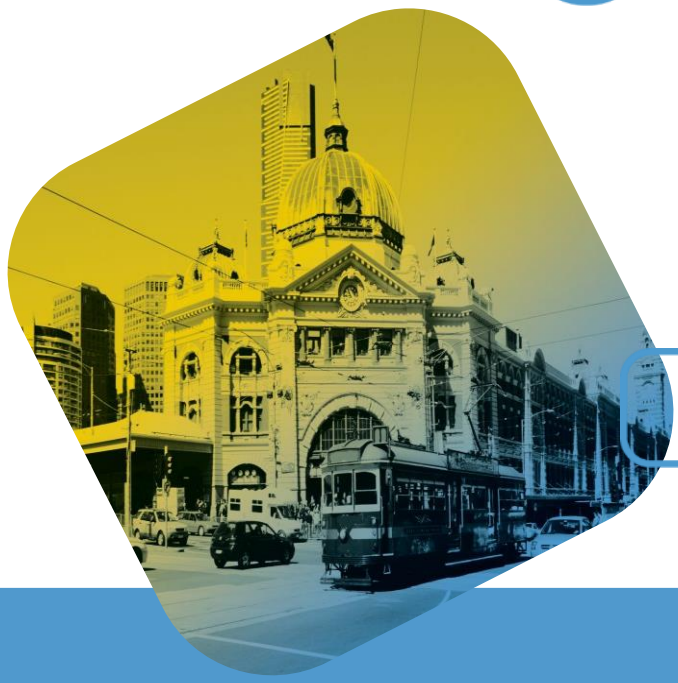
37°21'25.5"S
144°31'38.0"E

Woodend Integrated Transport Plan



Traffic and Transport - Background Study

28 October 2022
Prepared for Macedon Ranges Shire Council

IMP2105097REP01F01

Impact

Macedon Ranges Shire Council

Company Information

Impact Traffic Engineering Pty Ltd

Level 17, 31 Queen Street, Melbourne, Victoria, 3000

ABN: 78 611 424 107

Email create@impactaustralia.com.au

Website www.impactaustralia.com.au

Document Information

Client	Macedon Ranges Shire Council
Report Title	Woodend Integrated Transport Plan
Report Reference	IMP2105097REP01F01
Date of Issue	28 October 2022
Approved By	David Ho

This work is exclusively owned by IMPACT Traffic Engineering Pty Ltd and cannot be reproduced, published, stored, copied, adapted, distributed or transmitted either wholly or in part, in any form or by any means whatsoever (graphic, electronic, mechanical, photocopying, r ecording or otherwise) without the prior written permission of IMPACT Traffic Engineering Pty Ltd.

© IMPACT Traffic Engineering Pty Ltd 2022. All Rights Reserved.

Document Control

Version	Date	Author
FINAL 01	28 October 2022	Henry Ma

Contents

Figures

Appendices

1 Introduction

1.1 Introduction

IMPACT® has been engaged by Macedon Ranges Shire Council to provide traffic and transport advice to inform the preparation of the Woodend Integrated Transport Plan.

This report provides a background study into the existing conditions and issues within the Woodend Township, identifying gaps and opportunities between existing infrastructure and community expectations and cumulating a list of prioritised recommendations for improvement opportunities.

1.2 Project Background & Purpose

Woodend is a town and district located approximately 60 kilometres north-west of the Melbourne CBD. In 2021, the district was estimated to have a population in the order of 8,200 people and is forecast to grow by over 1,000 to approximately 9,310 by 2036.

This growth will ultimately lead to increased traffic, pedestrian and cyclists movements to and through the Woodend district and township area.

To ensure that this growth is managed sufficiently, Macedon Range Shire Council adopted the Woodend Town Structure Plan & Neighbourhood Character Study in 2014. This document was prepared to provide a means & direction for the future sustainable development of Woodend over the proceeding 15-20 years.

This plan provided broad directions, strategies and objectives that are to be achieved in the future development of the Woodend district area. Part of these strategies and actions were goals in relation to:

- Pedestrian and Bicycle Network;
- Public Transport Network;
- Road Network;
- Car Parking; and
- Freight Access.

This document provided ideal strategies and objectives for each of these elements, noting that road, pedestrian and cyclist connections would need to be monitored and analysed to understand when upgrades are required.

2 Strategic Context

2.1 Documentation

State and Local Planning Policies provide a framework for future development within Woodend by providing the directions, objectives and strategies for activity centre development and transport planning.

An overview of key planning policies and objectives that affect land use within Woodend is presented in the following chapter along with relevant transport policies that influence transport and accessibility.

Thoese include:

- Transport Integration Act 2010;
- Victorian Transport Plan 2008;
- Victorian Cycling Strategy 2018-28;
- Pedestrian Access Strategy 2010;
- Victorian Road Safety Strategy 2021-2030;
- Movement and Place in Victoria;
- Macedon Ranges Planning Scheme;
- Macedon Ranges Shire Walking and Cycling Strategy 2014;
- Woodend Structure Plan and Neighbourhood Character Study 2014;
- Macedon Ranges Shire Council Plan 2021-2031;

2.2 Victorian Government Policy

One of the key elements of the State Planning Policy Framework (SPPF) is the provision of infrastructure including our roads, tramways, public transport and bicycle transport. Key objectives of the SPPF are the provision of integrated transport around existing and planned road and public transport routes, and planning for bicycles to encourage cycling as an alternative mode of travel.

2.2.1 Transport Integration Act 2010

The Transport Integration Act sets out a vision, objectives and principles for transport in Victoria. It makes clear that the transport system needs to be integrated and sustainable - in economic terms, in environmental terms and in social terms. It requires all Victorian transport agencies - including the Director of Public Transport, VicRoads, VicTrack, V/Line and the Linking Melbourne Authority to work together towards the common goal of an integrated and sustainable transport system.

The objectives of the Act are as follows:

- Social and economic inclusion;
- Economic prosperity;
- Environmental sustainability;
- Integration of transport and land use
- Efficiency, coordination and reliability; and
- Safety, health and wellbeing.

2.2.2 Victorian Transport Plan 2008

The Victorian Transport Plan (VTP) was developed by the former Victorian Government in response to strong population growth in Victoria, coupled with the global challenges of high petrol prices and climate change, which have applied pressure to Victoria's transport infrastructure.

The VTP was adopted by the former Victorian Government of Victoria in November 2008, replacing Meeting our Transport Challenges (MOTC) (2006). The VTP outlines transport infrastructure projects and initiatives, provides a framework for future land development, and a list of short, medium and long term transport projects to respond to current demands and to shape the State for future generations.

The Victorian Transport Plan identified four priorities related to Woodend as outlined below:

- Making jobs and services more accessible in Victoria through transport investment;
- Linking rural, regional and metro Victoria so all parts of the State share in the benefits of growth in Victoria;
- Linking communities together by closing gaps, reducing congestion and improving road safety; and
- Focus on a sustainable future by lowering the carbon footprint from transport in Victoria.

The Victorian Transport Plan recommend actions to be take include:

- Protecting the liveability of established suburbs through locating more housing in and around activity centres, along bus routes on the Principal Public Transport Network and close to train stations;
- Greater accessibility and improved connections of trains and busses, giving people more confidence about the safety of the network;
- Improved service performance of buses on shared roads through higher priority; and
- New and expanded on and off-road bicycle and walking paths to encourage safer cycling and walking as a transport mode; cycling and walking tracks

2.2.3 Victorian Cycling Strategy 2018-28

The Victorian Cycling Strategy 2018-28 will guide planning and investment in cycling over this period. The aim of this strategy is to increase the number, frequency and diversity of people cycling for transport in both metropolitan and regional centres. A key focus is delivering a safer, lower stress and better connected network which is based on three strategic directions related to Woodend as outlined below:

- To improve safety using a Safe Systems approach through separating pedestrians, bicycles and motor vehicles and minimising potential points of conflict between modes of transport;
- Provide a lower-stress cycling experience through reducing stress associated from interactions with motor vehicles which is dependant on motor vehicle conditions to improve perceived and actual safety of cyclists; and
- Integrate cycling and public transport to encourage more people to cycle for transport, particularly improved strategic cycling corridors to train stations and public transport stops.

Another goal of the Victorian Cycling Strategy is promoting inclusive cycling culture through attracting a more diverse range of people to cycling by the strategies outlined below:

- Making cycling a more comfortable experience by placing cycling routes in attractive locations;
- Providing wider and smoother paths to allow for overtaking and side by side riding in comfort;
- Maintenance of existing paths; and
- Minimising delays for cyclists, particularly at intersections and crossings.

2.2.4 Pedestrian Access Strategy 2010

The Pedestrian Access Strategy sets out the former Victorian Government's vision for a more pedestrian-friendly transport system for Victorians. The aim of the Strategy is to encourage more people to walk in Victoria, especially for short trips. It builds upon the Victorian Transport Plan and the Victorian Cycling Strategy to promote sustainable transport across the State.

The strategy establishes five (5) key strategic directions to prioritise future actions and are outlined below:

- Encourage people to walk by changing attitudes and behaviour;
- Collaboration of State and local governments e to improve provision for walking;
- Create pedestrian-friendly built environments, streets and public spaces;

- Increase the safety of walking through providing regular and sufficient pedestrian crossings; and
- Continue integrating walking with public transport through providing safe and convenient walking access to public transport stops and interchanges.

2.2.5 Victorian Road Safety Strategy 2021-2030

The Victorian Road Safety Strategy targets to eliminate death from roads in Victoria by 2050 by first halving road deaths by 2030. The purpose of this strategy is to create a safer road environment and reduce the opportunity for poor decision making. The strategies objectives are as follows:

- To ensure all Victorians are safe and feel safe on and around all roads;
- Halve road deaths and reduce serious injuries by 2030;
- Embed a culture of safety in the Victorian community; and
- Deliver initiatives which are achievable and impact the short term safety of our roads and also prepare for the state of the future road network.

The Victorian Road Safety Strategy aims to achieve these objectives by these relevant focuses for Woodend:

- Supporting and enforcing safer driver behaviour;
- Improving safety on high-speed roads and at intersections as well as reducing the underlying risk;
- A focus on vulnerable and unprotected road users; and
- Increasing safety for those using the road for work or at work.

2.2.6 Movement and Place in Victoria

A fundamental aspect of movement and place is the recognition that streets perform multiple functions. Transport links not only move people from one place to another but also serve as key places and destinations in their own right. The Movement and Place Framework follows four key modules outlined below:

- Network classification uses place and movement classifications to represent the mix of transport links that are required to support the overall demand for movement across a network;
- Network performance to determine how well network links perform toward their aspired function and if user requirements are met through analysing movement factors such as travel speed, cycling and walking, accessibility to public transport and road safety and comfort as well as crash history;
- Options development to close the gap between actual and aspirational performance by defining road and street type at transport links, identifying possible potential interventions with reference to available design guides; and
- Assessing options to ensure they align with the aspirational function of transport links and support better movement, place, road safety and environment outcomes.

These key modules allow at a project or local level to translate the requirements of different road users, provide design guidance for development of project options and solutions, impact evaluation on wider network performance and assist with community engagement.

2.3 Local Government Policy & Supporting Documents

This section summarises the key policy and strategy with respect to traffic and transport, highlighting the relevant overarching objectives and strategies relevant to Woodend.

2.3.1 Macedon Ranges Planning Scheme

The Victorian State Planning Policy Framework states under Clause 18 that Planning should ensure an integrated and sustainable transport system that provides access to social and economic opportunities, facilitates economic prosperity, contributes to environmental sustainability, coordinates reliable movements of people and goods, and is safe.

Under the Local Planning Policy Framework of the Macedon Ranges Planning Scheme, Clause 21.11 provides local content to support Clause 18. The following objectives relate to integrated transport within the Shire:

- To integrate transport with land use and development in the Shire to facilitate efficient transport use;
- To provide a safe and efficient road transport network;
- To encourage the use of more sustainable transport modes and reduce distances travelled;
- To facilitate public transport use in the Shire; and
- To facilitate the use of alternative transport modes in the Shire, in particular walking, cycling and riding.

Strategies of note which support the above objectives include:

- Ensuring that land use and development proposals have regard for the existing and planned transport network;
- Locate new development adjacent to major arterial roads in such a way as to minimise the impact on traffic movements on the adjoining road network and provide safe and efficient access along with adequate and well located car parking areas;
- Encouraging development in settlements near existing transport infrastructure; and
- Facilitating improvements to the recreational path network.

2.3.2 Macedon Ranges Shire Council - Walking and Cycling Strategy 2014

The Walking and Cycling Strategy has been developed with reference to a number of previous community and open space related strategies, responsive to the high value placed on walking and cycling opportunities. The primary purpose of this document is to advise Council on ways to increase participation and improve infrastructure.

The strategy identifies issues and opportunities for the Macedon Ranges Shire Council across a range of themes, including connections between towns, within the town, tourism trails, support infrastructure and participation. The key Direction is to:

"Consider in all road works projects whether the road is on the Preferred Cycling Network and include improvements for cycling in any major upgrades (both within towns and between towns)".

Identified bicycle infrastructure upgrades within Woodend have a focus on Shire wide improvements on road conditions for cycle networks and bicycle safety campaigns. A proposed route for a shared trail from Woodend to Hanging Rock is identified as well as proposed construction. There are also further aspirations to develop a pedestrian and cycling link around the Woodend train station (triangle including Corinella Road, High Street and between the station and Urquhart Street) as well as a loop around the town centre along Corinella Road, Quarry Road, Templeton Street, Nicholson Street, Forest Street, Jeffrey Street, Schaw Street and Urquhart Street.

2.3.3 Woodend Structure Plan and Neighbourhood Character Study 2014

The Woodend Town Structure Plan is used to develop a collective vision for the future of the Woodend township based on population growth, demand for additional residential, commercial, and industrial land. It provides an analysis of traffic circulation, parking needs and pedestrian and cycling links through the town to identify possible improvements to the transport network.

The Woodend Structure Plan highlights the following transport issues and strategies:

- The poor condition of the pedestrian network outside of the town centre as well as barriers to safety within the town centre due to limited crossing points over high street and near the railway station in particular. An additional crossing on High Street is suggested which seeks to minimise crossing distance for pedestrians;
- The wide service roads of High Street provided opportunity for shared zone implementation to prioritise pedestrian movements;

- Limited cycling facilities with few formal bicycle lanes and several shared paths. A network of bicycle facilities to connect major land use attractors and residential areas to promote cycling;
- 'Spines' of a shared pedestrian/cycle pathway network to be established through the town along High Street and connecting to primary access roads to residential areas;
- Lack of end of trip facilities and proposed provision of short-term bicycle parking spaces in main pedestrian areas around High Street;
- Poor integration of the railway station with the town centre and minimal direct pedestrian connections. Future redevelopment should provide a dedication pedestrian link to High Street;
- Lack of local bus services in Woodend and an exact route and promoting the implementation of a local bus service is an integral part of public transport provision; and
- Concern around the safety of High Street intersections and roundabouts have been highly suggested and future road upgrades need to provide a high priority for pedestrians and cyclists.

The Woodend Structure Plan identifies the following transport objectives:

- Create a pedestrian-focused and well-connected public realm;
- Promote sustainable methods of transport, supporting walking and cycling as viable alternatives to car travel;
- Manage the road network to optimise the safety, efficiency and amenity for all users;
- Enhance existing connections to, from and between nearby regional destinations;
- Manage car parking demand and provision to support the activity and amenity of the town centre; and
- Advocate for improved public transport provision.

2.3.4 Macedon Ranges Shire Council Plan 2021-2031

The Council Plan provides the strategic direction for the future of the Macedon Ranges Shire and the key priorities for the next four years. The Council Plan has a strategic objective to maintain the built environment in a sustainable way with effective land-use planning. The strategic priorities related to transport in Woodend to achieve this objective include:

- Improve connectivity and movement, providing transport choices to the community, including walking trails and bike paths;
- Integrate land-use planning, and revitalise and protect the identity and character of the shire; and
- Encourage active and healthy lifestyles for people of all ages and abilities through enhanced pedestrian and cycling networks.

The Council Plan identifies the council role in 2022/2023 to finalise the Woodend corridor study to investigate the movement of pedestrians, cyclists and vehicles within Woodendís main road corridor, identifying areas of concern and possible solutions.

2.3.5 Road Safety Strategy 2008-2012

Council previously prepared a strategy for Road Safety management in Macedon Ranges (2008-2012). The vision outlined in this strategy was to reduce the risk of injury and death on all roads and paths so that people of all ages feel confident that they can travel on the road network safely.

Relevant to this document, we note that the strategy suggests that future developments and changes within the municipality should be cultivated with a safe systems approach as the framework.

Accordingly, we note that a safe system approach to road design is a key consideration to both Council and DoT, and that any future transport planning within the area should acknowledge this.

The strategy also flagged key actions / focus items for the municipality which includes (but not limited to):

- Undertaking a review and reducing vehicle speeds in activity centre areas;
- Identifying high risk crash locations by undertaking a review of available crash data; and

— Implementing engineering works to improve conditions for pedestrians / cyclists of all abilities at key activity centre areas.

2.3.6 Transport Action Group

The Transport Action Group (a subset of the Macedon Ranges Sustainability Group - a group of local advocates) advocates for sustainable transport solutions for the whole community. This group has prepared a study that places focus on the ease and safety of movements for pedestrians and cyclists around the Woodend township area.

The study highlighted several strategies which could be implemented by Council to achieve the communities expectations including:

— Speed reductions;
— Changing of road allocations to provide more priority to pedestrians and cyclists;
— Provision of additional cyclists infrastructure including shared lanes and cycling lanes; and
— Provision of additional pedestrian infrastructure including pedestrian crossings at key roads / along key desire lines and footpaths.

2.3.7 Safe System Approach

The Safe System is a road safety philosophy that requires roads to be designed and managed so that death and serious injury are avoidable.

The focus of the Safe System is to protect people so that if they are involved in a crash, they won't be killed or seriously injured, no matter the form of transport (walking, driving, cycling and riding).

The basic principles include:

1. Humans will inevitably make mistakes when driving, riding or walking;
2. Road trauma should not be accepted as inevitable, e.g. no one should be killed or seriously injured on our roads; and
3. To prevent serious trauma, the road system must be forgiving, so that the forces of collision do not exceed the limits and tolerance of the human body.

The Safe System philosophy is commonly divided into four (4) core pillars:

— Safer Roads
  - Considers ways to design, operate and maintain the road network to reduce the likelihood of crashes occurring as well as the consequences.
— Safer Speeds
  - Considers the speed at which vehicles are likely to travel on the road. Factors that influence speed include posted speed limits, level of compliance and physical constraints. Unsafe speeds can increase the likelihood and consequence of a crash.
— Safer Vehicles
  - Considers safety features, including intelligent technologies that are incorporated into vehicles of different types which contribute to crash avoidance / reducing severity of crashes.
— Safer Road Users
  - Considers road user behaviour, driver / rider training and levels of compliance and personal safety equipment, particularly in the case of vulnerable road users such as cyclists and motorists.

3 Existing Conditions Summary

3.1 Location & Access

The Woodend Township acts as a key regional Town and is located centrally within the Macedon Shire Council. The Township is bounded by the Calder Freeway located towards the northern and eastern end of the Town and major arterial routes such as Forest Street to the west and Black Forest Drive to the south.

Most notably, the Town provides direct access to Kyneton to the north, Daylesford to the west and Gisborne to the south.

The Woodend train station is located within the central business district (CBD) and provides V/Line services for Melbourne and Bendigo.

Figure 1 illustrates the key transport links providing access to Woodend.

Figure 1 Woodend Transport Access Links

3.2 Planning Zone

The Woodend Township area includes a mix of Neighbourhood Residential Zone (NRZ3), Commercial 1 Zone (CZ1), Rural Living Zone1 (RLZ1), Transport Zone 2 (TRZ2), and Public Conservation & Resource Zone (PCRZ).

Figure 2 shows the Planning Zones within the Woodend Township.

