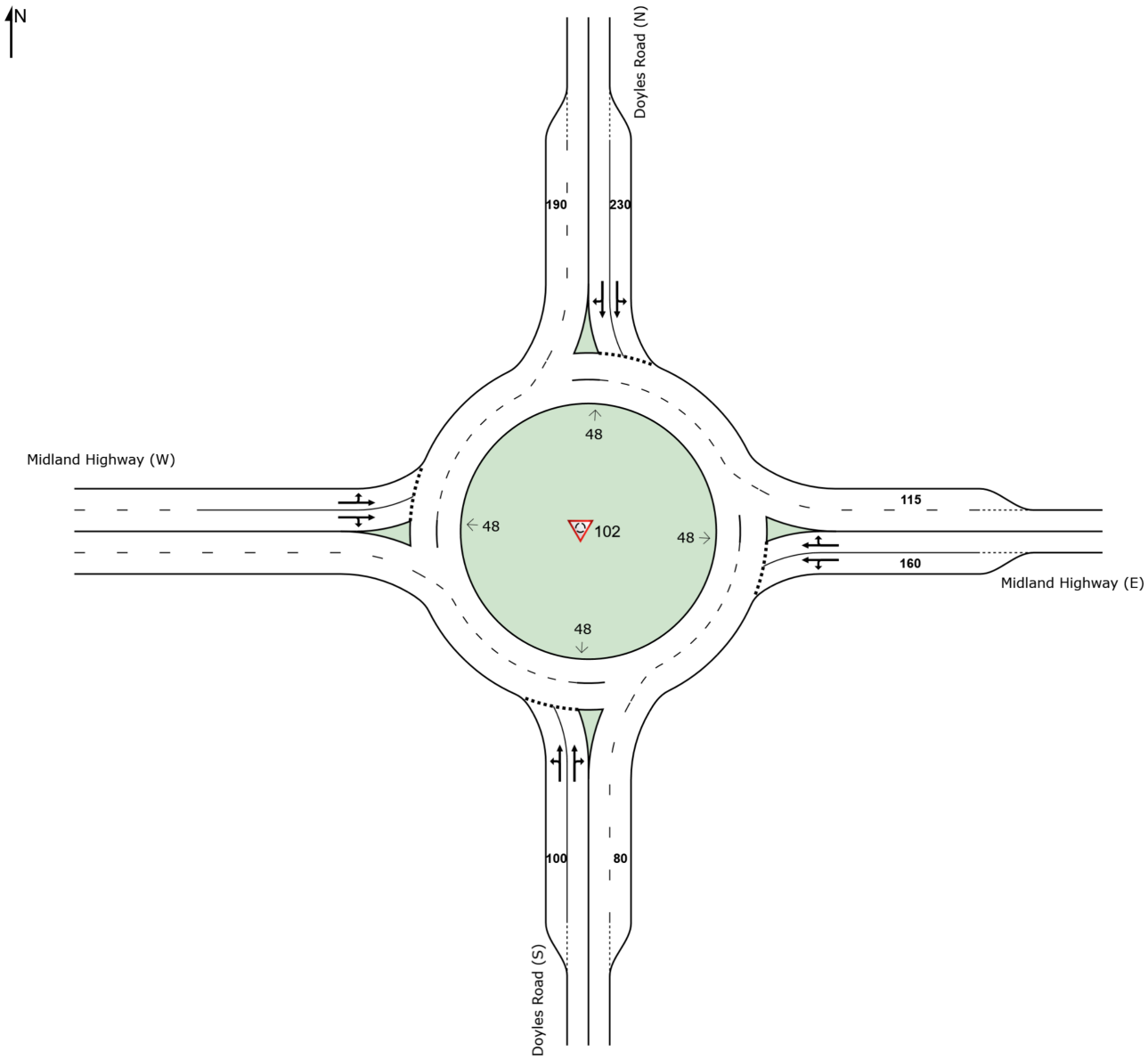
5 Lane under-utilisation found by the program
6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

Site: 102 [PM (Future) - Updated - 230718 (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