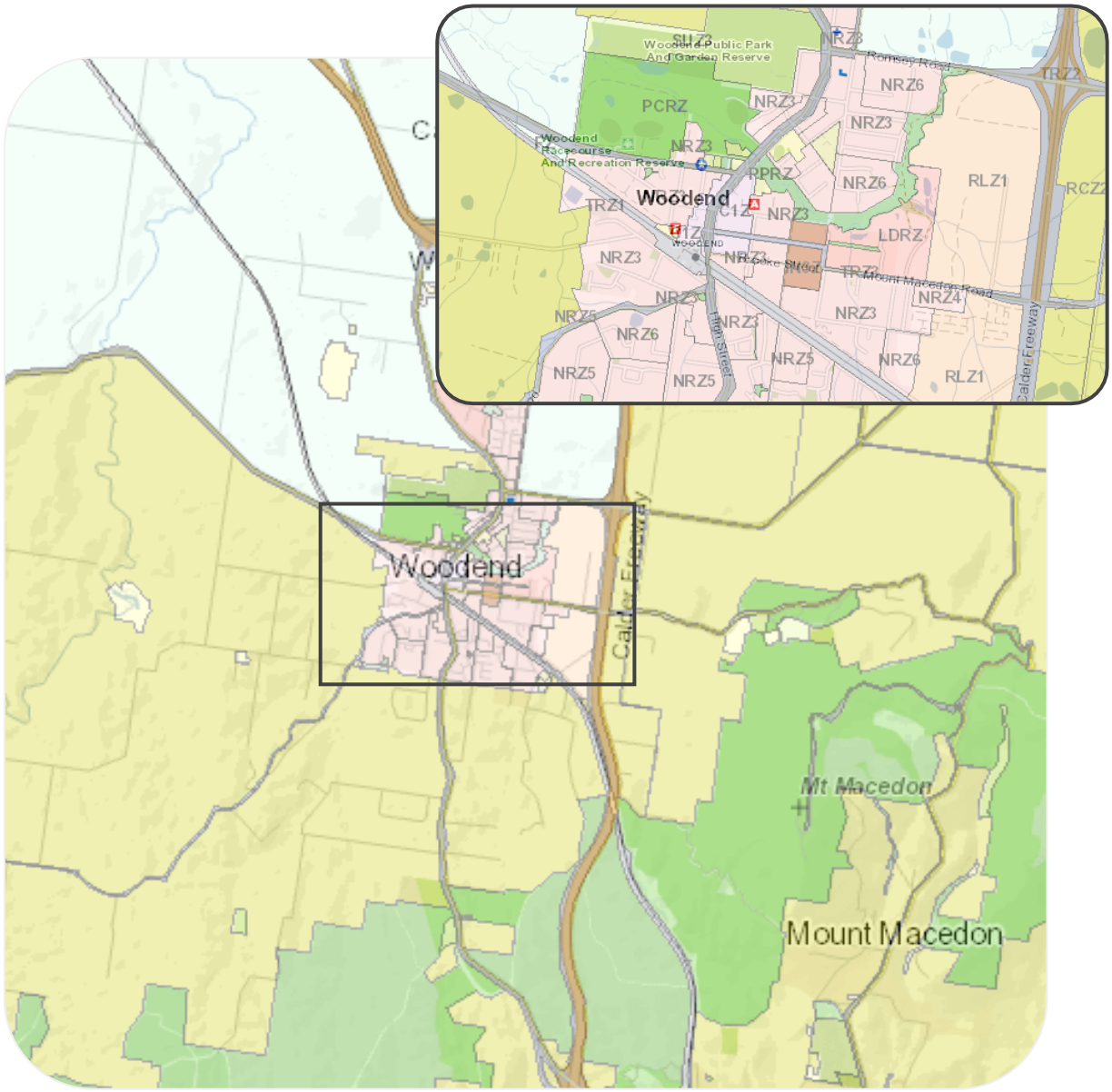


Figure 2 Woodend Township Planning Zone

The Woodend Township consist of a range of employment, retail, education and services to support the current population.

These current facilities are highlighted in Figure 3 overleaf.

Figure 3 Existing Key Destinations in Woodend

3.3 Existing Road Network

3.3.1 High Street

Classified as an arterial road, managed and maintained by the Department of Transport (DoT).

This section of High Street provides direct access to the Calder Freeway / Gisborne to the south and links with the Avenue of Honour to the north.

Its typical cross section accommodates for one (1) lane in each direction and a 1.0m - 3.0m shoulder on both ends of the carriageway.

A posted speed limit of 60km/hr applies along High Street through the Township.

Parking is generally restricted along High Street however some sections within the CBD provide for timed on-street parking.

Dedicated bicycle lanes are provided along High Street and forms part of the shoulder of the existing carriageway.

Traffic volumes extracted from the DoT's SCATS database for the pedestrian operated signal (POS) located along High Street north of Anslow Street shows that this section carries up to 31,000 vehicles per day.

Its typical cross-section is shown in Figure 4 overleaf.

Figure 4 Views of High Street Facing North

3.3.1.1 Avenue of Honour / Freeway Interchange

The interchange of the Avenue of Honour / Calder Freeway currently provides for an off-ramp for vehicles travelling to Kyneton or Bendigo however provides no option for vehicles travelling from Melbourne to exit at Avenue of Honour to access the Woodend Township.

In this instance drivers will need to use Romsey Road exit to access the Woodend Township.

Feedback from the community prompts the need to consider / implement an additional leg at the interchange to provide for further connectivity. This recommendation has been adopted and is described further in Chapter 6.

3.3.2 Urquhart Street

Classified as a local road, managed and maintained by the council.

Urquhart Street connects to High Street and the High Street service road. It provides residential street access to the east and west of its intersection with High Street.

Its typical cross section accommodates for one (1) lane in each direction and a 2.0m – 2.5m traffic island in both directions at the intersection with High Street.

A speed limit of 50km/hr applies along Urquhart Street.

Parking is provided on Urquhart Street to the west of the intersection with High Street and there is some on street unrestricted parallel parking permitted to the east of the intersection.

Traffic volumes extracted from the turning movement counts at the intersection of Urquhart Street / High Street is the PM peak volume of 230 vehicles. This generates an anticipated daily volume of 2,300 vehicles per day.

Its typical cross-section is shown in Figure 5.

Figure 5 Views of Urquhart Street Facing West

3.3.3 Anslow Street

Classified as a local road, managed and maintained by the council.

It provides access to Forest Road to the north-west and residential street access to the east and west of its intersection with High Street.

Its typical cross section accommodates for one (1) lane in each direction and a 2.5m traffic island in both directions at the intersection with High Street.

A posted speed limit of 50km/hr applies along Anslow Street.

Timed restricted and unrestricted on-street parking is provided on Anslow Street to the east and west of the intersection with High Street.

Traffic volumes extracted from the turning movement counts at the intersection of Anslow Street / High Street is the PM peak volume of 322 vehicles. This generates an anticipated daily volume of 3,220 vehicles per day.

Its typical cross-section is shown in Figure 6.

Figure 6 Views of Anslow Street Facing West

3.3.4 Forest Street

Classified as an arterial road, managed and maintained by the Department of Transport (DoT).

This section of Forest Street connects to High Street to the east and Trentham Road to the west.

Its typical cross section accommodates for one (1) lane in each direction and a 1.0m - 3.0m shoulder on one or both ends of the carriageway.

A posted speed limit of 60km/hr applies near the intersection with High Street and increases to 80km/hr to the west.

Timed restricted and unrestricted on-street parking is provided along Forest Street near the High Street intersection.

Traffic volumes extracted from the vehicle surveys located along Forest Street west of High Street shows that this section carries approximately 3,700 vehicles per day.

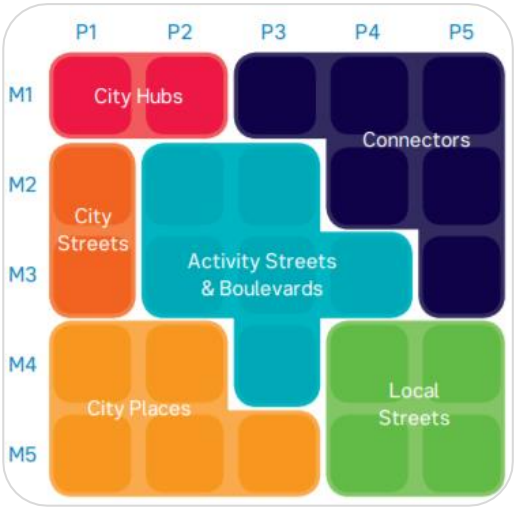
Its typical cross-section is shown in Figure 7.

Figure 7 Views of Forest Street Facing West

3.4 Movement and Place Framework

3.4.1 Movement and Place Classification

Having regard to the Movement and Place Framework[1] reproduced below, the road network within the Woodend CBD can be described as follows.

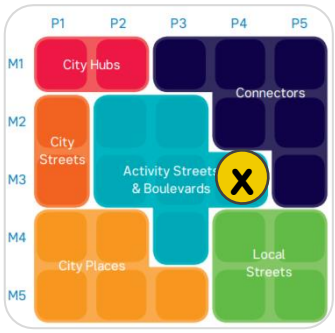
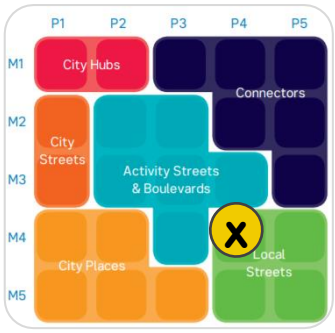


Place definitions	
P1	Place of state or national significance.
P2	Place of regional significance.
P3	Place of municipal significance .
P4	Place of neighbourhood significance.
P5	Place of local significance.

Movement definitions	
M1	Mass movement of people and/or goods on routes with a state or national-level movement function or provides primary access to state-level places.
M2	Significant movement of people and/or goods on routes connecting across multiple municipalities or provides primary access to regional-level places.
M3	Moderate movement of people and/or goods on routes connecting municipalities or provides primary access to municipal-level places.
M4	Movement of people and/or goods within a municipality.
M5	Local movement.

[1] A decision-making framework that outlines the competing interests on the transport links and reports performance in terms of movement, place, environment and safety outcomes

Table 1 Movement & Place Classification

Road	Movement	Place	Network Classification
High Street & Forest Street	**M3**: Moderate movement of people &/or goods on routes connecting municipalities or primary access to Municipal level places.	**P4**: Place Neighbourhood Importance	
Urquhart Street & Anslow Street	**M4**: Movement of people &/or goods within a municipality	**P5**: Place of Local Importance	

The Network Classification for both High Street & Forest Street is 'Activity Streets and Boulevards'. Successful Activity Streets and Boulevards provide access to shops and services by all modes. There is high demand for movement as well as place with a need to balance different demands within the available road space. Activity Streets and Boulevards aim to ensure a high-quality public realm with a strong focus on supporting businesses, traders and neighbourhood life.

The Network Classification for Urquhart Street & Anslow Street is 'Local Streets'. Successful Local Streets should provide quiet, safe and desirable residential access for all ages and abilities. They are part of the fabric of our neighbourhoods, where we live our lives and facilitate local community access.

3.4.2 Other Classifications

Overall movement classification for main access routes through Woodend Township (e.g. High Street, Forest Street and Romsey Road) as mapped out by the Department of Transport (DoT) is described further in Table 2.

The classification maps for each movement are provided in Appendix A for reference.

Table 2 Movement Type Categories

Movement Type	Category	Definition
General Traffic	GT4	Movement of people by private vehicle within a municipality or providing primary access to Neighbourhood level places (P4).
Freight	F3	Freight access routes where provision for freight vehicles is important however freight is not a priority movement.
Cycling	TBC	No Strategic Cycling Routes Identified for Woodend, as these were only identified for places identified by Plan Melbourne for growth. Opportunity to Map C3 and C4 as well as Recreation/Training routes
Walking	W2	Regionally Significant walking links in close proximity to key activity generators with existing and/or potential demand. This includes strip

		shopping, educational institutions, railway stations and employment precincts. (W2 because of the railway station)
	W3	Municipal walking links that support pedestrian movements to and around activity generators.

3.5 Existing Active Transport Infrastructure

3.5.1 Overview

Currently there is limited dedicated cycling infrastructure in Woodend with the majority of dedicated lanes located along High Street.

Pedestrian paths however are generally provided throughout the Township and activity centres however are limited within residential areas.

3.5.2 Pedestrian Network

Currently, the main pedestrian crossing point is the pedestrian operated signals (POS) located across High Street within the Woodend CBD.

Generally within the Township, pedestrian footpath's are well connected with a number of line-marked pedestrian crossings provided which prioritise pedestrian movements over vehicle movements.

However, a number of pedestrian footpath locations were identified that were in need of upgrade to meet current standards (e.g. DDA compliant crossings) in addition to providing for improved connectivity.

3.5.3 Bicycle Network

Bicycle infrastructure within Woodend is limited with the only dedicated on-road bicycle lane located along High Street travelling through the Woodend CBD.

Currently, bicycle movements are limited to informal cycling routes (e.g. along the existing road pavement) and off-road shared paths.

3.5.4 Strategic Context - Active Transport

In 2014, Macedon Shire Council released the Walking and Cycling Strategy 2014 document which was developed to supplement existing Council planning documents such as previous Bike Strategy (2002, Leisure Strategy (2006), Shire-wide Footpath Plan (2013), Open Space Strategy (2013) and individual Community Plans.

This strategy reflects the high value placed on walking and cycling opportunities by the community by providing priorities and guidelines for future action where creating walking and cycling friendly environments within Macedon Ranges is seen as critical to achieving Councils vision for the shire.

The primary purpose of the strategy is to provide Council with a strategic direction on ways to increase participation in and improvement support infrastructure and resourcing for walking and cycling in the shire over the next 10 years.

From the study, various maps have been developed for the Shire with a map of the aspiration cycling and walking network for Macedon Ranges.

Figure 8 overleaf illustrates the proposed cycling and walking routes throughout the Macedon Shire Council region which spans from Clarkefield to Castlemaine and from Trentham to Lancefield.

Figure 9 shows the preferred routes through the Woodend Township with formal and in-formal routes proposed along High Street and off-road pedestrian and cycling routes connecting from Woodend Racecourse Reserve to Hanging rock.

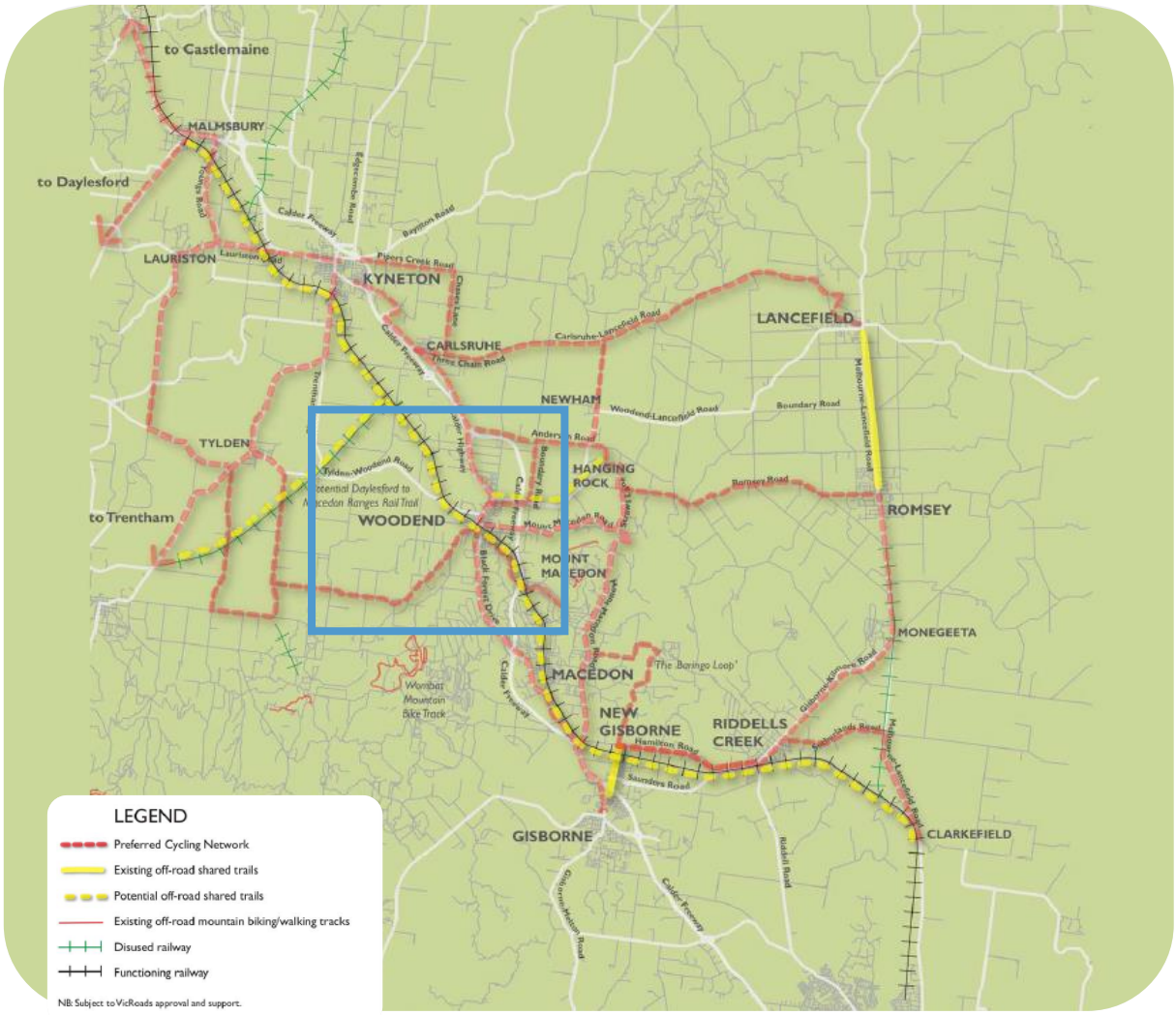


Figure 8 Macedon Shire Walking and Cycling Plan - Connectivity Map

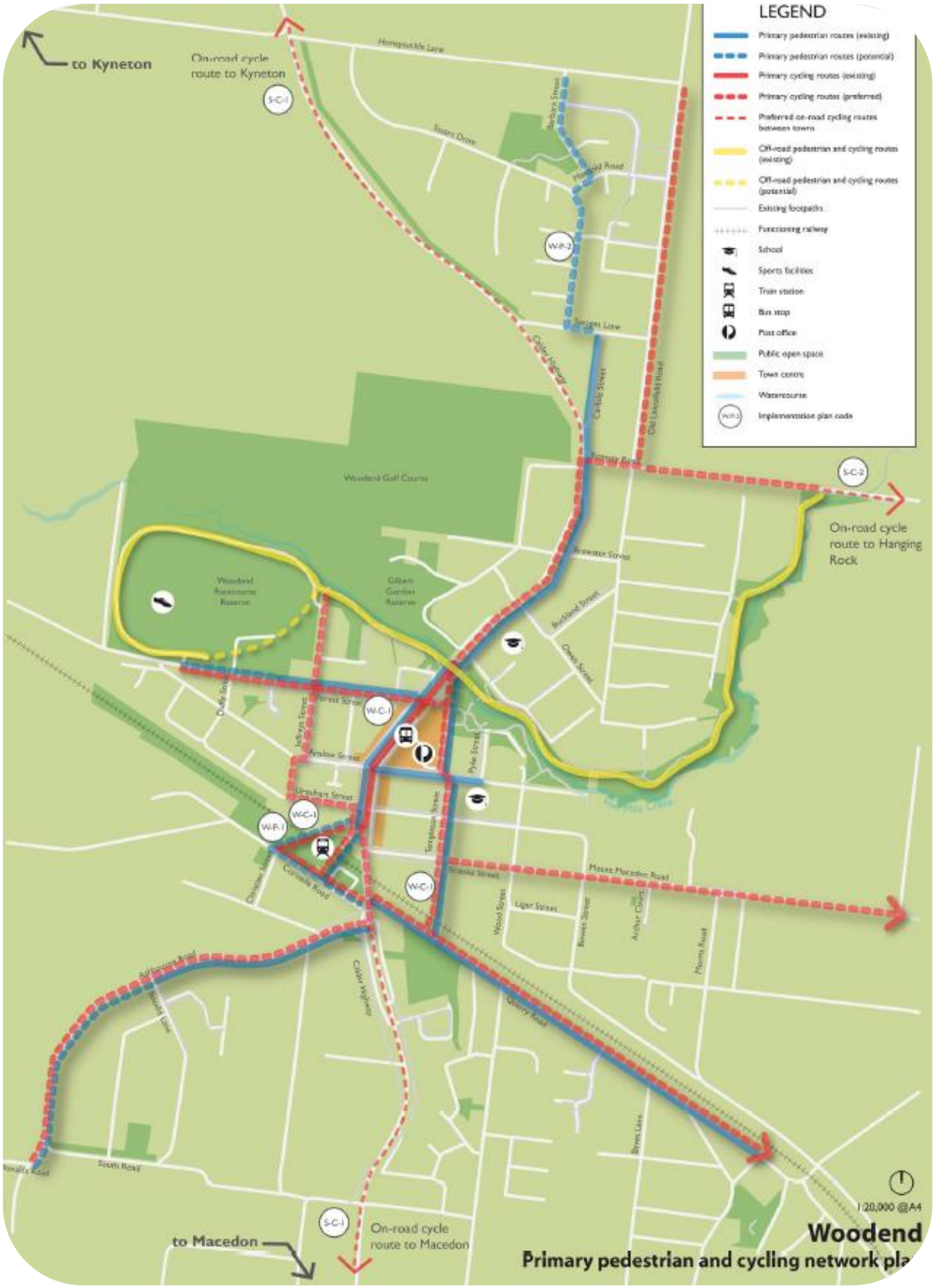


Figure 9 Woodend Township Walking and Cycling Map

3.6 Public Transport Accessibility

3.6.1 Bus Services

Buses currently operate as a 'FlexiRide' bus service which provides on-demand bus services as required.

Data provided by the Department of Transport (DoT) highlighted the number of fares from this FlexiRide bus service across a period of a month.

Figure 10 shows the location of the services and Figure 11 provides an illustration of this data between July 2018 and March 2020.

Most notably, the data revealed the following:

- A peak monthly demand of 420 fares was recorded
  - This translate to a daily peak of approximately 14 daily fares on average.
- Demand was largely weighted towards concession fares
  - Daily demands comprised 1-2 full fares and 6-13 concession fares (dependant on the time of the year).
  - This rate continued through the pandemic period (including when Woodend was in lockdown) which indicated that a majority of bus users required the service for essential services.

It is to be noted that no data was available for May 2019. In addition, data between March 2020-present has been excluded due to the impacts of the COVID19 pandemic.

Additional data post the implementation of the COVID-19 vaccine (i.e. post-Christmas) would likely provide an indicator as to the possible 'COVID normal' demands in the near future.

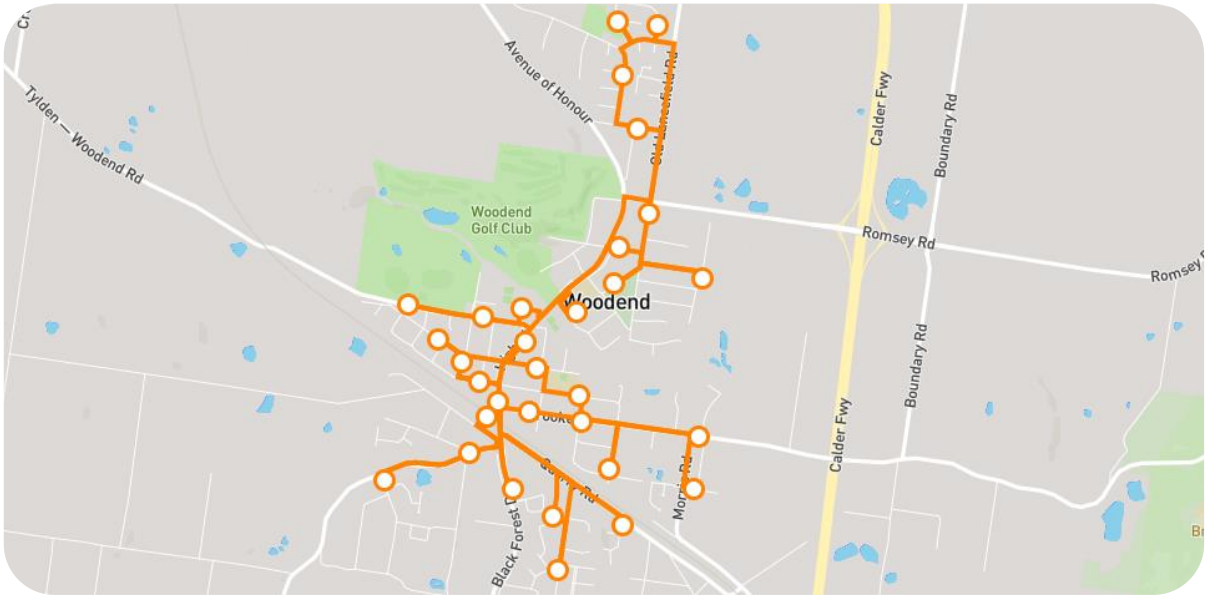


Figure 10 FlexiRide Bus Service Locations within Woodend

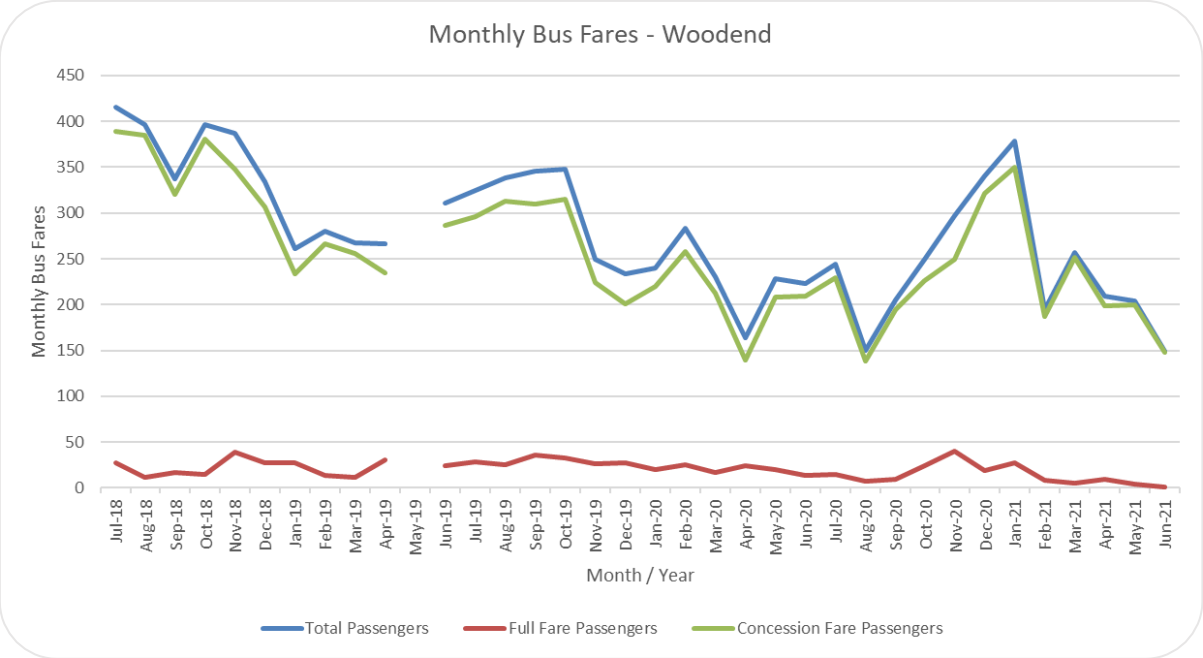


Figure 11 FlexiRide Woodend Bus Service Fares (Source: DoT)

3.6.2 Train Services

The Woodend train station currently provides services V/Link services for Bendigo - Melbourne via Sunbury, Echuca/Moama - Melbourne via Bendigo or Heathcote and Swan Hill - Melbourne via Bendigo.

To understand the demand of passengers that utilise the Woodend train station, data was extracted and provided by the Department of Transport (DoT) which documented the monthly number of boardings.

Figure 12 illustrates the historic boarding records for Woodend.

- Most notably, it can be seen that up to 17,000 passengers were boarding at the Woodend Station pre-pandemic times;
- During the peak of the pandemic, up to 1,000 passengers per month were recorded; and
- 'COVID Normal' conditions were approximately half of the level they were prior to the pandemic.

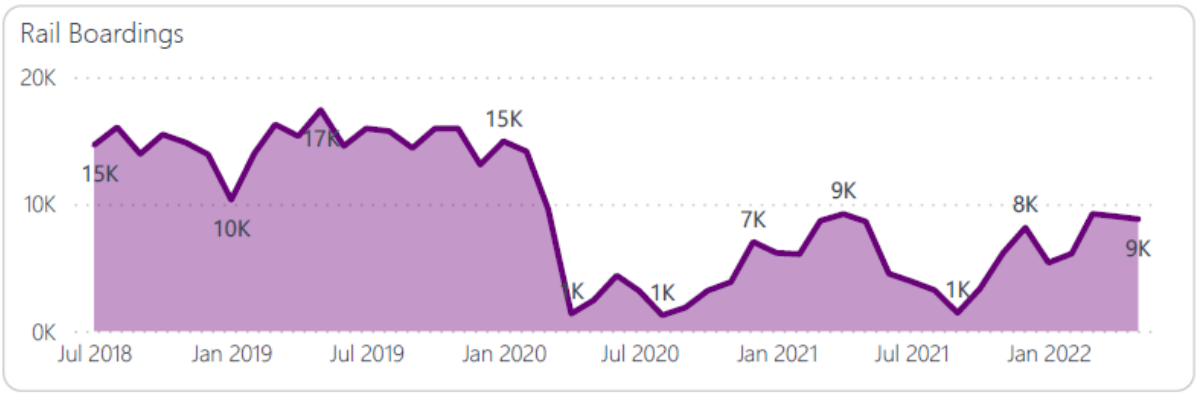


Figure 12 Woodend Train Station Boarding Records (Source: DoT)

3.7 Car Parking

3.7.1 Car Parking Supply and Restrictions

In 2015, Macedon Ranges Shire Council conducted peak occupancy parking surveys for on-street and off-street parking spaces within Woodend.

Specifically, these surveys were undertaken on Thursday 8/01/2015 and Friday 9/01/2015 between 9:00am to 5:00pm and on Saturday 10/01/201 between 9:00am to 2:00pm.

It is noted that these surveys were conducted during school holiday periods and represents a non-conservative outcome and generally would expect higher occupancy and utilisation rates during a typical weekday / weekend period, e.g. non-school holiday periods. Figure 13 illustrates the scope of the survey area.

Figure 13 Woodend Parking Map (Source: Macedon Ranges Shire Council 2015)

The following statistics were derived from this study:

- A total of 1,123 car spaces within Woodend (for on-street and off-street parking spaces);
- 591 of these spaces were located on-street (53%);

- 532 of these spaces were located off-street (47%); and
- No paid parking restrictions were identified (at the time of the survey).

The average occupancy rates across a typical weekday period (Thursday & Friday) was 43% and up to 35% during the weekend period (Saturday).

The overall peak time was observed to be between 11:00am - 12:00pm on Thursday, between 2:00pm - 3:00pm on Friday and from 12:00pm - 1:00pm on Saturday (inclusive of both on-street and off-street parking).

Following this, the survey identified the following locations for on-street parking with high occupancy rates (e.g. over 80%):

- Anslow Street (A5) on Thursday, Friday and Saturday; and
- High Street (A2) on Saturday

For off-street parking, the survey identified an average occupancy rate of greater than 80% to be Private Parking (A20) on Saturday.

3.8 Road Safety

3.8.1 Vehicle Crash Statistics

To understand the severity of vehicle crashes and potential problematic locations around the Woodend Township, crash data was provided by Council and extracted from the Road Crash Information System (RCIS) and reviewed for the last five (5) years prior to 10/11/2020.

Overall, crash-data was examined for the Woodend region and identified a total of 16 recorded incidents occurring over the 5-year period. From the crash statistics, the following observations are made:

Incidents within the Township

- Other Injury Accident (no medical assistance needed):
  - One (1) incidents occurred at the intersection of Urquhart Street and Templeton;
  - One (1) incident at the intersection of High Street / Ashbourne Road;
  - One (1) incident at the intersection of Romsey Road / High Street;
  - One (1) incident at the intersection of High Street north of Quarry Road;
  - One (1) incident at the intersection of High Street / Brewster Street;
  - One (1) incident at the intersection of High Street / East Street; and
  - One (1) incident at the intersection of High Street / Urquhart Street.
- Serious Injury Accident (medical assistance needed):
  - One (1) incident at the intersection of Urquhart Street / Templeton Street;
  - One (1) incident at the intersection of High Street / Five Mile Creek Bridge; and
  - One (1) incident at the intersection of Stuart Drive / Manifold Road.
- Fatal Accidents:
  - Nil (0) recorded accidents.

Incidents outside the Township

- Other Injury Accident (no medical assistance needed):
  - One (1) incident at along Tylden-Woodend Road (600m west from Gregory Street);
  - One (1) incident at the intersection of Romsey Road / East Street;
- Serious Injury Accident (medical assistance needed):
  - One (1) incident along Woodend-Romsey Road (170m east of East Street);
  - One (1) incident at the intersection of Romsey Road / Old Lancefield Road;
  - One (1) incident along the Avenue of Honour south of Honeysuckle Lane;
- Fatal Accidents:
  - One (1) fatality along the Avenue of Honour (400m north-west of Savage Lane)

A review of the crash incidents as mentioned above indicate that most incidents within the Woodend Township were the result of user error, and not necessarily a result of poor design outcomes.

Locations with multiple incidents suggest that conditions may not be optimal and conducive to creating an accident.

3.9 Traffic Surveys

3.9.1 Vehicle Movements

The purpose of the vehicle movement surveys were to identify any patterns and on how vehicles are currently to and from Woodend.

The survey locations of the vehicle movements are shown in Figure 14 and the traffic volumes at these locations is shown in Table 3.

Results indicated that the majority of movements generally occur along High Street through the CBD with approximately 1,100 vehicles during the PM Peak periods.

Roads which provide access to surrounding Townships such as Kyneton via Avenue of Honour experience approximately 400 vehicles during both peak periods or an weekday average of 3,900 vehicles. Tylden-Woodend Road which provides access to Tylden and Daylesford via Forest Street experience up to 320 vehicles an hour during the PM peak periods and up to 3,500 vehicles daily.

Further to this, heavy vehicle percentages were also extracted which showed that Forest Street experiences up to 12% heavy vehicles across a typical weekday whilst Old Lancefield Road experiences up to 15% heavy vehicles during a typical weekday.

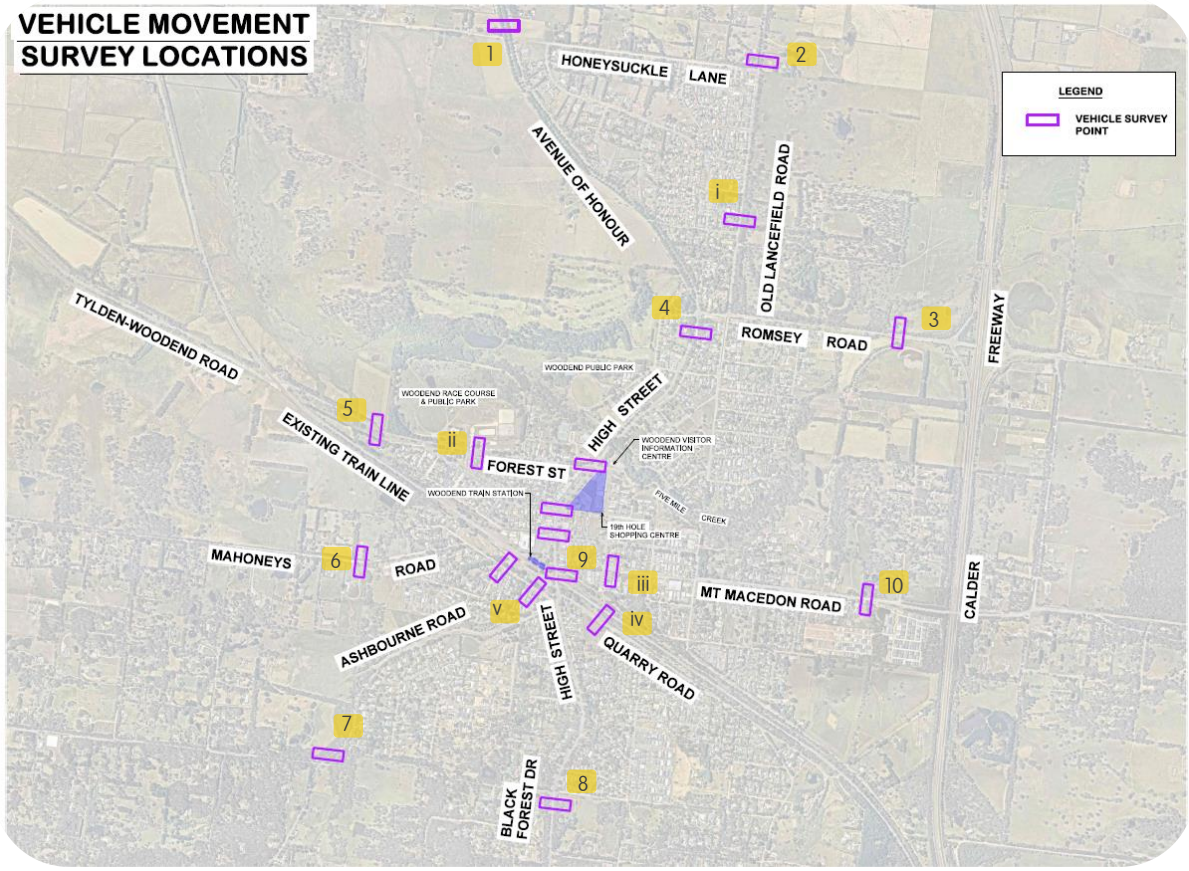


Figure 14 Vehicle Movement Survey Locations

Table 3 Traffic Counts at Survey Locations

Count ID	Count Location (Description)	Weekly Average (Mon – Sun)	Weekday Average (Mon – Fri)	Weekday AM Peak	Weekday PM Peak
9	High Street (near train station)	10,879	11,041	969	1,077
4	High Street (near bridge)	7,067	7,247	661	708
8	Black Forest Drive (near South Road)	7,323	6,955	521	617
3	Romsey Road	4,035	4,087	383	396
1	Avenue of Honour (near Honeysuckle Lane)	3,601	3,824	382	387
5	Forest Street	3,713	3,508	252	316
ii	Forest Street (near Duffy Street)	2,352	2,182	155	199
iv	Quarry Road (near crossing)	2,083	2,094	214	220
7	Ashbourne Road	2,000	2,031	202	184
iii	Brooke Street (near Templeton Street)	1,613	1,749	185	171
10	Mt Macedon Road	1,437	1,551	167	192
i	Old Lancefield Road (north of Savages Lane)	1,267	1,403	135	167
v	Corinella Road (East of rail entrance)	693	767	70	70
2	Old Lancefield Road (north of Honey Suckle Lane)	528	647	67	75
v	Corinella Road (West of rail entrance)	411	446	40	44
6	Mahoneys Road	234	258	31	27

3.9.2 Origin Destination Surveys

Origin-destination surveys were undertaken for the Woodend Township to understand where traffic was travelling to and from, and particularly to understand any trends along specific roads or routes.

Table 4 provides the general statistics / observations made from the study.

The data is categorised into two (2) headings to simply the data, these include:

- 'Into Town' - defined as the number of vehicles that stay and travel within the Township and is often attributed to residents; and
- 'Through Town' - defined as the number of vehicles that enter the town and exit the town during the respective peak periods. These vehicles are often people who live or work outside of Woodend and need to enter the Township or tourists.

The results suggest that there is generally a higher proportion of traffic moving into town across a day than through the town. Results also show that weekend periods often experience more traffic travelling into town and fewer going through town which provides an indication of commuter trips vs. weekend trips.

Table 4 General Statistics

Period	Direction	Daily Volumes (7am - 7pm)	AM Peak 8:00am - 10:00am	PM Peak 3:00pm - 5:00pm
Typical Weekday	Into Town	10,251 (58%)	1,583 (57%)	1,966 (61%)
	Through Town	7,502 (42%)	1,173 (43%)	1,266 (39%)
Typical Weekend	Into Town	10,714 (62%)	1,692 (56%)	N/A
	Through Town	6,693 (38%)	1,313 (44%)	

Table 5 provides a summary of the weekday vs weekend period volumes and indicates generally there are more traffic travelling into town on the weekend and less travelling through town.

Table 5 Weekday vs Weekend Period

Period	Direction	Daily Volumes (7am - 7pm)
Weekday vs. Weekend (total movements)	Into Town	+4% (463 vehicles total)
	Through Town	-12% (809 vehicles total)

3.9.3 Pedestrian & Cyclists Movements

Pedestrian counts have been undertaken at key generators including:

- High Street Intersections
- School Access Routes
- Recreational Access Routes

Pedestrian movement survey locations are shown in Figure 15 and both weekday and weekend pedestrian movement counts are shown in Figure 16 and Figure 17.

Results from the survey suggest that the main pedestrian corridor occurs along High Street and Nicolson Street during the weekday and weekend periods and experiences over 100 pedestrian movements an hour.

Forest Street and Five Mile Creek trial also shows approximately 10 - 25 pedestrian movements an hour.