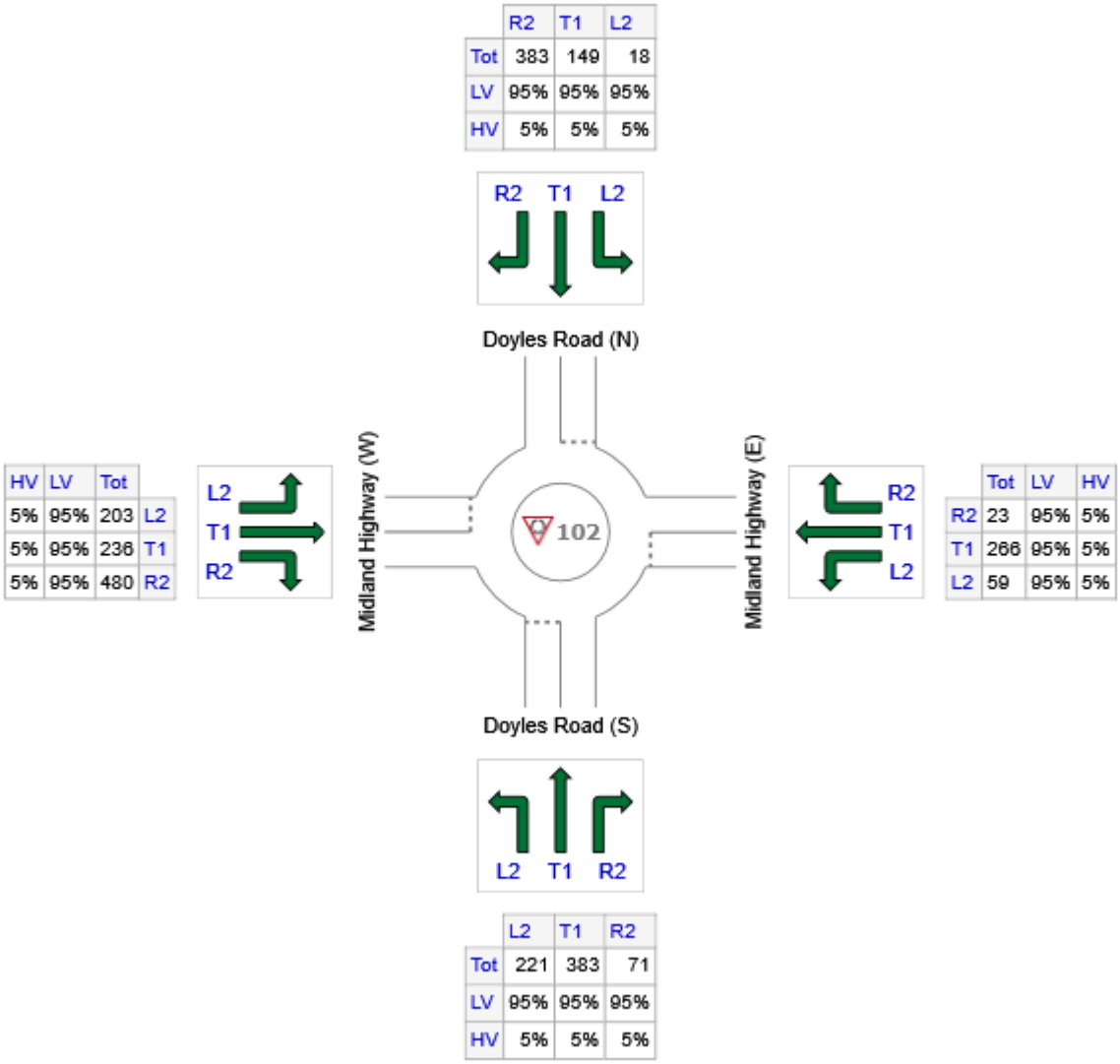
Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Input Volumes

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: Doyles Road (S)	675	641	34
E: Midland Highway (E)	348	331	17
N: Doyles Road (N)	550	523	28
W: Midland Highway (W)	919	873	46
Total	2492	2367	125