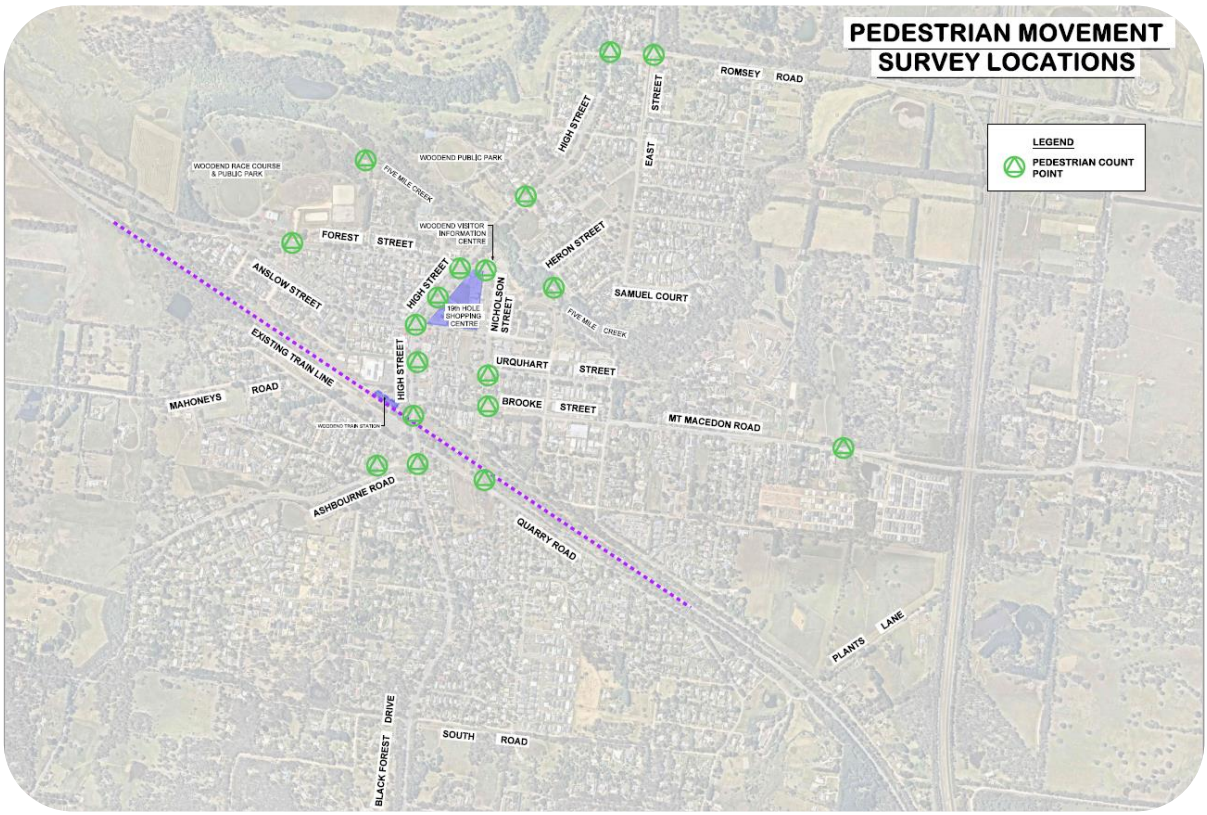


Figure 15 Pedestrian Movement Survey Locations

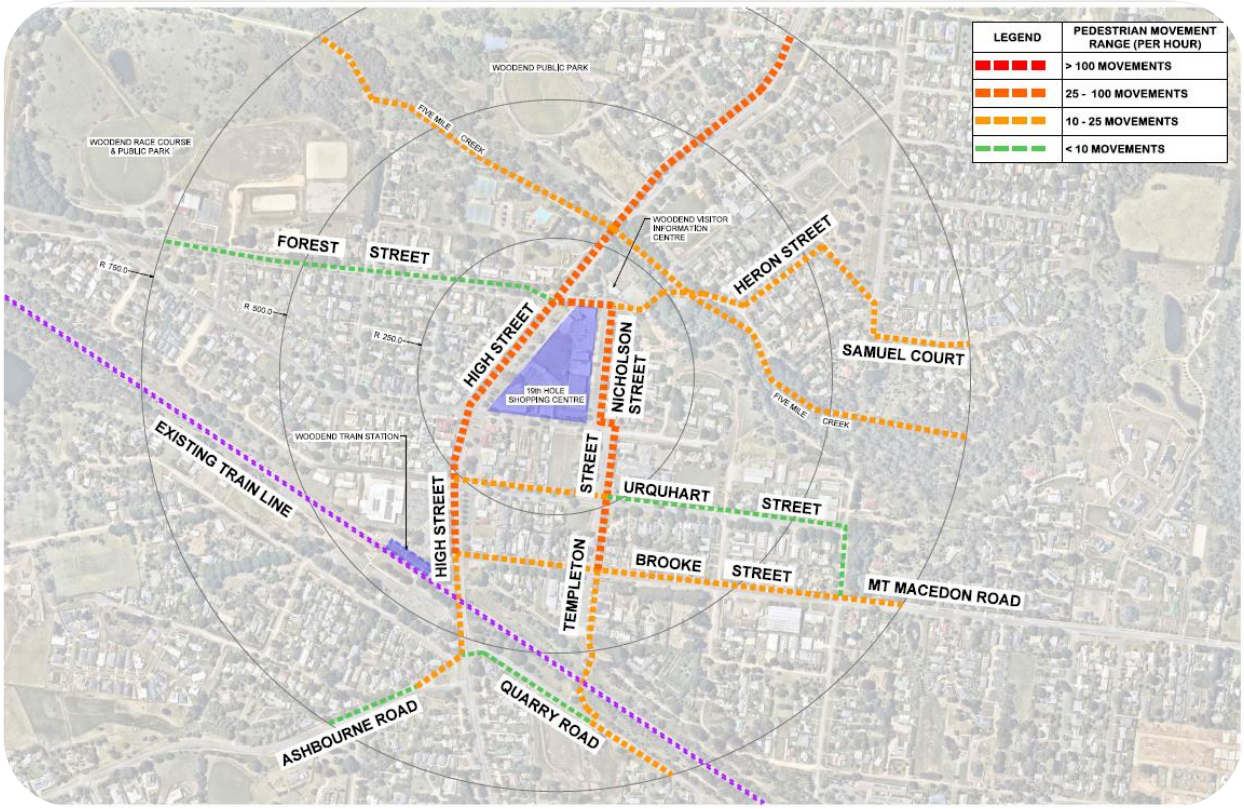


Figure 16 **Pedestrian Movement - Typical Weekday Counts**

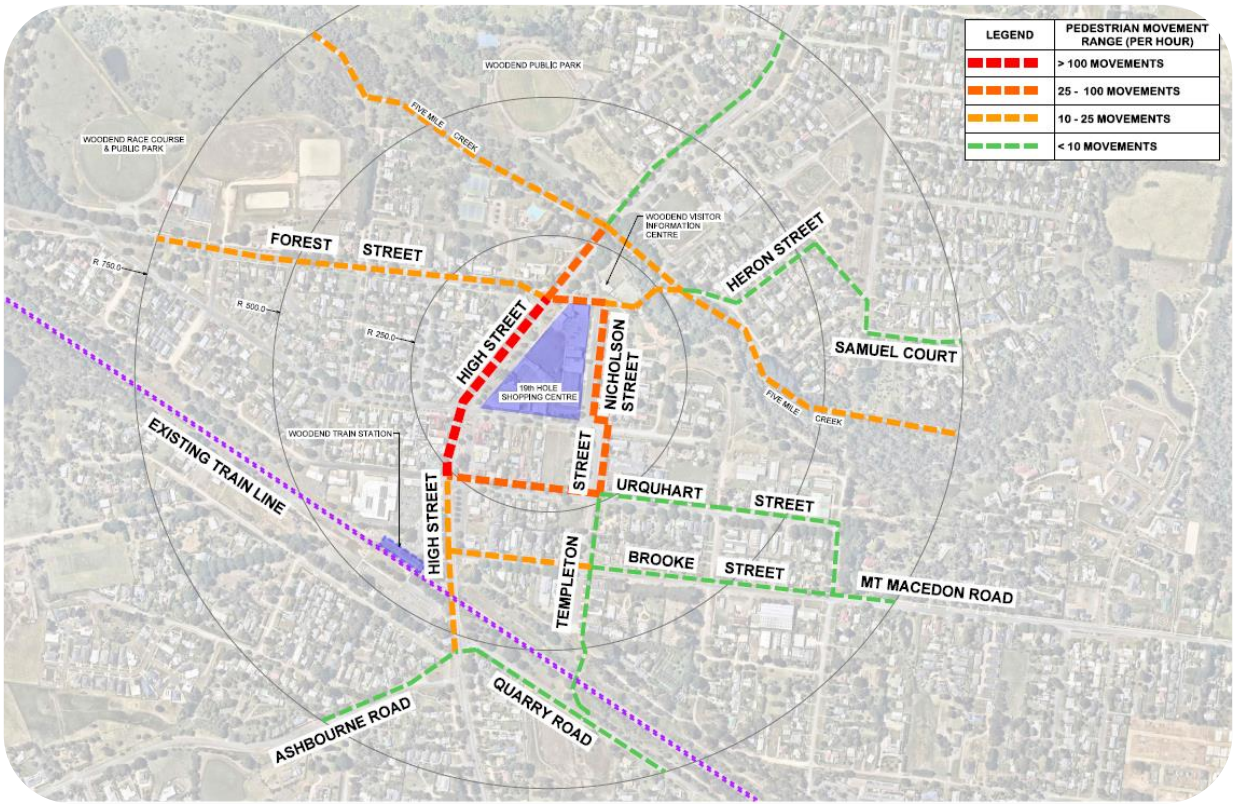


Figure 17 **Pedestrian Movement - Typical Weekend Counts**

Cyclist counts have also been undertaken at key activity generating locations including:

- High Street Intersections
- School Access Routes
- Recreational Access Routes

Cyclist movement survey locations are shown in Figure 18 and both weekday and weekend cyclist movement counts are shown in Figure 19 and Figure 20.

Results from the survey suggest that High Street currently caters for 25 - 100 cyclists movements an hour during a typical peak hour.

Brooke Street / Mt Macedon Road also experiences up to 25 - 100 cyclists movements during the weekend period which suggest that this is a key cycling corridor.

Forest Street also experience 10 - 25 cyclists movements during the weekend period and suggest that cyclists utilise this route to travel Tylden and Daylesford.

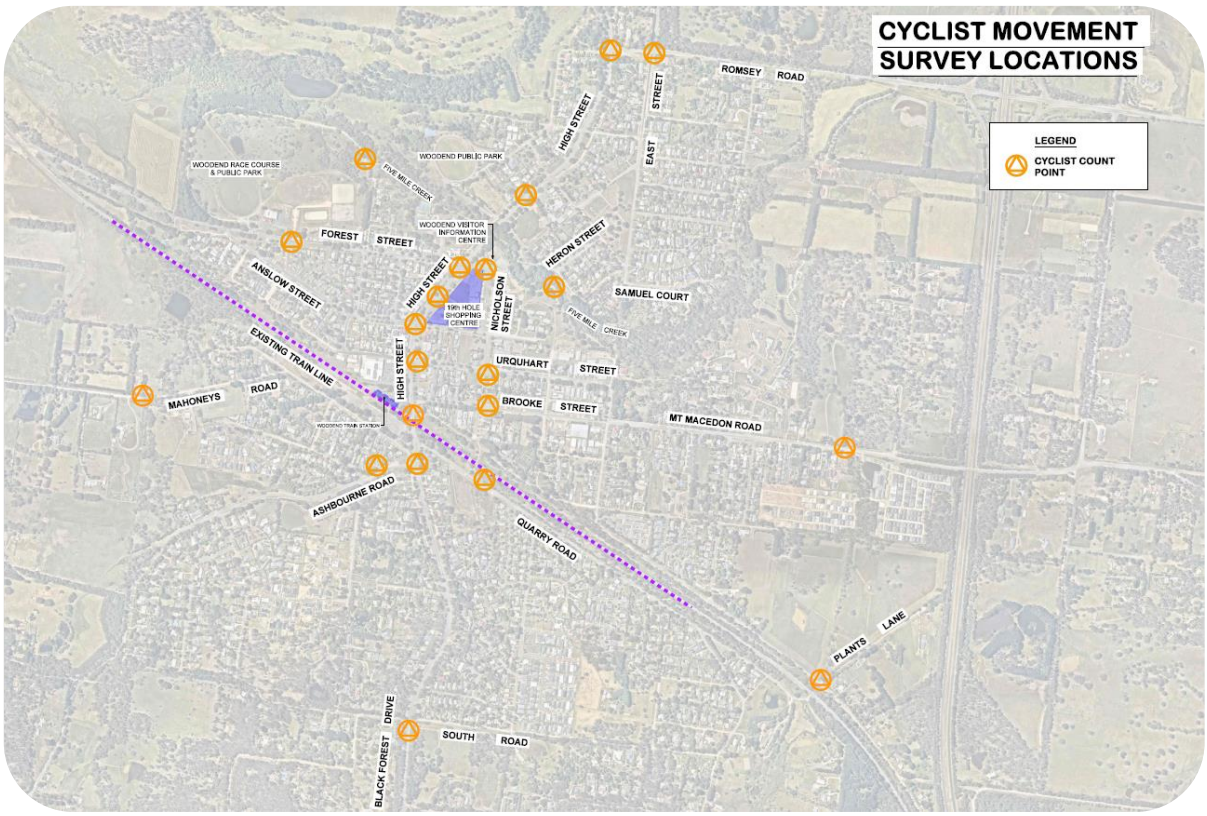


Figure 18 Cyclist Movement Survey Locations

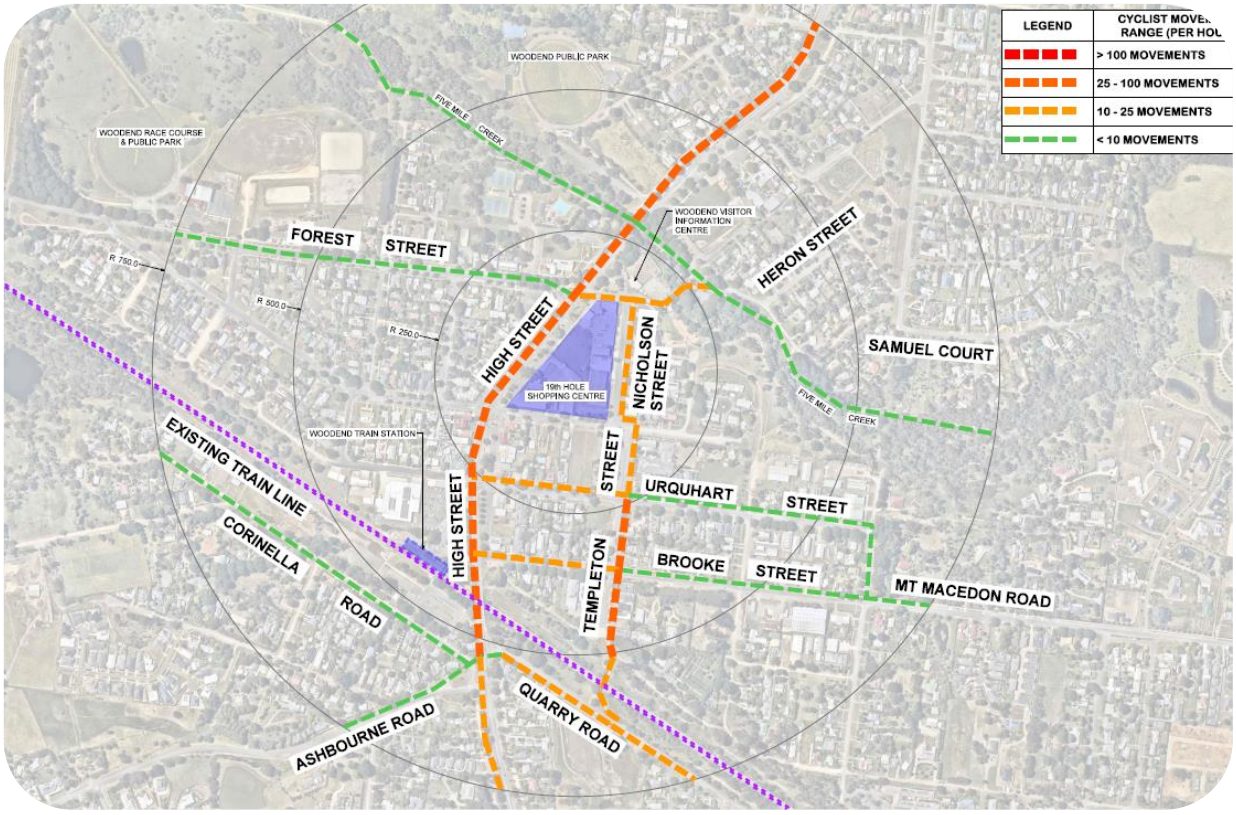


Figure 19 **Cyclist Movement - Typical Weekday Counts**

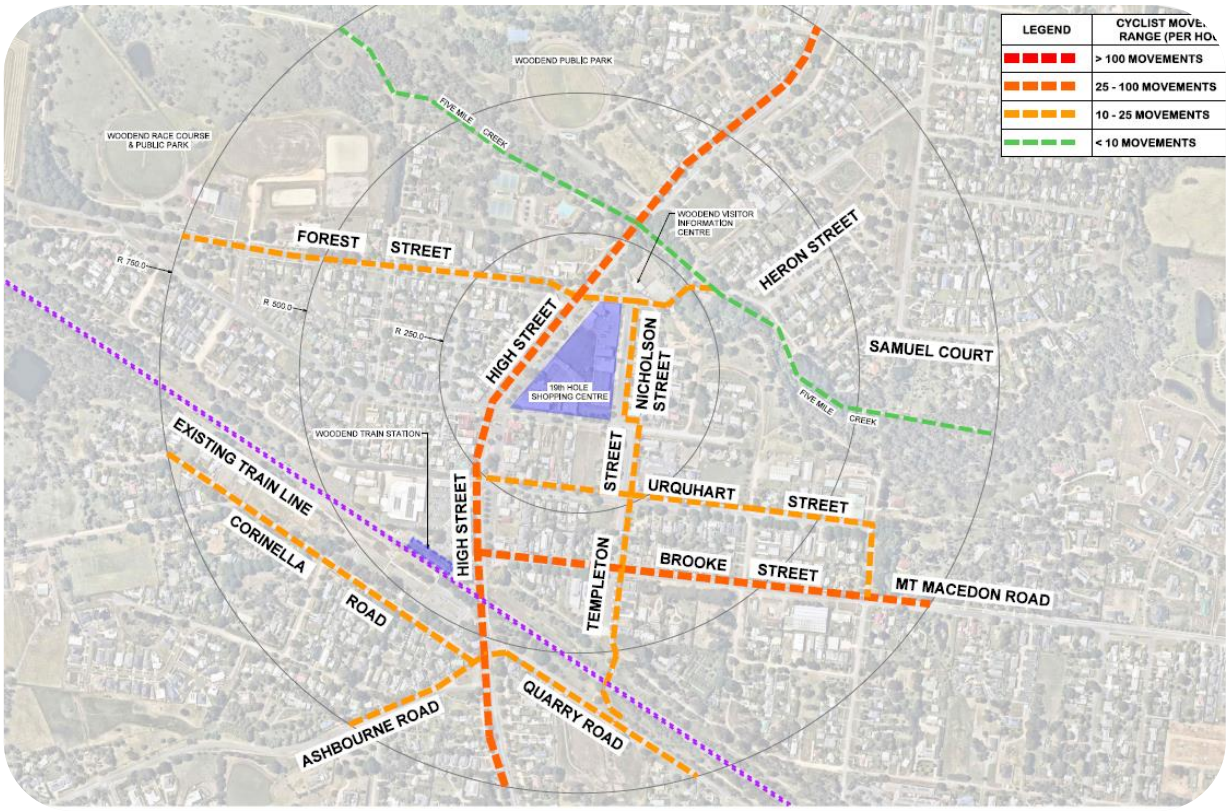


Figure 20 **Cyclist Movement - Typical Weekend Counts**

3.10 Intersection Modelling

3.10.1 Data Sources

The following data sources and documents have been referenced as part of the modelling assessment performed using SIDRA:

- Turning movement counts undertaken on Thursday 17/02/2022 and Saturday 19/02/2022 at each section analysed;
- Nearmap imagery for existing intersection layouts and dimensions; and
- Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis.

3.10.2 Performance Metrics

To understand the impact of current traffic on the performance of exiting intersection infrastructure, SIDRA Intersection version 9.0 was utilised. Critical outputs of SIDRA analysis software are:

Degree of Saturation (D.O.S.) - Defined as the ratio of the volume of traffic observed making a movement compared to the maximum capacity for that movement.

Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis (2013) notes that for signal-controlled intersections when the intersection DoS is:

- **Less than 1** Intersection is under-saturated.
- **Equal to 1** Intersection is saturated, or operating at capacity
- **Greater than 1** Intersection is oversaturated

It is also noted that queue lengths and delay increase disproportionally as the DOS approaches 1.

Accordingly, VicRoads Supplement to Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis suggests that the target maximum degree of saturation of the critical (maximum) movement at a signalised intersection should be 0.9 (desirable) and 0.95 (maximum).

Average Delay / Level of Service (LOS): is the qualitative measure describing operational conditions within a traffic stream and the perception by motorists and/or passengers. Defined as the delay time, in seconds, which can be expected over all vehicles making a movement in the peak hour.

The different levels of service can generally be described as follows:

Table 6 Level of Service (LOS) Criteria

LOS	Description	Average Delay - Signalised Intersection	Average Delay - Unsignalised Intersection
A	Free-flow operations (best condition)	≤ 10 sec	≤ 10 sec
B	Reasonable free-flow operations	10-20 sec	10-15 sec
C	At or near free-flow operations	20-35 sec	15-25 sec
D	Decreasing free-flow levels	35-55 sec	25-35sec
E	Operations at capacity	55-80 sec	35-50 sec
F	A breakdown in vehicular flow (worst condition)	≥ 80sec	≥ 50sec

3.10.3 Identified Intersections for Analysis

Feedback from the community, particularly in-respect to access and operational performances around the Woodend CBD area / Coles vicinity prompted the need to undertake a SIDRA assessment to understand the existing intersection performances.

Key intersections along the High Street corridor were identified for analysis were as follows:

- Forest Street / High Street;
- Anslow Street / High Street; and
- Urquhart Street / High Street.

The results from this assessment will be utilised to aid discussion in future improvement works along these intersections.

3.10.4 Intersection Analysis

The following section summarises the analysis for each intersection under the existing layout.

Modelling has been undertaken for both AM and PM weekday peaks as well as the Saturday peak periods. The SIDRA summary output tables have been provided in the Appendix B for reference.

3.10.4.1.1 Forest Street / High Street

Forest Street links to High Street and the High Street Service Road and provides access to the Woodend Racecourse and Recreation Reserve, various commercial sites and low-density residential properties.

The existing intersection layout is a priority controlled intersection with High Street as the major road. High Street consists of one full length lane each direction with additional short length right-turn lanes onto Forest Street in both east and west directions.

The intersection of Anslow Street / High Street is located 245m to the south and a signalised pedestrian crossing is located 135m to the south on High Street. Forest Street is a single lane road in each direction with 90-degree parking provided on the north side of Forest Street on the west approach and parallel parking provided on the south side of the west and east approach to the intersection. Figure 21 shows the current intersection configuration.

Figure 21 Forest Street / High Street Intersection

The SIDRA analysis shows that the existing intersection arrangement operates within capacity under current traffic conditions with a DOS of 0.33 for the AM Peak, 0.55 for the PM Peak and 0.34 for the Saturday Peak. The SIDRA results for the existing conditions outlined above are presented in Appendix B.

3.10.4.2 Anslow Street / High Street

Anslow Street links to High Street and the High Street Service Roads. This intersection provides access to Macedon Ranges St. Ambrose's Parish School, various commercial sites and low-density residential properties.

The existing intersection layout is a priority intersection with High Street as the major road. High Street consists of one full length lane and bicycle lane each direction with additional short length right turn lanes onto Anslow Street in both east and west directions. No pedestrian facilities are provided at this intersection. The intersection of Forest Street / High Street is located 245m to the north and a signalised pedestrian crossing is located 135m to the north on High Street. The intersection of Urquhart Street / High Street is located 130m to the south.

Anslow Street is a single lane road in each direction with 90-degree parking provided on both sides of the street on the east approach of the intersection. 45-degree angle parking is provided on both sides of Anslow Street on the west approach to the intersection. Figure 22 shows the current intersection configuration.

Figure 22 Anslow Street / High Street Intersection

The SIDRA analysis shows that the existing intersection arrangement operates within capacity in the AM and weekend peaks under current traffic conditions with a DOS of 0.31 for the AM Peak and 0.54 for the Saturday Peak. However, in the PM Peak, the intersection operates at a poor condition with a DOS of 0.92. Anslow Street experiences a delay of 101 seconds for the west approach right turn movement which is equivalent to a LOS F.

This could be the result of high conflict points at this cross intersection, with high traffic volumes on High Street which has right of way. The SIDRA results for the existing conditions outlined above are presented in Appendix B.

3.10.4.3 Urquhart Street / High Street

Urquhart Street links to High Street and the High Street Service Roads. This intersection provides access to the Woodend Railway Station, Coles and various commercial sites as well as low-density residential properties.

The existing intersection layout is a priority intersection with High Street as the major road. High Street consists of one full length lane and bicycle lane each direction with additional short length right turn lanes onto Anslow Street in both east and west directions and a short left turn lane from the south approach. A zebra crossing is provided on the west approach of Urquhart Street and no pedestrian facilities are provided on

High Street at this intersection. The intersection of Anslow Street / High Street is located 130m to the north and a signalised intersection of Quarry Road / High Street with a pedestrian crossing is located 315m to the south.

Anslow Street is a single lane road in each direction with short right turn lanes provided at both east and west approaches. 90-degree is provided on both sides of the street on the east approach of the intersection. 45-degree angle parking is provided on the south side of Anslow Street on the west approach to the intersection. Figure 23 shows the current intersection configuration.

Figure 23 Anslow Street / High Street Intersection

The SIDRA analysis shows that the existing intersection arrangement operates within capacity in the AM and weekend peaks under current traffic conditions with a DOS of 0.20 for the AM Peak, a DOS of 0.51 for the PM Peak and 0.34 for the Saturday Peak. However, in the PM Peak, Urquhart Street experiences a delay of 129 seconds for the east approach right turn movement and a delay of 161 seconds in the west approach right turn movement which are both equivalent to a LOS F. It is to be noted that outputs from SIDRA are often more conservative and then what is experienced on-site and given the high delays, it is expected that motorists will likely take higher risks (by finding smaller gaps in traffic) to enter the intersection.

The SIDRA results for the existing conditions outlined above are tabulated in Appendix B.

4 Community Feedback

4.1 Overview

Community consultation was undertaken as part of the Woodend Integrated Transport Plan to establish an understanding of community values and to gauge the issues associated with traffic and transport within the municipality.

As part of the consultation process, Council provided opportunities for the community to provide feedback through their online portal in 2021 and subsequently through an in-person stakeholder meeting in 2022.

4.1.1 Online Community Survey

The online community survey was opened by Council between October to December 2021 and allowed the community to provide feedback on key issues within the Woodend Township.

4.1.1.1 Issues Raised

A total of 63 respondents provided feedback of which the following key issues were identified:

- Performance at the intersection of Urquhart Street / High Street (Coles);
- Bicycle and pedestrian connectivity: and
- Flex bus stops and operating hours.

From the 63 respondents, 36 (57%) raised issues relating to the intersection of Urquhart Street / High Street (Coles) in addition to other matters.

Following this, grouping the issues raised into individual areas, the survey results identified that up to 31% of were related to the performance of the intersection of Urquhart Street / High Street and 25% relating to bicycle / pedestrian infrastructure.

Graphical representations of the online survey results are presented in Figure 24.

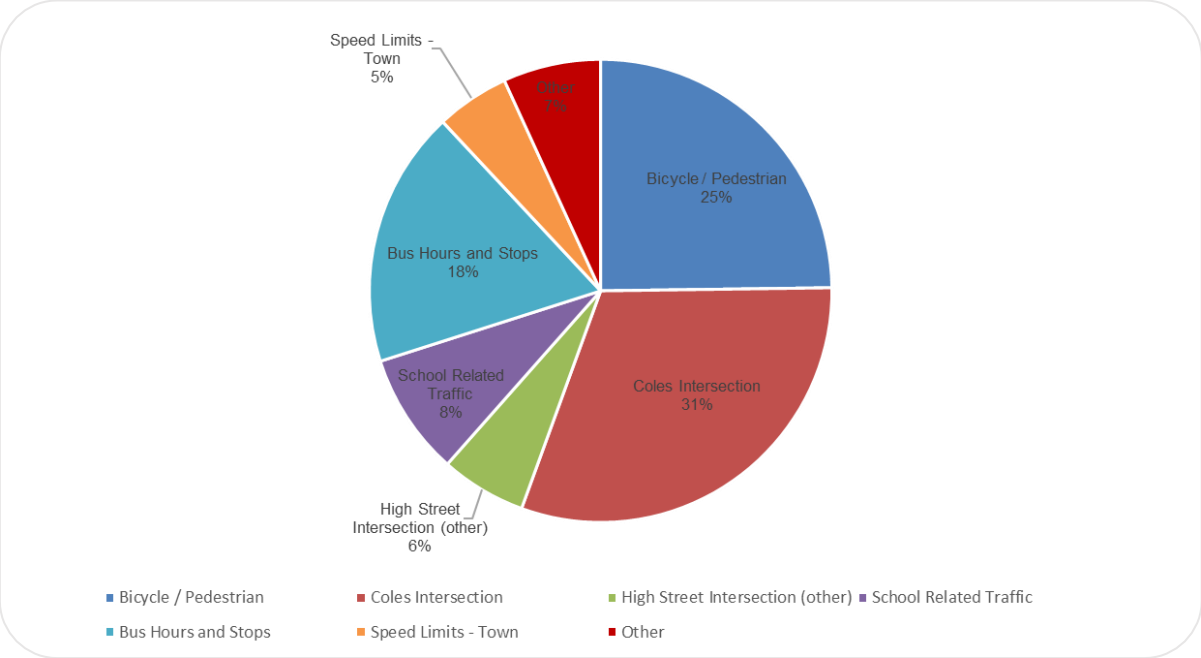


Figure 24 Community Online Feedback

4.1.2 Stakeholder Meeting

Following on from the online community survey, Council in joint-partnership with Department of Transport (DoT) were in the process of developing the Woodend Integrated Transport Plan and were seeking community feedback.

As part of the study, the project team facilitated a workshop on the 7th of July 2022 with key stakeholders to present the following:

- Background and Purpose of Traffic Study;
- Movement and Place;
- Recent and Planned DoT and Council Road Improvement Projects;
- Traffic Key Observations; and
- Traffic and Transport Gaps.

The intent of the workshop was to inform stakeholders of the current work-in-progress done to date and allow opportunities for feedback.

The following stakeholders were invited to the workshop:

- Disability Discrimination Act / All abilities representatives
- Woodend Bike Riding Group
- Woodend Neighbourhood Group
- Wombat Mountain Bike Club
- Organs Coaches
- Braemar College
- Woodend Primary School
- St Ambrose Primary School
- Old Lancefield Road community group
- Macedon-Woodend Scout Group (Amalgamation of 1st Macedon and 2nd Woodend scout groups)
- Woodend Trader Association
- Macedon Ranges Sustainability Group (Includes Transport Action Group and Farmers)
- Woodend Farmers Market
- Woodend Landcare
- Woodend Senior Citizens

5 Key Findings

To following summarises key findings associated with this study and provide a basis for future recommendations and key Council objectives.

5.1 Road Network

Intersection assessments along High Street intersecting with Forest Street, Anslow Street and Urquhart Street demonstrate that the existing network is congested specifically for side-road traffic entering High Street.

The current level of traffic travelling on High Street during the peak periods in addition to the existing infrastructure along High Street, e.g. predominately priority controlled intersections provides for little relief / gaps for side road traffic.

Community feedback also suggest that the intersection of High Street / Urquhart Street where Coles is located experiences operational deficiencies.

Further to this, it is noted that this assessment considers only the existing intersection performances from the locations mentioned and does not consider the impact of future development or growth on the network.

Notwithstanding, there is a need to understand how the High Street corridor and overall network will operate as a result of future developments.

5.2 Active Transport

Based on the survey and assessment, it is generally considered that pedestrian and cyclists infrastructure within Woodend is lacking. Whilst dedicated on-road bicycle lanes on High Street provide for some connectivity through the Woodend CBD, there is a need to provide for further connectivity onto major cycling routes and corridors.

As identified through the Active Transport Group, there are several strategies that should be undertaken to enhance cycling and walking through Woodend, such as allocation of more road space for pedestrians and cyclists and the provision of additional shared lanes, cycle lanes, reducing speed along High Street and pedestrian infrastructure at key roads within Woodend.

In order to achieve these objectives, it is vital to understand the 'missing links' in terms of the quality of existing infrastructure needed to facilitate these upgrades and to understand how these fits in with the overall pedestrian and bicycle network for Macedon Ranges.

5.3 Public Transport

Feedback from the community, particularly at GemLife age care facility have voiced their concerns over the availability of nearby bus stops with residents expected to walk up to 500m to the nearest bus stop. It is therefore recommended to review existing bus infrastructure and how it best fits in with the communities needs.

Bus and train occupancies are generally low however to cater for future population growth and development, it is recommended to advocate for higher frequency services to Melbourne and expansion of the bus network into new growth areas.

6 Recommendations & Future Objectives

Through the development of the Woodend Integrated Transport Plan Study, a range of recommendations have been identified through, existing condition surveys of the Township, stakeholder & Council feedback and relevant key policies and plans that have been undertaken.

Notwithstanding, the priority/ranking of these recommendations are based mainly upon the Safe Systems Approach which considers the four (4) main pillars of Safer Roads, Safer Speed environments, Safer Vehicles and Safer Road users.

These recommendations have been allocated into five (5) main categories: Active Transport Program, Public Transport Program, Intersection and Road Upgrades, Transport Planning Program and Review & Advocate Program.

These projects have been further categorised as follows:

- Level of stakeholder involvement:
  - Low stakeholder involvement such as local council and local interest groups
  - Medium stakeholder involvement includes both local and Victorian Governments
  - High stakeholder involvement refers to multiple local and state agencies
- Likely delivery timeframe
  - Short term - 1 to 3 years
  - Medium term - 4 to 7 years
  - Long term - 7 years or more
- Likely level of costs
  - $ - Less than $10,000
  - $$ - Between $10,00 to $50,000
  - $$$ - Greater than $50,001
- Project status
  - To be undertaken
  - In-progress
  - Completed

Notwithstanding, the following highlights the top five (5) key projects/initiatives for each period (e.g. delivery time-frame for short, medium and long-term) that were identified within this study.

<u>Planning, Design &/or Construct Initiatives:</u>

- Short Term Priorities:
  1. Undertake a review of pedestrian access along side roads, namely to provide pedestrian refuge and DDA compliant pram ramps
  2. Undertake a review of speed limits / reductions within the Township and along activity centres
  3. High Street service lane upgraded to wombat crossing
  4. Refuge crossing at the intersection of Romsey Road and Ave of honour
  5. Refuge crossing at Forest Street & High Street
- Medium Term Priorities:
  6. Proposal to upgrade Urquhart Street / High Street Intersection
  7. Undertake an audit of walking and cycling infrastructure within the Township
- Long Term Priorities:
  8. Undertake a survey / develop a database highlighting all existing footpaths within Woodend to identify missing links
  9. Develop a database of all on-road and off-road bicycle lanes to identifying missing links
  10. Implementation of dedicated bicycle lane on south of High Street past station and pedestrian crossing on Quarry Road
  11. Implementation of Bicycle-lane on Anslow Street (full-length)

Review & Advocate Program (Short-Term Priorities only):

- Short Term Priorities:
    1. Undertake a review of crossing points around schools and consider LATM treatments where appropriate
    2. Advocate for further funding for pedestrian and cycling connectivity with other Towns
    3. Undertake a review of access at the train station to identify missing links, specifically around pedestrian and cycling connectivity and vehicle access
    4. Review bus-stop locations within Town and investigate how this aligns with future developments and key activity centres
    5. Advocacy of Northern Diagonal interchange with the Department of Transport for an additional exit ramp to Ave of Honour

Tables provided on the following pages illustrates the full list of recommendations and key future objectives for the Woodend Township.

No.	Initiative	Description	Location	The Town's Role	Level of Complexity			Project Status
					Level of stakeholder involvement	Likely delivery timeframe	Likely level of cost	
ACTIVE TRANSPORT PROGRAM								
AT1	Pedestrian crossing improvement works at Nicolson, Anslow and Templeton Street	Design completed and currently under construction	Nicolson, Anslow and Templeton Street	Design and/or construction	Low	Short term	$	In-progress
AT2	Raised pedestrian crossing at Urquhart Street near the intersection of Templeton Street and Urquhart Street	Fully constructed	Urquhart Street near the intersection of Templeton Street and Urquhart Street	Design and/or construction	Low	Short term	$	Completed
AT3	Raised intersection and pedestrian crossing at Brooke and Templeton Street	Detail design is in progress	Brooke and Templeton Street intersection	Design and/or construction	Low	Short term	$	In-progress
AT4	Proposal of new footpath at Old Lancefield Road	Currently on-going	Old Lancefield Road	Design and/or construction	Low	Medium term	$	In-progress
AT5	Undertake an audit of walking and cycling infrastructure within the Township		Schools within Woodend Township	Planning	Low	Medium term	$	To be undertaken
AT6	Undertake a survey / develop a database highlighting all existing footpaths within Woodend to identify missing links		Woodend Township	Planning	Low	Long term	$	To be undertaken
AT7	Undertake a review of pedestrian access along side roads, namely to provide pedestrian refuge and DDA compliant pram ramps		Woodend Township	Planning	Low	Short term	$	To be undertaken
AT8	Implementation of Bicycle lane on Anslow Street (full-length)		Anslow Street	Design and/or construction	Low	Long term	$$	To be undertaken
AT9	Implementation of dedicated bicycle lane on south of High Street past station and pedestrian crossing on Quarry Road		High Street south	Design and/or construction	Low	Long term	$$	To be undertaken
AT10	Develop a database of all on-road and off-road bicycle lanes to identifying missing links		Woodend township	Planning	Low	Long term	$	To be undertaken

No.	Initiative	Description	Location	The Town's Role	Level of Complexity			Project Status
					Level of stakeholder involvement	Likely delivery timeframe	Likely level of cost	
INTERSECTION & ROAD UPGRADES								
IR1	Slow point treatment at Brooke Street	Detailed design in-progress	Brooke Street	Design and/or construction	Low	Short term	$	In-progress
IR2	Refuge crossing at the intersection of Romsey Road and Ave of honour		Romsey Road and Avenue of Honour	Design and/or construction	Low	Short term	$	To be undertaken
IR3	Proposal to upgrade Urquhart Street / High Street Intersection	In discussion and funded for detailed design by DoT	Urquhart Street / High Street	Design and/or construction	Medium	Medium term	$$$	In-progress
IR4	Zebra crossing on Brooke Street 50m east from High Street		50m east from High Street	Planning, design and/or construction	Medium	Short term	$$	To be undertaken
IR5	Zebra crossing at intersection of Forest Street & High Street		Forest St & High St intersection	Planning, design and/or construction	Medium	Short term	$$	To be undertaken
IR6	Refuge crossing at Forest Street & High Street		Forest St & High St intersection	Planning, design and/or construction	Medium	Short term	$$	To be undertaken
IR7	High Street service lane upgraded to wombat crossing		High St service lane	Planning, design and/or construction	Medium	Short term	$$	To be undertaken