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Doyles Road (S)													
Lane 1[d]	397	5.0	1110	0.357	100	5.1	LOS A	2.0	14.8	Short	100	0.0	NA
Lane 2	314	5.0	877	0.357	100	6.9	LOS A	1.9	13.7	Full	500	0.0	0.0
Approach	711	5.0		0.357		5.9	LOS A	2.0	14.8				
East: Midland Highway (E)													
Lane 1[d]	210	5.0	906	0.232	100	6.4	LOS A	1.4	10.0	Short	160	0.0	NA
Lane 2	156	5.0	674	0.232	100	8.1	LOS A	1.2	8.9	Full	500	0.0	0.0
Approach	366	5.0		0.232		7.1	LOS A	1.4	10.0				
North: Doyles Road (N)													
Lane 1	176	5.0	756	0.233	60[5]	6.6	LOS A	1.1	8.3	Short	230	0.0	NA
Lane 2[d]	403	5.0	1032	0.391	100	12.1	LOS A	2.3	17.1	Full	500	0.0	0.0
Approach	579	5.0		0.391		10.5	LOS A	2.3	17.1				
West: Midland Highway (W)													
Lane 1	405	5.0	980	0.413	89[6]	5.1	LOS A	2.3	16.5	Full	500	0.0	0.0
Lane 2[d]	563	5.0	1212	0.464	100	10.5	LOS A	2.8	20.7	Full	500	0.0	0.0
Approach	967	5.0		0.464		8.2	LOS A	2.8	20.7				
Intersection	2623	5.0		0.464		7.9	LOS A	2.8	20.7				

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

5 Lane under-utilisation found by the program
6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

USER REPORT FOR SITE

All Movement Classes

Project: 230503sid-11-MidlandHighway_ZurcasLane **Template: Site Report**

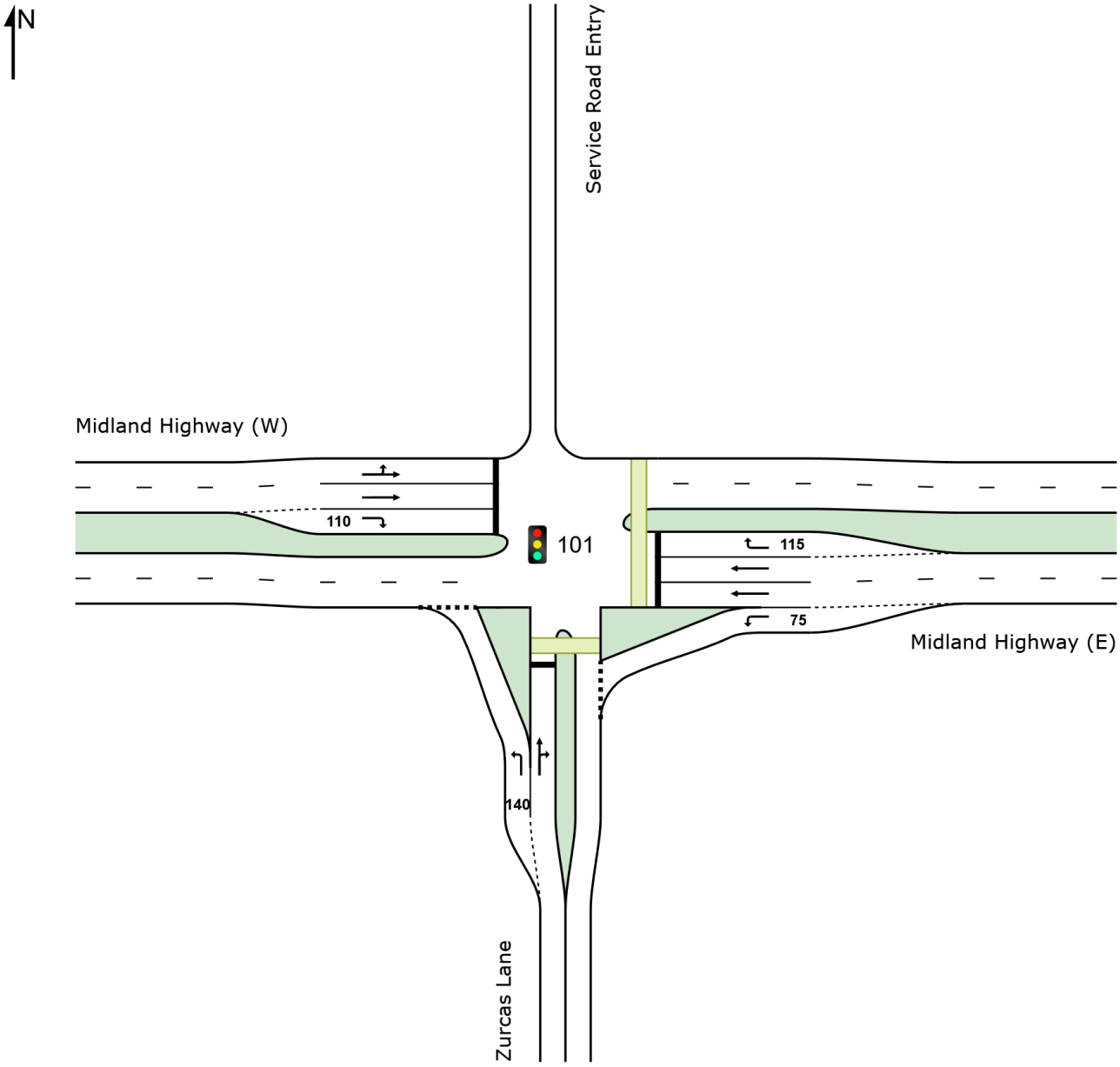
Site: 101 [AM (Future) - Updated - 230718 (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B, C, C1*, C2*
Output Phase Sequence: A, B, C
(* Variable Phase)

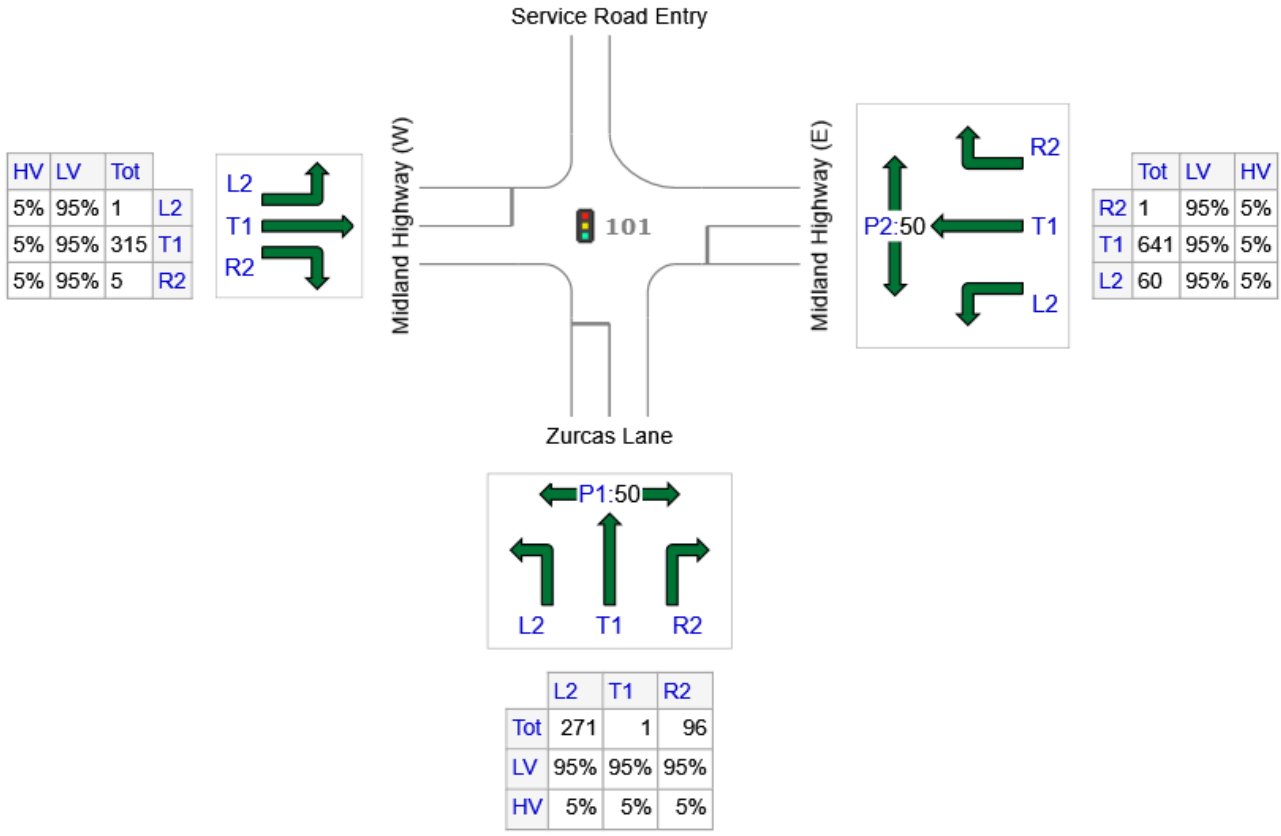
Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Input Volumes