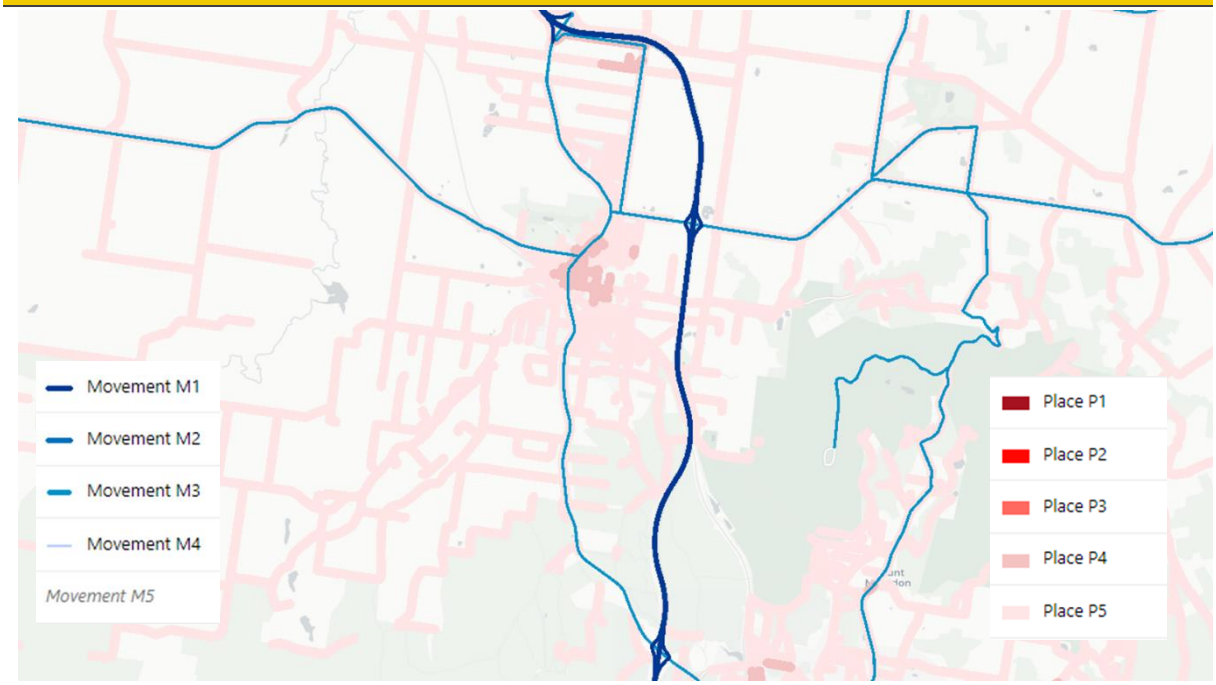
No.	Initiative	Description	Location	The Town's Role	Level of Complexity			Project Status
					Level of stakeholder involvement	Likely delivery timeframe	Likely level of cost	
TRANSPORT PLANNING PROGRAM								
TP1	Review and monitor heavy vehicle access along Old Lancefield Road		Old Lancefield Road	Planning, design and/or construction	Low	Short term	$	In-progress
TP2	Undertake a review of speed limits / reductions within the Township and along activity centres		Schools and activity centres within Woodend Township	Planning	Low	Short term	$	To be undertaken
TP3	Develop a strategy to manage access and traffic (parking management plan / traffic management plan) for the Farmers Market event		High Street / Farmers Market	Planning	Medium	Medium term	$	To be undertaken
TP4	Undertake detailed modelling to determine the impacts of future growth, key land use developments and to investigate appropriate infrastructure improvements		Woodend township	Planning	High	Long term	$$	To be undertaken
TP5	Identify and update Movement & Place categories for the Town	Completed	Woodend township	Planning	Medium	Short term	$	Completed

No.	Initiative	Description	Location	The Town's Role	Level of Complexity			Project Status
					Level of stakeholder involvement	Likely delivery timeframe	Likely level of cost	
PUBLIC TRANSPORT PROGRAM								
PT1	Advocate for bus-stop to be located near the GemLife retirement resort;		GemLife retirement resort	Planning and/or design	Medium	Short term	$	To be undertaken

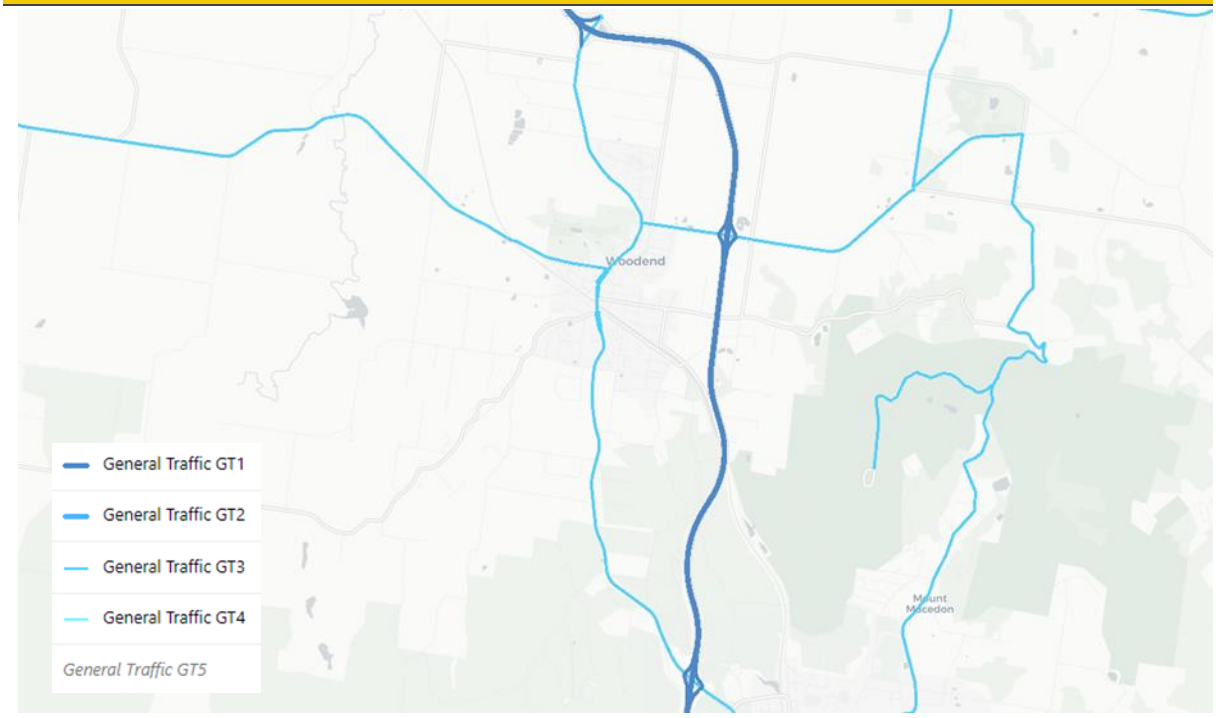
No.	Initiative	Description	Location	The Town's Role	Level of Complexity			Project Status
					Level of stakeholder involvement	Likely delivery timeframe	Likely level of cost	
REVIEW & AVOCATE PROGRAM								
AT11	Undertake a review of crossing points around schools and consider LATM treatments where appropriate		Schools within Woodend Township	Planning	Low	Short term	$	To be undertaken
AT12	Advocate for further funding for pedestrian and cycling connectivity with other Towns		Woodend Township	Planning	High	Short term	$	To be undertaken
PT2	Review bus-stop locations within Town and investigate how this aligns with future developments and key activity centres		Woodend Township	Planning	Medium	Short term	$	To be undertaken
PT3	Undertake a review of access at the train station to identify missing links, specifically around pedestrian and cycling connectivity and vehicle access		Woodend train station	Planning	Low	Short term	$	To be undertaken
IR8	Advocacy of Northern Diagonal interchange with the Department of Transport for an additional exit ramp to Ave of Honour		Freeway interchange with Ave of Honour	Planning	High	Short term	$$$	To be undertaken
TP6	Undertake a review of the northern car park train station access with the intent of formalising the service road access	Consider a review of the service road and how it aligns with future intersection arrangements	Woodend train station	Planning	Low	Short term	$	To be undertaken

APPENDIX A
Movement and Place Mapping

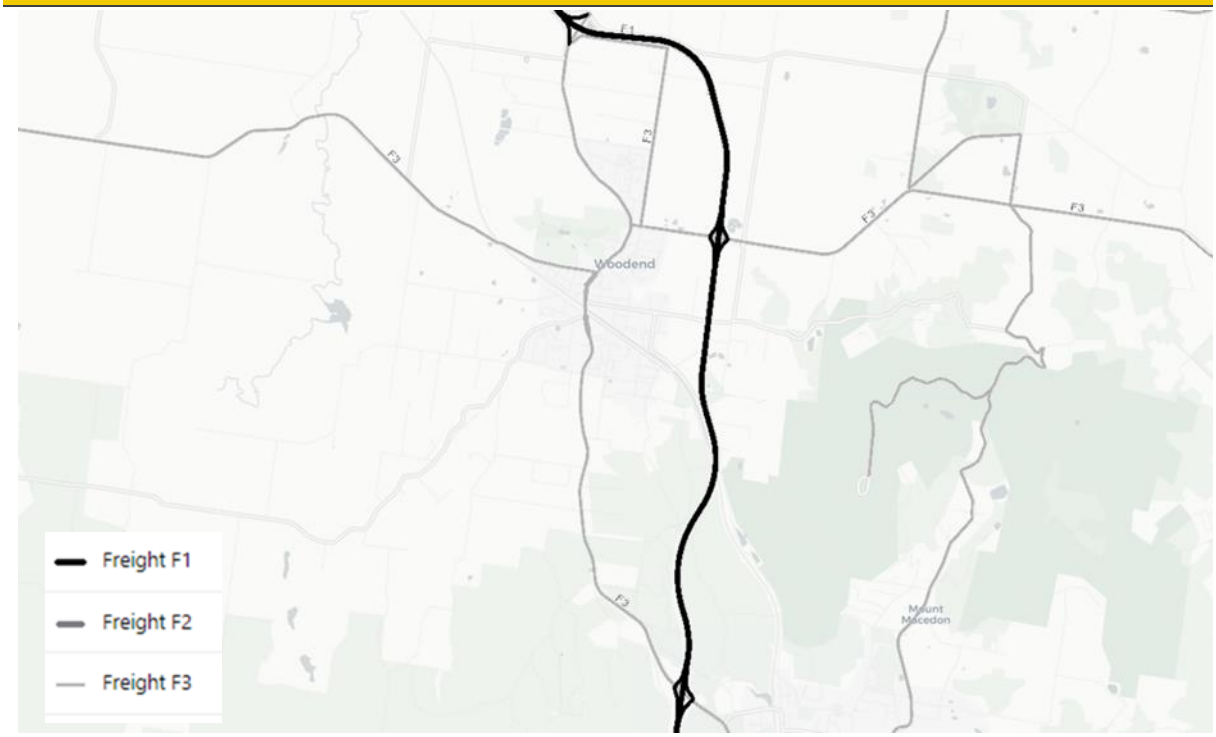
Movement & Place



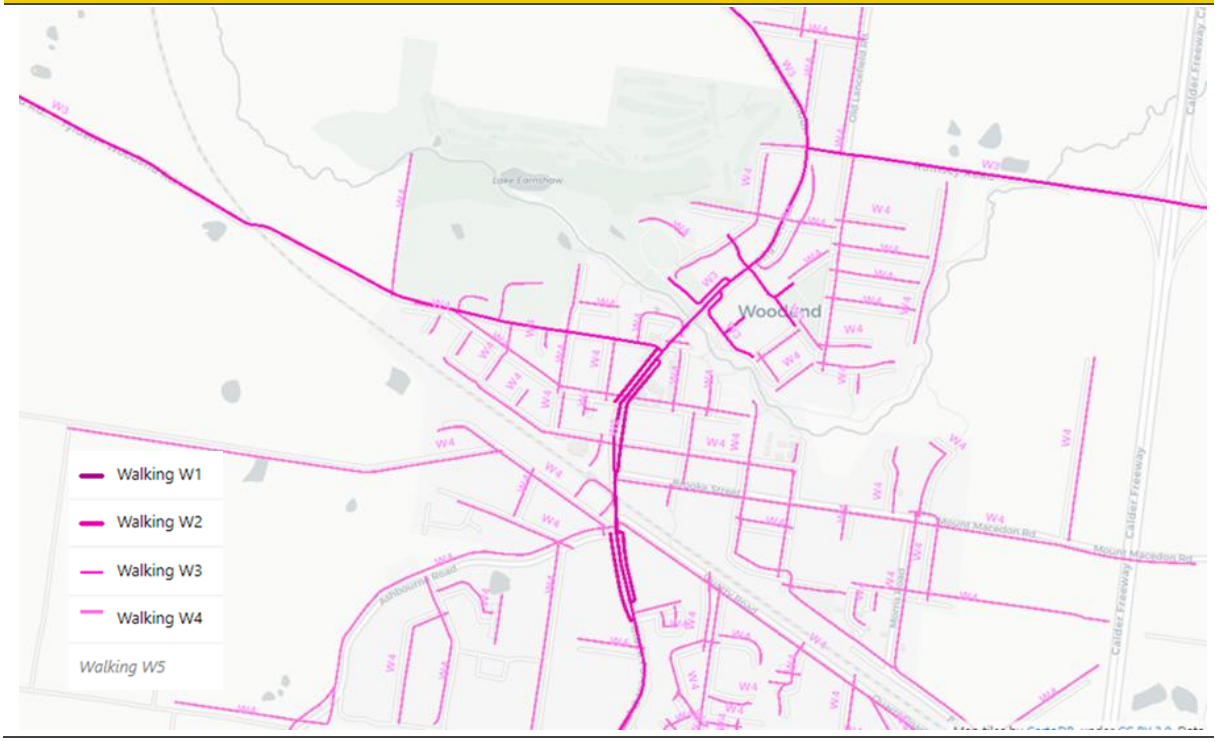
General Traffic



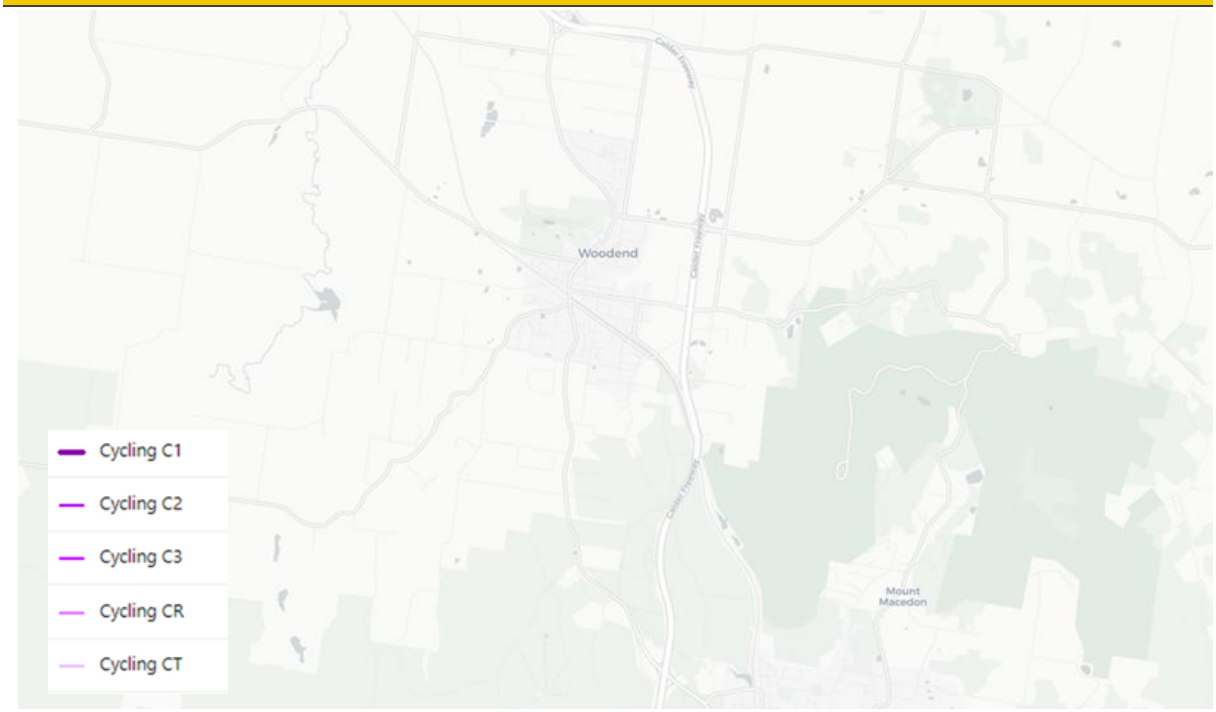
Freight



Walking



Cycling (TBC)


Woodend
Mount Macedon
Cycling C1
Cycling C2
Cycling C3
Cycling CR
Cycling CT

APPENDIX B
Intersection Performance Results

LANE SUMMARY

Site: [I-03A; Forest Street / High Street - AM Peak - Main Intersection 1 (Site Folder: Networked Sites - AM Peak)]

Network: N101 [I-03A; Forest Street / High Street + Service Road - AM Peak (Network Folder: Networked Sites - AM Peak)]

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

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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. %
NorthEast: High Street (NE)															
Lane 1	412	9.0	412	9.0	1827	0.225	100	0.0	LOS A	0.0	0.0	Full	30	0.0	0.0
Lane 2	72	9.0	72	9.0	1194	0.060	100	3.6	LOS A	0.3	1.9	Short	28	0.0	NA
Approach	483	9.0	483	9.0		0.225		0.5	NA	0.3	1.9				
West: Forest Street (W)															
Lane 1	81	9.0	81	9.0	1147	0.071	100	3.1	LOS A	0.3	2.1	Full	15	0.0	0.0
Lane 2	78	9.0	78	9.0	361	0.215	100	12.3	LOS B	0.8	6.1	Full	15	0.0	0.0
Approach	159	9.0	159	9.0		0.215		7.6	LOS A	0.8	6.1				
SouthWest: High Street (SW)															
Lane 1	348	9.0	348	9.0	1803	0.193	100	0.7	LOS A	0.0	0.0	Full	100	0.0	0.0
Approach	348	9.0	348	9.0		0.193		0.7	NA	0.0	0.0				
Intersection	991	9.0	991	9.0		0.225		1.7	NA	0.8	6.1				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network 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).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Approach Lane Flows (veh/h)

NorthEast: High Street (NE)

Mov. From NE To Exit:	T1 SW	R1 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	412	-	412	9.0	1827	0.225	100	NA	NA
Lane 2	-	72	72	9.0	1194	0.060	100	0.0	1
Approach	412	72	483	9.0		0.225			

West: Forest Street (W)

Mov. From W To Exit:	L1 NE	R3 SW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	81	-	81	9.0	1147	0.071	100	NA	NA
Lane 2	-	78	78	9.0	361	0.215	100	NA	NA
Approach	81	78	159	9.0		0.215			

SouthWest: High Street (SW)

Mov.	L3	T1	Total	%HV		Deg.	Lane	Prob.	Ov.

LANE SUMMARY

Site: [I-03A; Forest Street / High Street - AM Peak - Main Intersection 2 (Site Folder: Networked Sites - AM Peak)]

Network: N101 [I-03A; Forest Street / High Street + Service Road - AM Peak (Network Folder: Networked Sites - AM Peak)]

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

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Forest Street (E)															
Lane 1	131	9.0	131	9.0	396	0.329	100	15.5	LOS C	1.4	10.6	Full	800	0.0	0.0
Approach	131	9.0	131	9.0		0.329		15.5	LOS C	1.4	10.6				
NorthEast: High Street (NE)															
Lane 1	81	9.0	81	9.0	1535	0.053	100	6.6	LOS A	0.0	0.0	Short	50	0.0	NA
Lane 2	420	9.0	420	9.0	1842	0.228	100	0.0	LOS A	0.0	0.0	Full	345	0.0	0.0
Approach	501	9.0	501	9.0		0.228		1.1	NA	0.0	0.0				
SouthWest: High Street (SW)															
Lane 1	368	9.0	368	9.0	1831	0.201	100	0.0	LOS A	0.0	0.0	Full	30	0.0	0.0
Lane 2	23	9.0	23	9.0	762	0.030	100	5.0	LOS A	0.1	0.8	Short	20	0.0	NA
Approach	392	9.0	392	9.0		0.201		0.3	NA	0.1	0.8				
Intersection	1023	9.0	1023	9.0		0.329		2.6	NA	1.4	10.6				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network 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).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Approach Lane Flows (veh/h)

East: Forest Street (E)

Mov. From E To Exit:	L1 SW	R3 NE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	63	67	131	9.0	396	0.329	100	NA	NA
Approach	63	67	131	9.0		0.329			

NorthEast: High Street (NE)

Mov. From NE To Exit:	L3 E	T1 SW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	81	-	81	9.0	1535	0.053	100	0.0	2
Lane 2	-	420	420	9.0	1842	0.228	100	NA	NA
Approach	81	420	501	9.0		0.228			

SouthWest: High Street (SW)

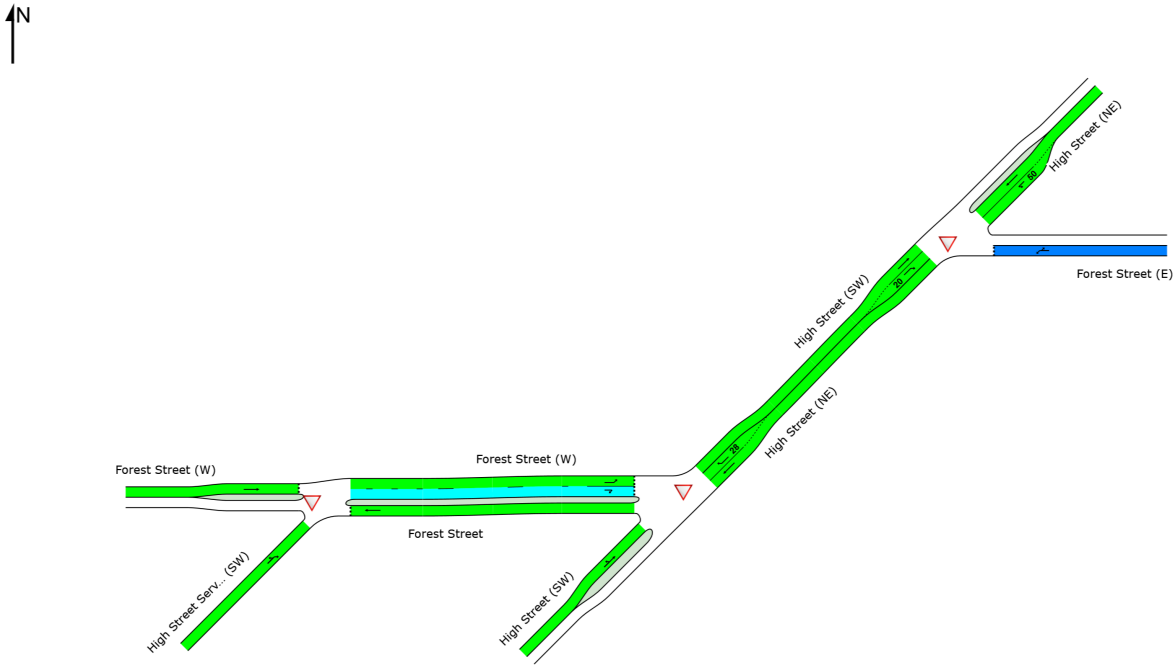
Mov. From SW	T1	R1	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL Ov.	Ov. Lane

LEVEL OF SERVICE

Lane Level of Service

Network: N101 [I-03A; Forest Street / High Street + Service Road - AM Peak (Network Folder: Networked Sites - AM Peak)]

New Network
Network Category: (None)



Colour code based on Level of Service

LOS A	LOS B	LOS C	LOS D	LOS E	LOS F

Delay Model: SIDRA Standard (Geometric Delay is included).