Volume Display Method: Total and %



HV	LV	Tot	
5%	95%	1	L2
5%	95%	315	T1
5%	95%	5	R2

	Tot	LV	HV
R2	1	95%	5%
T1	641	95%	5%
L2	60	95%	5%

	L2	T1	R2
Tot	271	1	96
LV	95%	95%	95%
HV	5%	5%	5%

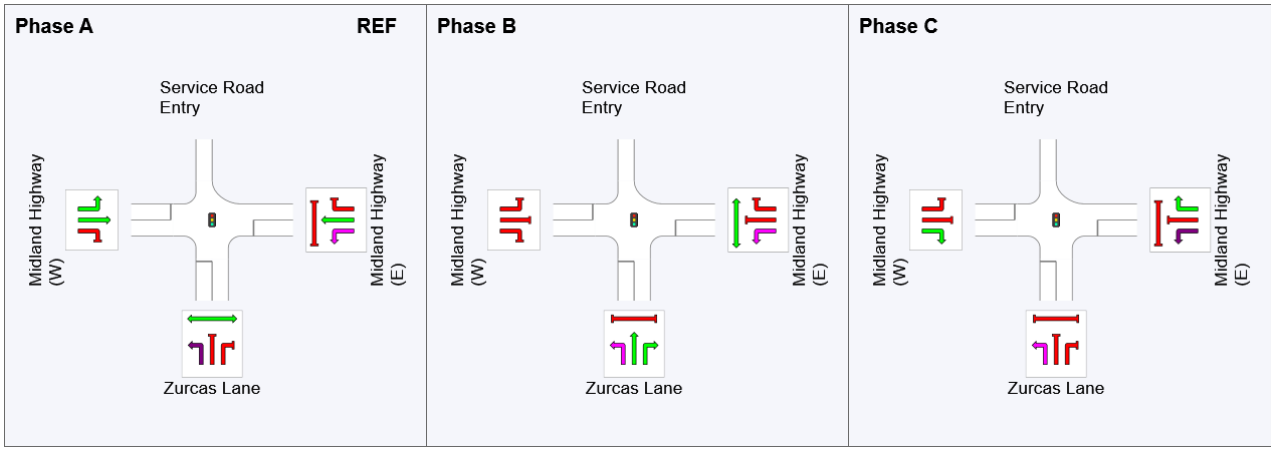
	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: Zurcas Lane	368	350	18
E: Midland Highway (E)	702	667	35
W: Midland Highway (W)	321	305	16
Total	1391	1321	70

Phase Timing Summary

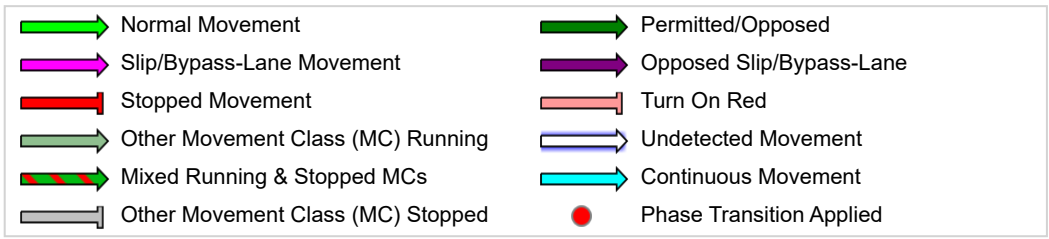
Phase	A	B	C
Phase Change Time (sec)	0	33	48
Green Time (sec)	27	9	6
Phase Time (sec)	33	15	12
Phase Split	55%	25%	20%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Zurcas Lane													
Lane 1	285	5.0	987	0.289	100	7.1	LOS A	2.6	19.1	Short	140	0.0	NA
Lane 2	102	5.0	269	0.379	100	30.8	LOS C	2.9	20.9	Full	500	0.0	0.0
Approach	387	5.0		0.379		13.4	LOS A	2.9	20.9				
East: Midland Highway (E)													
Lane 1	63	5.0	1471	0.043	100	5.2	LOS A	0.2	1.5	Short	75	0.0	NA
Lane 2	337	5.0	850	0.397	100	12.0	LOS A	6.7	48.9	Full	500	0.0	0.0
Lane 3	337	5.0	850	0.397	100	12.0	LOS A	6.7	48.9	Full	500	0.0	0.0
Lane 4	1	5.0	179	0.006	100	31.6	LOS C	0.0	0.2	Short	115	0.0	NA
Approach	739	5.0		0.397		11.5	LOS A	6.7	48.9				
West: Midland Highway (W)													
Lane 1	166	5.0	850	0.196	100	10.8	LOS A	3.0	21.6	Full	500	0.0	0.0
Lane 2	166	5.0	850	0.196	100	10.8	LOS A	3.0	21.6	Full	500	0.0	0.0
Lane 3	5	5.0	179	0.029	100	32.1	LOS C	0.1	1.1	Short	110	0.0	NA
Approach	338	5.0		0.196		11.1	LOS A	3.0	21.6				
Intersection	1464	5.0		0.397		11.9	LOS A	6.7	48.9				

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

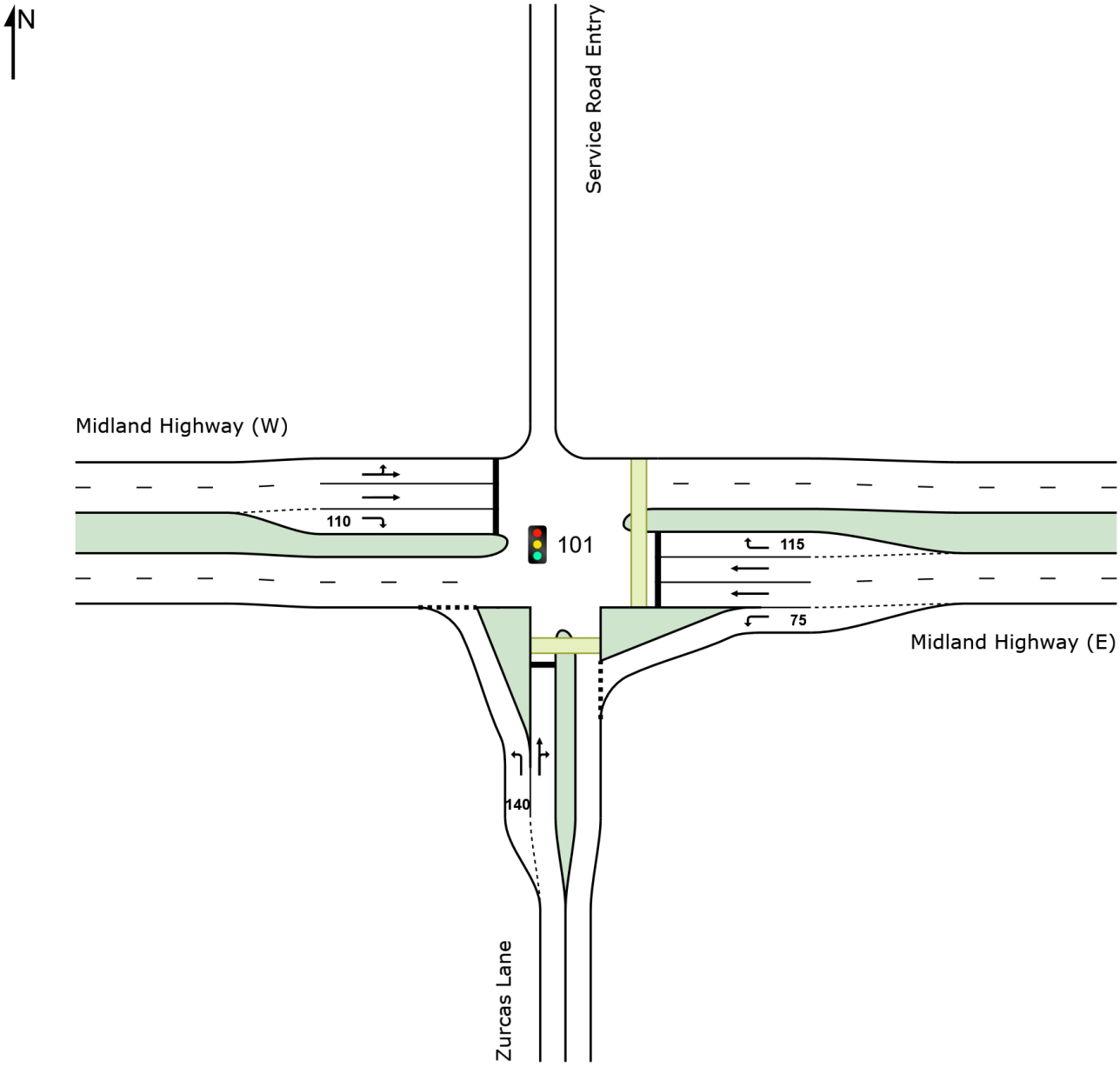
Site: 101 [PM (Future) - Updated - 230718 (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B, C, C1*, C2*
Output Phase Sequence: A, B, C
(* Variable Phase)