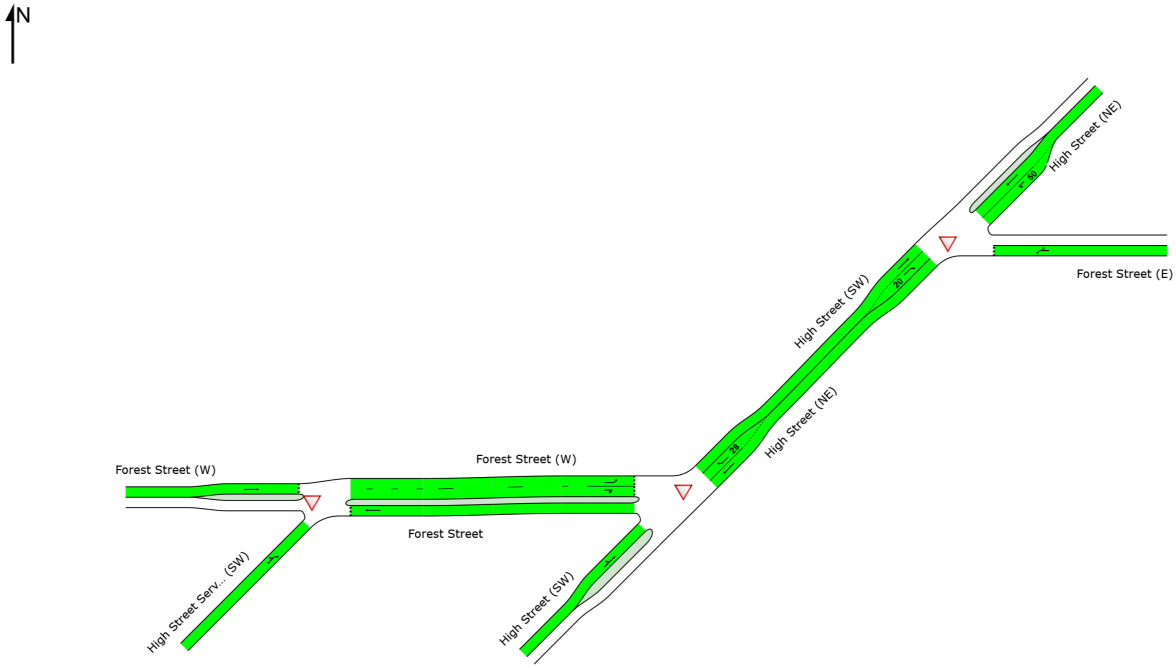
SIDRA INTERSECTION 9.0 | Copyright © 2000-2020 Akcelik and Associates Pty Ltd | sidrasolutions.com

DEGREE OF SATURATION

Ratio of Demand Volume to Capacity, v/c ratio per lane

Network: N101 [I-03A; Forest Street / High Street + Service Road - AM Peak (Network Folder: Networked Sites - AM Peak)]

New Network
Network Category: (None)



Colour code based on Degree of Saturation

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0]

SIDRA INTERSECTION 9.0 | Copyright © 2000-2020 Akcelik and Associates Pty Ltd | sidrasolutions.com

QUEUE STORAGE RATIO (PERCENTILE)

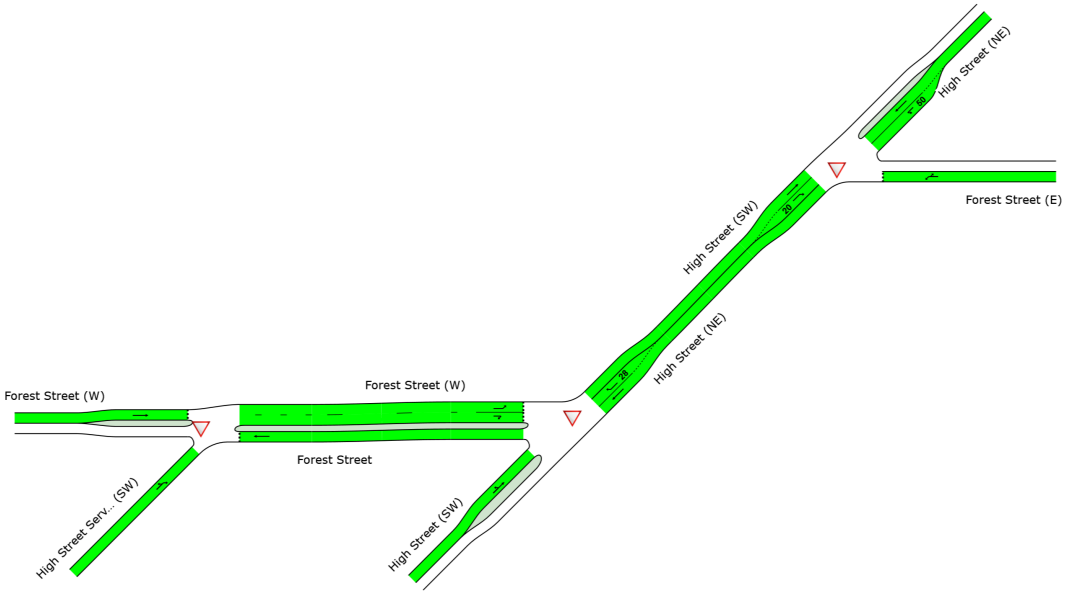
Ratio of the 95% Back of Queue Distance to the available queue storage distance per lane

Network: N101 [I-03A; Forest Street / High Street + Service Road - AM Peak (Network Folder: Networked Sites - AM Peak)]

New Network
Network Category: (None)

Short Lanes not included in determining Approach Queue Storage Ratios.

N



Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0]

Queue Model: SIDRA Standard.

LANE SUMMARY

Site: [I-03A; Forest Street / High Street - PM Peak - Main Intersection 1 (Site Folder: Networked Sites - PM Peak)]

Network: N101 [I-03A; Forest Street / High Street + Service Road - PM Peak (Network Folder: Networked Sites - PM Peak)]

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

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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. %
NorthEast: High Street (NE)															
Lane 1	453	9.0	453	9.0	1828	0.248	100	0.0	LOS A	0.0	0.0	Full	30	0.0	0.0
Lane 2	115	9.0	115	9.0	1037	0.111	100	4.4	LOS A	0.5	3.6	Short	28	0.0	NA
Approach	567	9.0	567	9.0		0.248		0.9	NA	0.5	3.6				
West: Forest Street (W)															
Lane 1	122	9.0	122	9.0	1045	0.117	100	3.6	LOS A	0.5	3.5	Full	15	0.0	0.0
Lane 2	113	9.0	113	9.0	267	0.421	100	20.3	LOS C	1.8	13.5	Full	15	0.0	2.0
Approach	235	9.0	235	9.0		0.421		11.6	LOS B	1.8	13.5				
SouthWest: High Street (SW)															
Lane 1	459	9.0	459	9.0	1788	0.257	100	1.0	LOS A	0.0	0.0	Full	100	0.0	0.0
Approach	459	9.0	459	9.0		0.257		1.0	NA	0.0	0.0				
Intersection	1261	9.0	1261	9.0		0.421		2.9	NA	1.8	13.5				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network 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).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Approach Lane Flows (veh/h)

NorthEast: High Street (NE)

Mov. From NE To Exit:	T1 SW	R1 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	453	-	453	9.0	1828	0.248	100	NA	NA
Lane 2	-	115	115	9.0	1037	0.111	100	0.0	1
Approach	453	115	567	9.0		0.248			

West: Forest Street (W)

Mov. From W To Exit:	L1 NE	R3 SW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	122	-	122	9.0	1045	0.117	100	NA	NA
Lane 2	-	113	113	9.0	267	0.421	100	NA	NA
Approach	122	113	235	9.0		0.421			

SouthWest: High Street (SW)

Mov.	L3	T1	Total	%HV		Deg.	Lane	Prob.	Ov.

LANE SUMMARY

Site: [I-03A; Forest Street / High Street - PM Peak - Main Intersection 2 (Site Folder: Networked Sites - PM Peak)]

Network: N101 [I-03A; Forest Street / High Street + Service Road - PM Peak (Network Folder: Networked Sites - PM Peak)]

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

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Forest Street (E)															
Lane 1	145	9.0	145	9.0	267	0.545	100	26.4	LOS D	2.6	19.8	Full	800	0.0	0.0
Approach	145	9.0	145	9.0		0.545		26.4	LOS D	2.6	19.8				
NorthEast: High Street (NE)															
Lane 1	56	9.0	56	9.0	1535	0.036	100	6.6	LOS A	0.0	0.0	Short	50	0.0	NA
Lane 2	505	9.0	505	9.0	1842	0.274	100	0.1	LOS A	0.0	0.0	Full	345	0.0	0.0
Approach	561	9.0	561	9.0		0.274		0.7	NA	0.0	0.0				
SouthWest: High Street (SW)															
Lane 1	489	9.0	489	9.0	1832	0.267	100	0.0	LOS A	0.0	0.0	Full	30	0.0	0.0
Lane 2	22	9.0	22	9.0	693	0.032	100	5.6	LOS A	0.1	0.9	Short	20	0.0	NA
Approach	512	9.0	512	9.0		0.267		0.2	NA	0.1	0.9				
Intersection	1218	9.0	1218	9.0		0.545		3.6	NA	2.6	19.8				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network 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).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Approach Lane Flows (veh/h)

East: Forest Street (E)

Mov. From E To Exit:	L1 SW	R3 NE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	62	83	145	9.0	267	0.545	100	NA	NA
Approach	62	83	145	9.0		0.545			

NorthEast: High Street (NE)

Mov. From NE To Exit:	L3 E	T1 SW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	56	-	56	9.0	1535	0.036	100	0.0	2
Lane 2	-	505	505	9.0	1842	0.274	100	NA	NA
Approach	56	505	561	9.0		0.274			

SouthWest: High Street (SW)

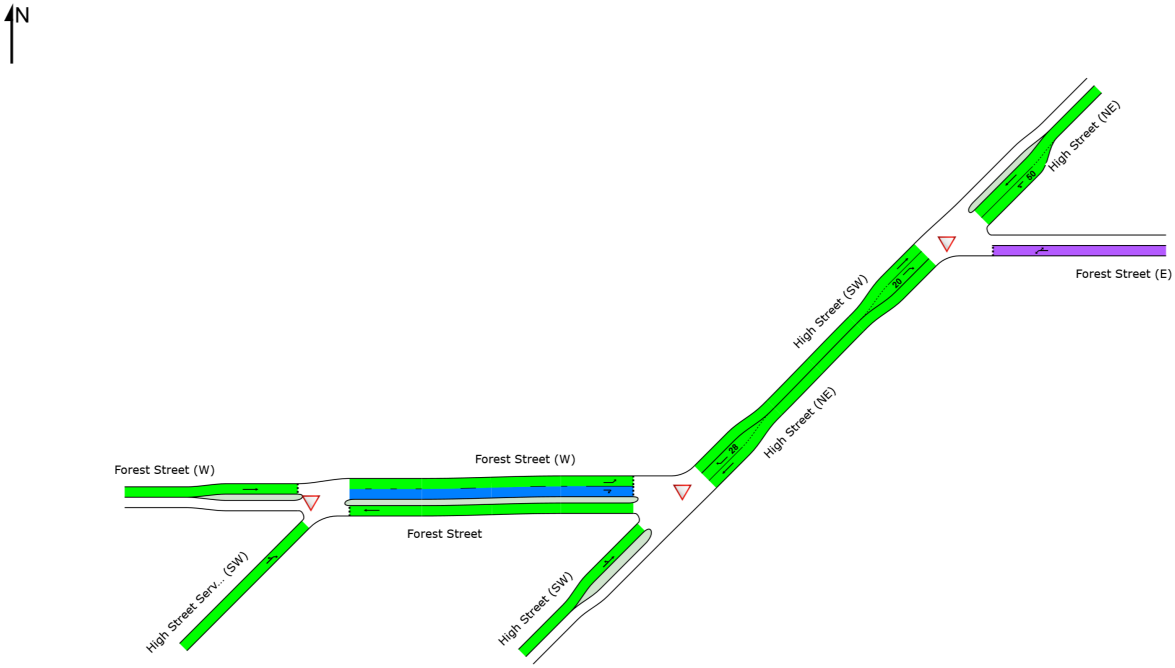
Mov. From SW	T1	R1	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL Ov.	Ov. Lane

LEVEL OF SERVICE

Lane Level of Service

Network: N101 [I-03A; Forest Street / High Street + Service Road - PM Peak (Network Folder: Networked Sites - PM Peak)]

New Network
Network Category: (None)



Colour code based on Level of Service

LOS A	LOS B	LOS C	LOS D	LOS E	LOS F

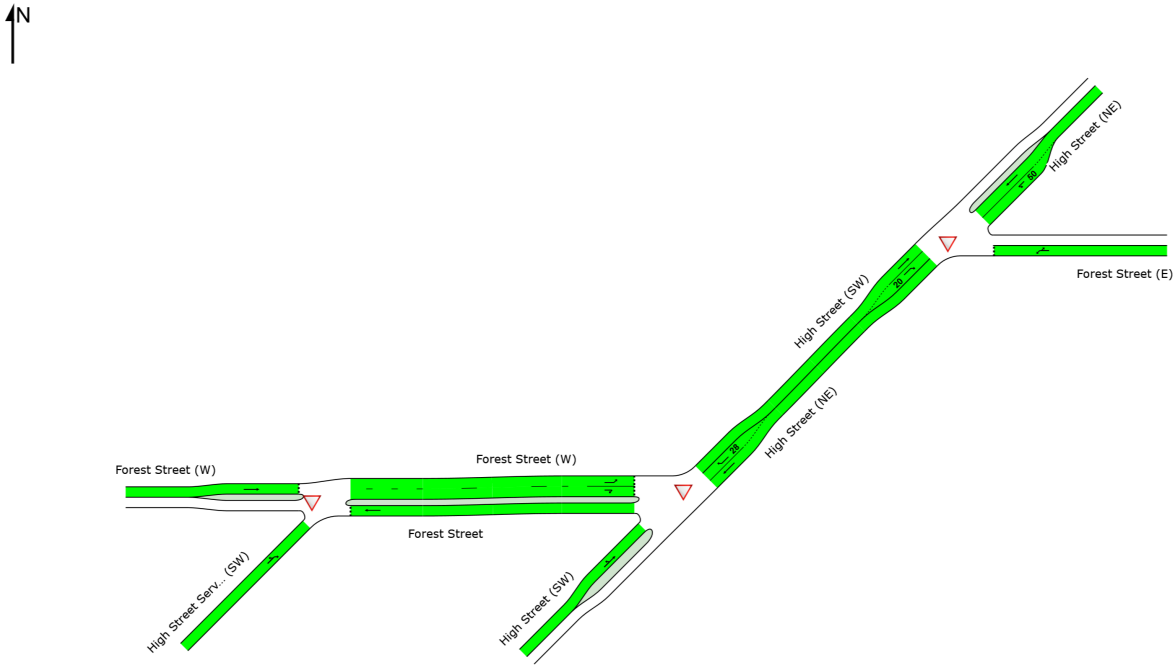
Delay Model: SIDRA Standard (Geometric Delay is included).

DEGREE OF SATURATION

Ratio of Demand Volume to Capacity, v/c ratio per lane

Network: N101 [I-03A; Forest Street / High Street + Service Road - PM Peak (Network Folder: Networked Sites - PM Peak)]

New Network
Network Category: (None)



Colour code based on Degree of Saturation

[< 0.6]	[0.6 – 0.7]	[0.7 – 0.8]	[0.8 – 0.9]	[0.9 – 1.0]	[> 1.0]

SIDRA INTERSECTION 9.0 | Copyright © 2000-2020 Akcelik and Associates Pty Ltd | sidrasolutions.com

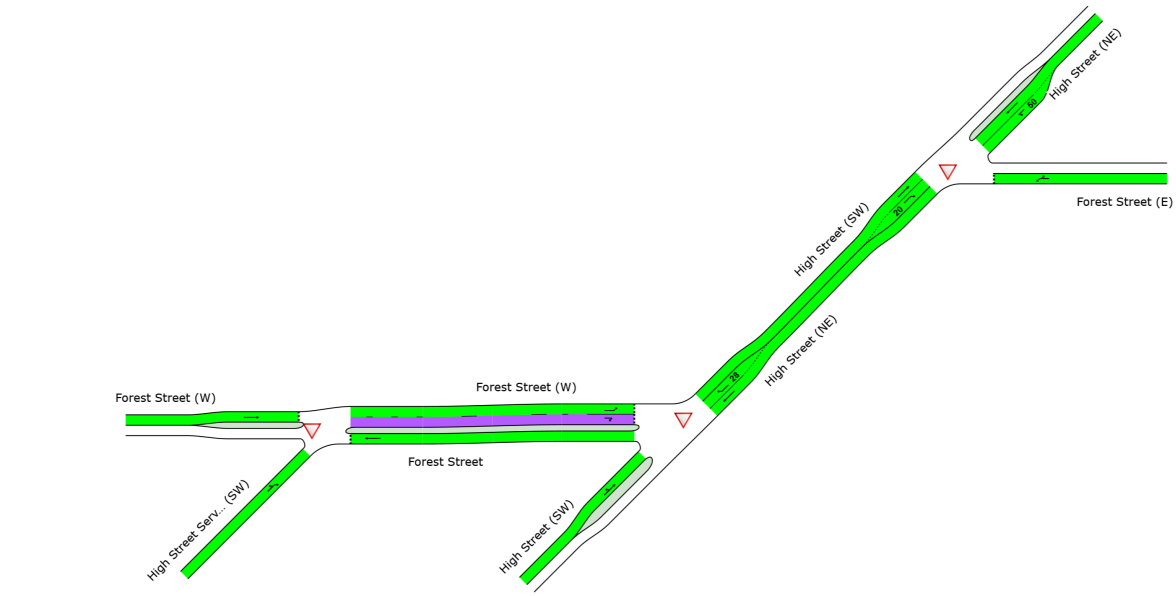
QUEUE STORAGE RATIO (PERCENTILE)

Ratio of the 95% Back of Queue Distance to the available queue storage distance per lane

Network: N101 [I-03A; Forest Street / High Street + Service Road - PM Peak (Network Folder: Networked Sites - PM Peak)]

New Network
Network Category: (None)

Short Lanes not included in determining Approach Queue Storage Ratios.



Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0]

Queue Model: SIDRA Standard.