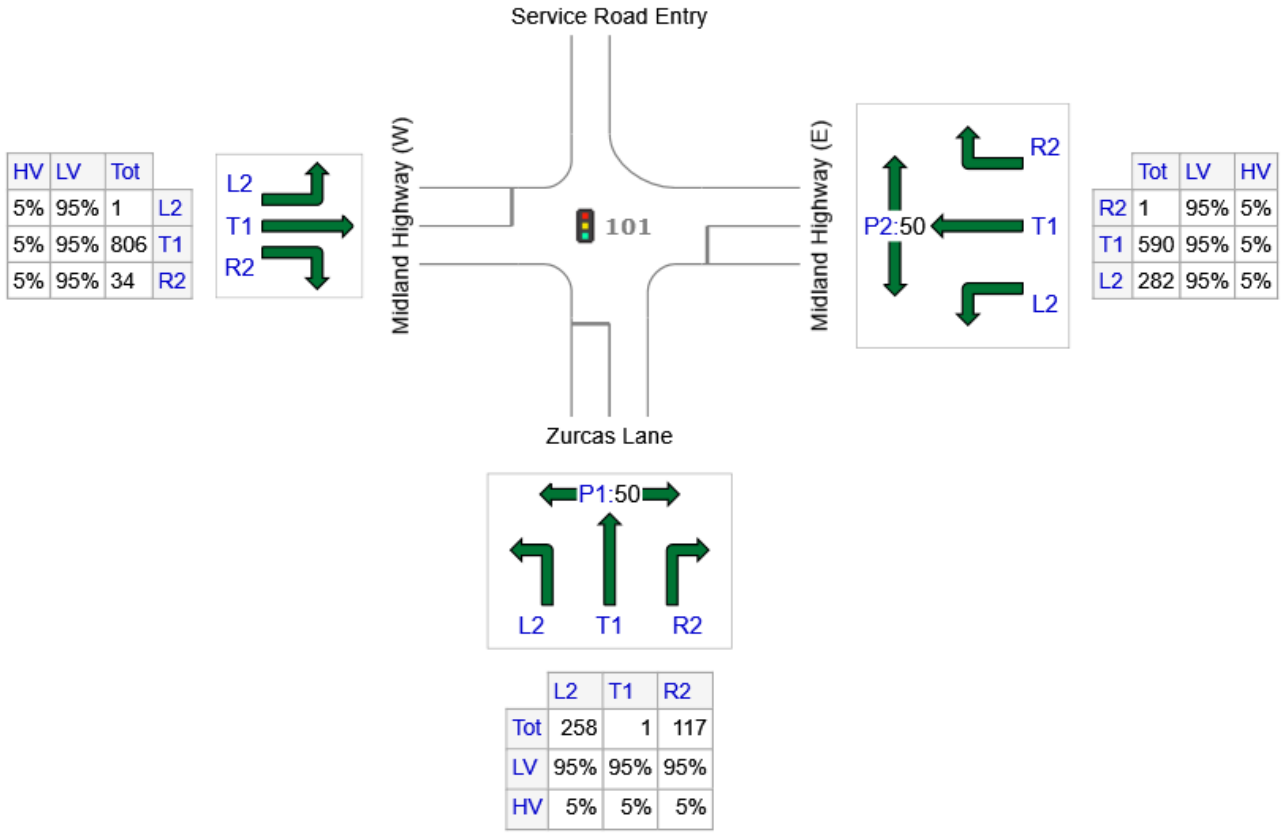
Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Input Volumes

Volume Display Method: Total and %



HV	LV	Tot	
5%	95%	1	L2
5%	95%	806	T1
5%	95%	34	R2

	Tot	LV	HV
R2	1	95%	5%
T1	590	95%	5%
L2	282	95%	5%

	L2	T1	R2
Tot	258	1	117
LV	95%	95%	95%
HV	5%	5%	5%

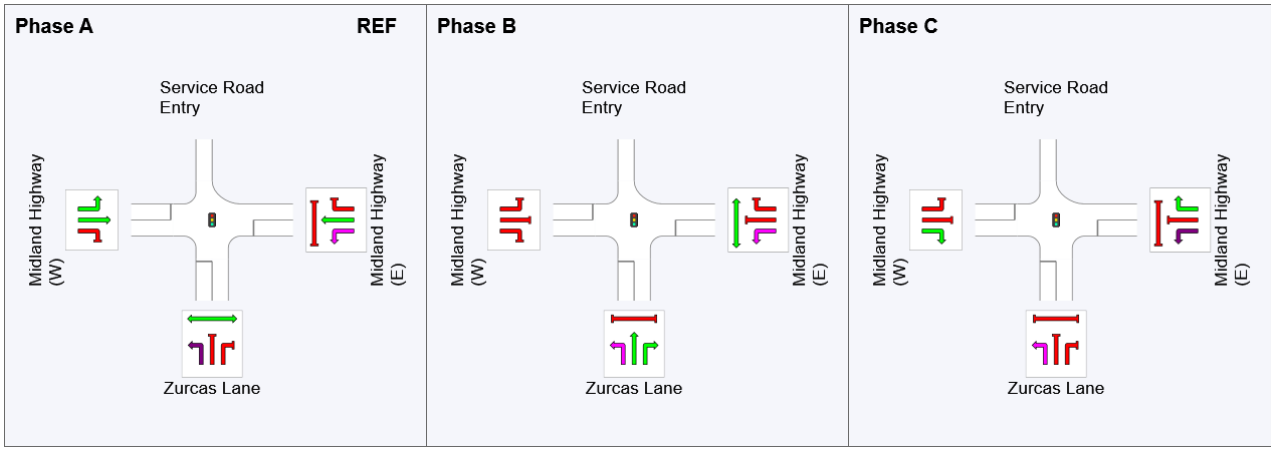
	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: Zurcas Lane	376	357	19
E: Midland Highway (E)	873	829	44
W: Midland Highway (W)	841	799	42
Total	2090	1986	105

Phase Timing Summary

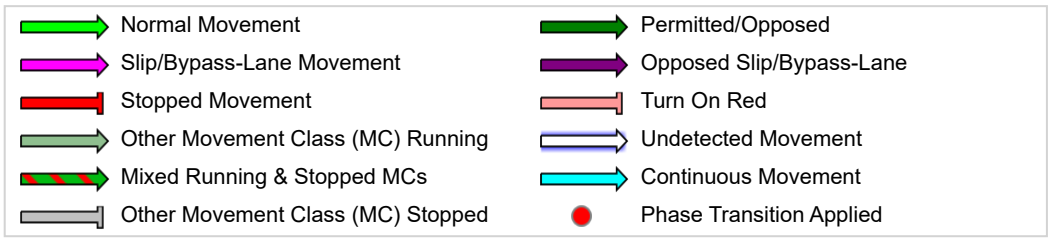
Phase	A	B	C
Phase Change Time (sec)	0	33	48
Green Time (sec)	27	9	6
Phase Time (sec)	33	15	12
Phase Split	55%	25%	20%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Zurcas Lane													
Lane 1	272	5.0	1009	0.269	100	6.7	LOS A	2.2	16.3	Short	140	0.0	NA
Lane 2	124	5.0	269	0.462	100	31.2	LOS C	3.5	25.8	Full	500	0.0	0.0
Approach	396	5.0		0.462		14.4	LOS A	3.5	25.8				
East: Midland Highway (E)													
Lane 1	297	5.0	1447	0.205	100	5.5	LOS A	1.3	9.3	Short	75	0.0	NA
Lane 2	311	5.0	850	0.365	100	11.8	LOS A	6.1	44.2	Full	500	0.0	0.0
Lane 3	311	5.0	850	0.365	100	11.8	LOS A	6.1	44.2	Full	500	0.0	0.0
Lane 4	1	5.0	179	0.006	100	31.6	LOS C	0.0	0.2	Short	115	0.0	NA
Approach	919	5.0		0.365		9.8	LOS A	6.1	44.2				
West: Midland Highway (W)													
Lane 1	425	5.0	850	0.500	100	12.8	LOS A	8.9	65.3	Full	500	0.0	0.0
Lane 2	425	5.0	850	0.500	100	12.8	LOS A	8.9	65.3	Full	500	0.0	0.0
Lane 3	36	5.0	179	0.200	100	33.3	LOS C	1.0	7.5	Short	110	0.0	NA
Approach	885	5.0		0.500		13.6	LOS A	8.9	65.3				
Intersection	2200	5.0		0.500		12.2	LOS A	8.9	65.3				

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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