SIDRA INTERSECTION 9.0 | Copyright © 2000-2020 Akcelik and Associates Pty Ltd | sidrasolutions.com

LANE SUMMARY

Site: [I-03A; Forest Street / High Street - Sat Peak - Main Intersection 1 (Site Folder: Networked Sites - Sat Peak)]

Network: N101 [I-03A; Forest Street / High Street + Service Road - Sat Peak (Network Folder: Networked Sites - Sat Peak)]

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

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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. %
NorthEast: High Street (NE)															
Lane 1	425	9.0	425	9.0	1825	0.233	100	0.0	LOS A	0.0	0.0	Full	30	0.0	0.0
Lane 2	82	9.0	82	9.0	1182	0.069	100	3.7	LOS A	0.3	2.3	Short	28	0.0	NA
Approach	507	9.0	507	9.0		0.233		0.6	NA	0.3	2.3				
West: Forest Street (W)															
Lane 1	61	9.0	61	9.0	1138	0.054	100	3.1	LOS A	0.2	1.6	Full	15	0.0	0.0
Lane 2	79	9.0	79	9.0	342	0.231	100	13.2	LOS B	0.9	6.6	Full	15	0.0	0.0
Approach	140	9.0	140	9.0		0.231		8.8	LOS A	0.9	6.6				
SouthWest: High Street (SW)															
Lane 1	357	9.0	357	9.0	1803	0.198	100	0.7	LOS A	0.0	0.0	Full	100	0.0	0.0
Approach	357	9.0	357	9.0		0.198		0.7	NA	0.0	0.0				
Intersection	1004	9.0	1004	9.0		0.233		1.8	NA	0.9	6.6				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network 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).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Approach Lane Flows (veh/h)

NorthEast: High Street (NE)

Mov. From NE To Exit:	T1 SW	R1 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	425	-	425	9.0	1825	0.233	100	NA	NA
Lane 2	-	82	82	9.0	1182	0.069	100	0.0	1
Approach	425	82	507	9.0		0.233			

West: Forest Street (W)

Mov. From W To Exit:	L1 NE	R3 SW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	61	-	61	9.0	1138	0.054	100	NA	NA
Lane 2	-	79	79	9.0	342	0.231	100	NA	NA
Approach	61	79	140	9.0		0.231			

SouthWest: High Street (SW)

Mov.	L3	T1	Total	%HV		Deg.	Lane	Prob.	Ov.

LANE SUMMARY

Site: [I-03A; Forest Street / High Street - Sat Peak - Main Intersection 2 (Site Folder: Networked Sites - Sat Peak)]

Network: N101 [I-03A; Forest Street / High Street + Service Road - Sat Peak (Network Folder: Networked Sites - Sat Peak)]

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

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Forest Street (E)															
Lane 1	128	9.0	128	9.0	378	0.340	100	16.2	LOS C	1.5	11.0	Full	800	0.0	0.0
Approach	128	9.0	128	9.0		0.340		16.2	LOS C	1.5	11.0				
NorthEast: High Street (NE)															
Lane 1	74	9.0	74	9.0	1535	0.048	100	6.6	LOS A	0.0	0.0	Short	50	0.0	NA
Lane 2	447	9.0	447	9.0	1842	0.243	100	0.0	LOS A	0.0	0.0	Full	345	0.0	0.0
Approach	521	9.0	521	9.0		0.243		1.0	NA	0.0	0.0				
SouthWest: High Street (SW)															
Lane 1	362	9.0	362	9.0	1833	0.198	100	0.0	LOS A	0.0	0.0	Full	30	0.0	0.0
Lane 2	17	9.0	17	9.0	739	0.023	100	5.2	LOS A	0.1	0.6	Short	20	0.0	NA
Approach	379	9.0	379	9.0		0.198		0.2	NA	0.1	0.6				
Intersection	1028	9.0	1028	9.0		0.340		2.6	NA	1.5	11.0				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network 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).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Approach Lane Flows (veh/h)

East: Forest Street (E)

Mov. From E To Exit:	L1 SW	R3 NE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	60	68	128	9.0	378	0.340	100	NA	NA
Approach	60	68	128	9.0		0.340			

NorthEast: High Street (NE)

Mov. From NE To Exit:	L3 E	T1 SW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	74	-	74	9.0	1535	0.048	100	0.0	2
Lane 2	-	447	447	9.0	1842	0.243	100	NA	NA
Approach	74	447	521	9.0		0.243			

SouthWest: High Street (SW)

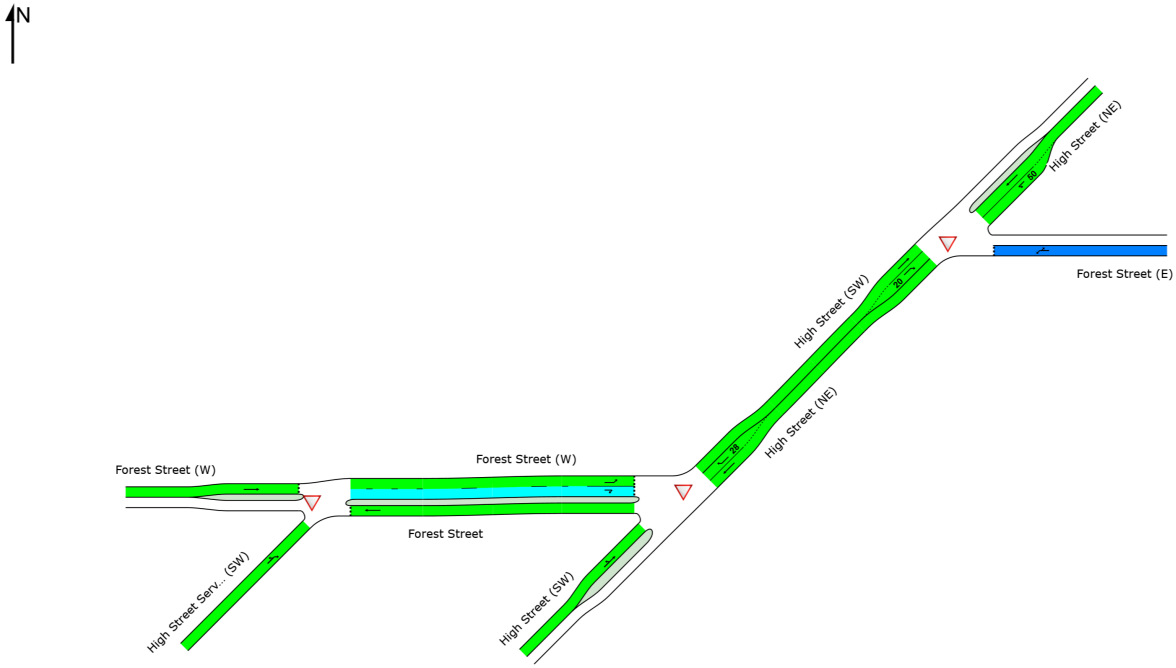
Mov. From SW	T1	R1	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL Ov.	Ov. Lane

LEVEL OF SERVICE

Lane Level of Service

Network: N101 [I-03A; Forest Street / High Street + Service Road - Sat Peak (Network Folder: Networked Sites - Sat Peak)]

New Network
Network Category: (None)



Colour code based on Level of Service

LOS A	LOS B	LOS C	LOS D	LOS E	LOS F

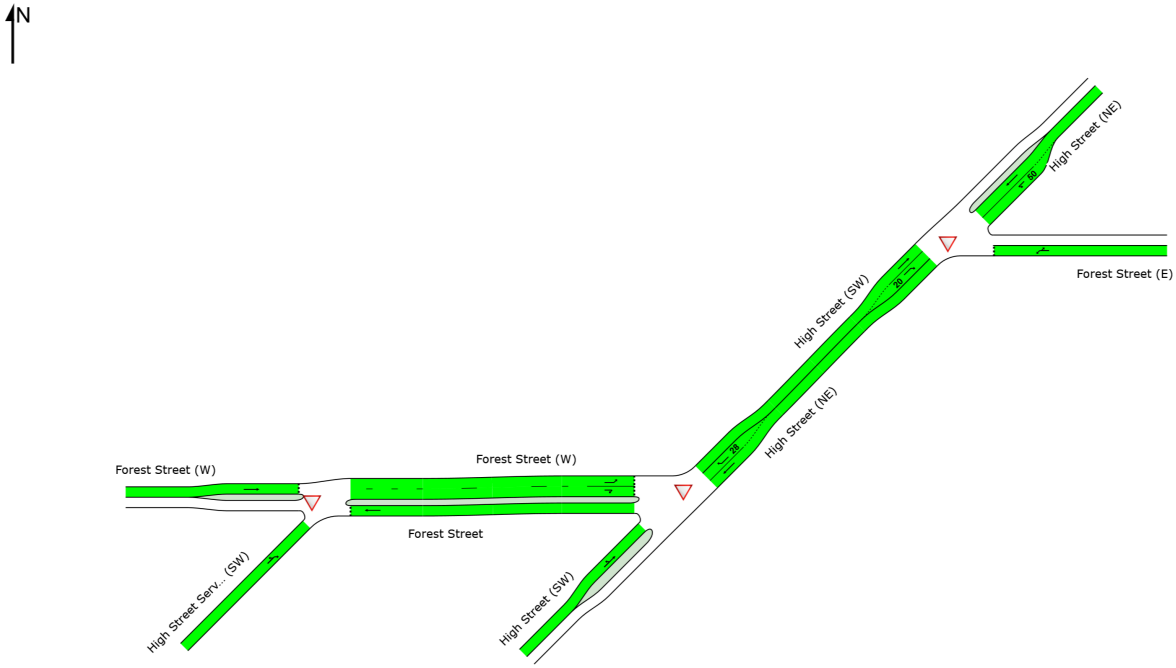
Delay Model: SIDRA Standard (Geometric Delay is included).

DEGREE OF SATURATION

Ratio of Demand Volume to Capacity, v/c ratio per lane

Network: N101 [I-03A; Forest Street / High Street + Service Road - Sat Peak (Network Folder: Networked Sites - Sat Peak)]

New Network
Network Category: (None)



Colour code based on Degree of Saturation

[< 0.6]	[0.6 – 0.7]	[0.7 – 0.8]	[0.8 – 0.9]	[0.9 – 1.0]	[> 1.0]

SIDRA INTERSECTION 9.0 | Copyright © 2000-2020 Akcelik and Associates Pty Ltd | sidrasolutions.com

QUEUE STORAGE RATIO (PERCENTILE)

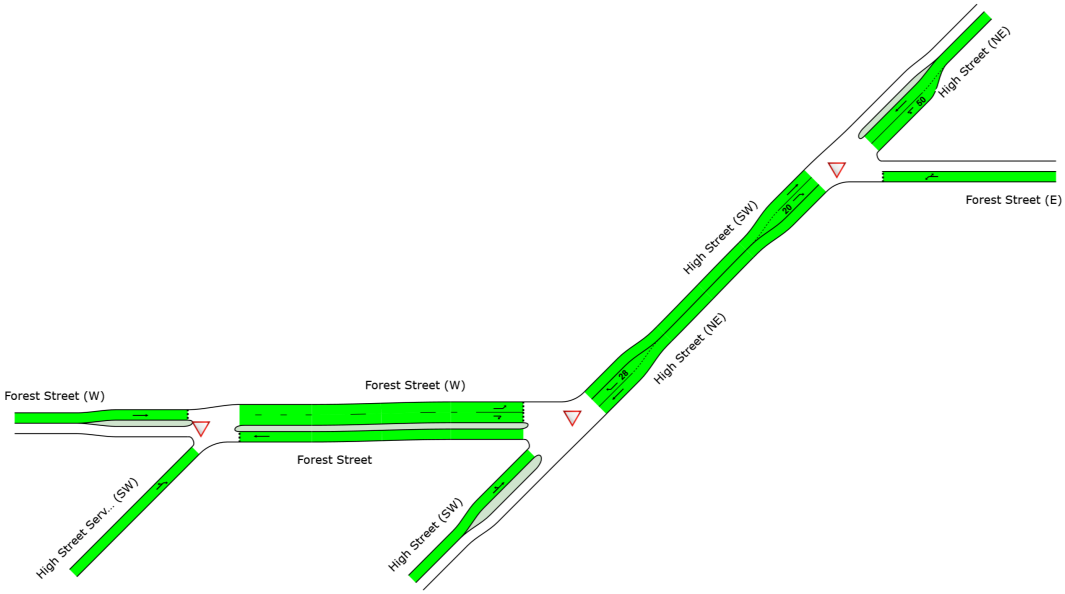
Ratio of the 95% Back of Queue Distance to the available queue storage distance per lane

Network: N101 [I-03A; Forest Street / High Street + Service Road - Sat Peak (Network Folder: Networked Sites - Sat Peak)]

New Network
Network Category: (None)

Short Lanes not included in determining Approach Queue Storage Ratios.

N



Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0]

Queue Model: SIDRA Standard.

LANE SUMMARY

Site: [I-02A; Anslow Street / High Street - AM Peak - Main Intersection (Site Folder: Networked Sites - AM Peak)]

Network: N101 [I-02A; Anslow Street / High Street - AM Peak (Network Folder: Networked Sites - AM Peak)]

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

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: High Street (S)															
Lane 1	453	6.0	453	6.0	1840	0.246	100	1.4	LOS A	0.0	0.0	Full	430	0.0	0.0
Lane 2	63	6.0	63	6.0	1215	0.052	100	6.9	LOS A	0.2	1.6	Short	70	0.0	NA
Approach	516	6.0	516	6.0		0.246		2.1	NA	0.2	1.6				
East: Anslow Street (E)															
Lane 1	87	6.0	87	6.0	947	0.092	100	3.8	LOS A	0.3	2.5	Full	15	0.0	0.0
Lane 2	49	6.0	49	6.0	258	0.191	100	15.8	LOS C	0.7	5.0	Full	15	0.0	0.0
Approach	137	6.0	137	6.0		0.191		8.1	LOS A	0.7	5.0				
North: High Street (N)															
Lane 1	356	6.0	356	6.0	1853	0.192	100	1.0	LOS A	0.0	0.0	Full	120	0.0	0.0
Lane 2	19	6.0	19	6.0	1078	0.018	100	7.4	LOS A	0.1	0.5	Short	30	0.0	NA
Approach	375	6.0	375	6.0		0.192		1.3	NA	0.1	0.5				
West: Anslow Street (W)															
Lane 1	14	6.0	14	6.0	892	0.015	100	3.7	LOS A	0.1	0.4	Full	10	0.0	0.0
Lane 2	67	6.0	67	6.0	219	0.307	100	20.9	LOS C	1.2	8.7	Full	10	0.0	1.1
Approach	81	6.0	81	6.0		0.307		18.0	LOS C	1.2	8.7				
Intersection	1108	6.0	1108	6.0		0.307		3.7	NA	1.2	8.7				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network 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).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Approach Lane Flows (veh/h)

South: High Street (S)

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	108	344	-	453	6.0	1840	0.246	100	NA	NA
Lane 2	-	-	63	63	6.0	1215	0.052	100	0.0	1
Approach	108	344	63	516	6.0		0.246			

East: Anslow Street (E)

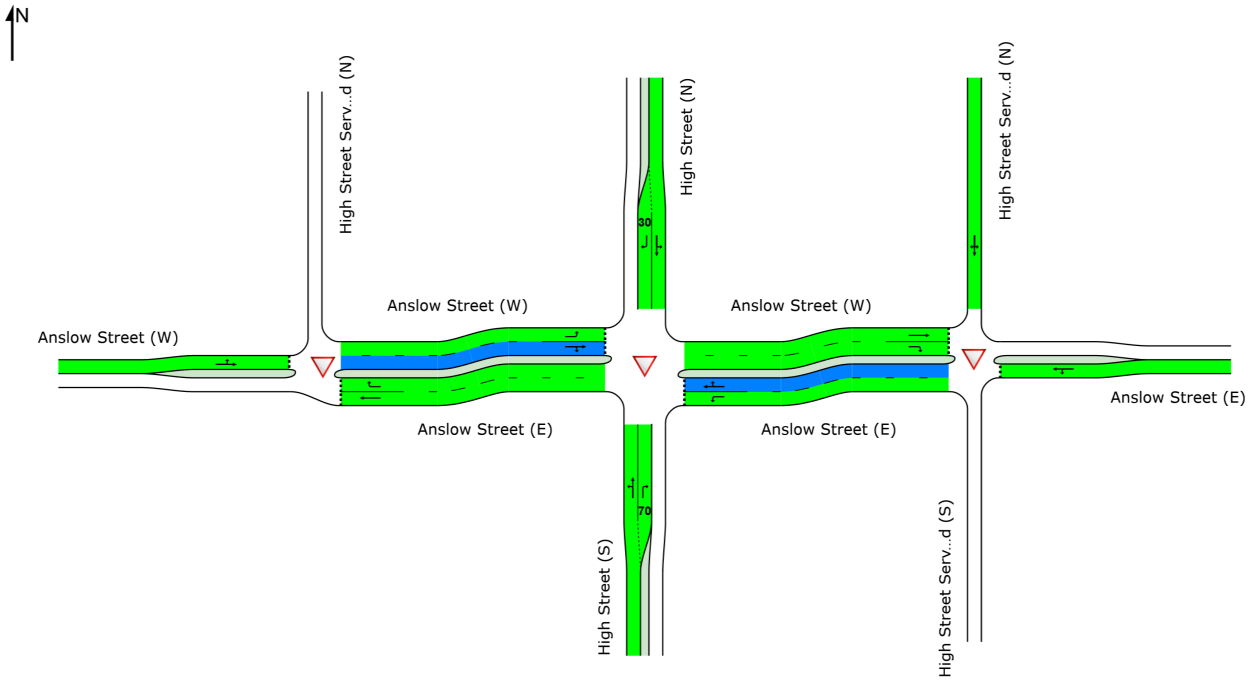
Mov. From E To Exit:	L2 S	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	87	-	-	87	6.0	947	0.092	100	NA	NA

LEVEL OF SERVICE

Lane Level of Service

Network: N101 [I-02A; Anslow Street / High Street - AM Peak (Network Folder: Networked Sites - AM Peak)]

New Network
Network Category: (None)



Colour code based on Level of Service

LOS A	LOS B	LOS C	LOS D	LOS E	LOS F

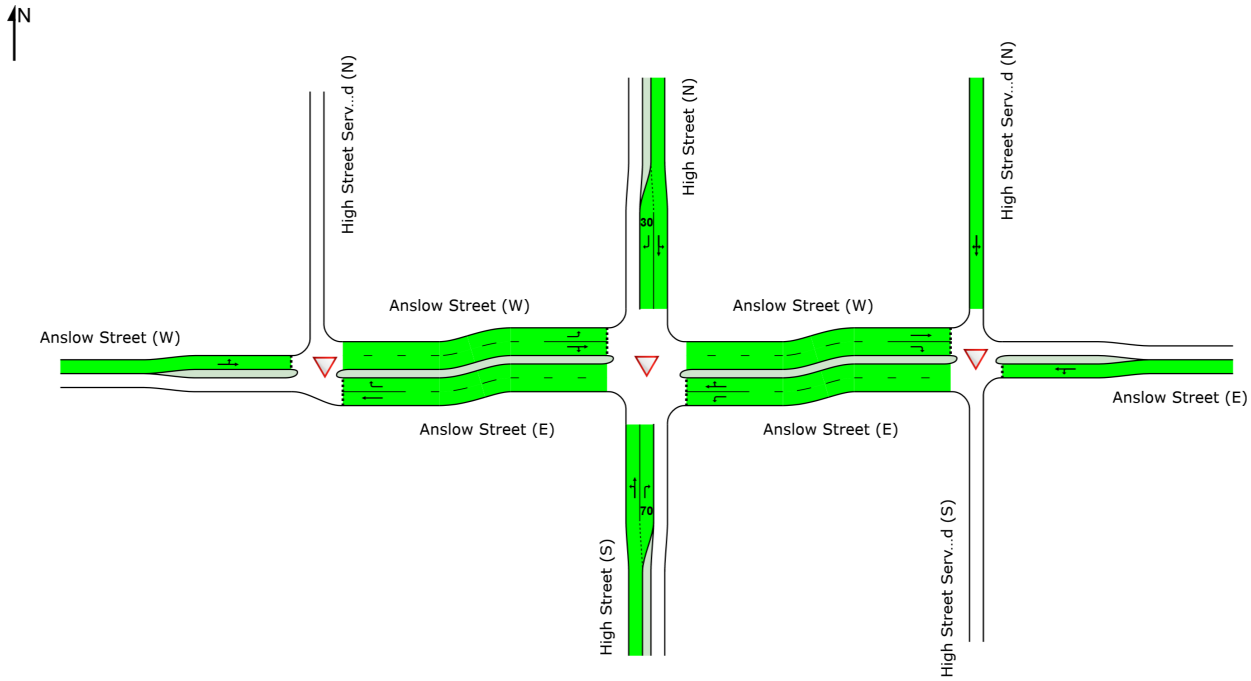
Delay Model: SIDRA Standard (Geometric Delay is included).

DEGREE OF SATURATION

Ratio of Demand Volume to Capacity, v/c ratio per lane

Network: N101 [I-02A; Anslow Street / High Street - AM Peak (Network Folder: Networked Sites - AM Peak)]

New Network
Network Category: (None)



Colour code based on Degree of Saturation

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0]

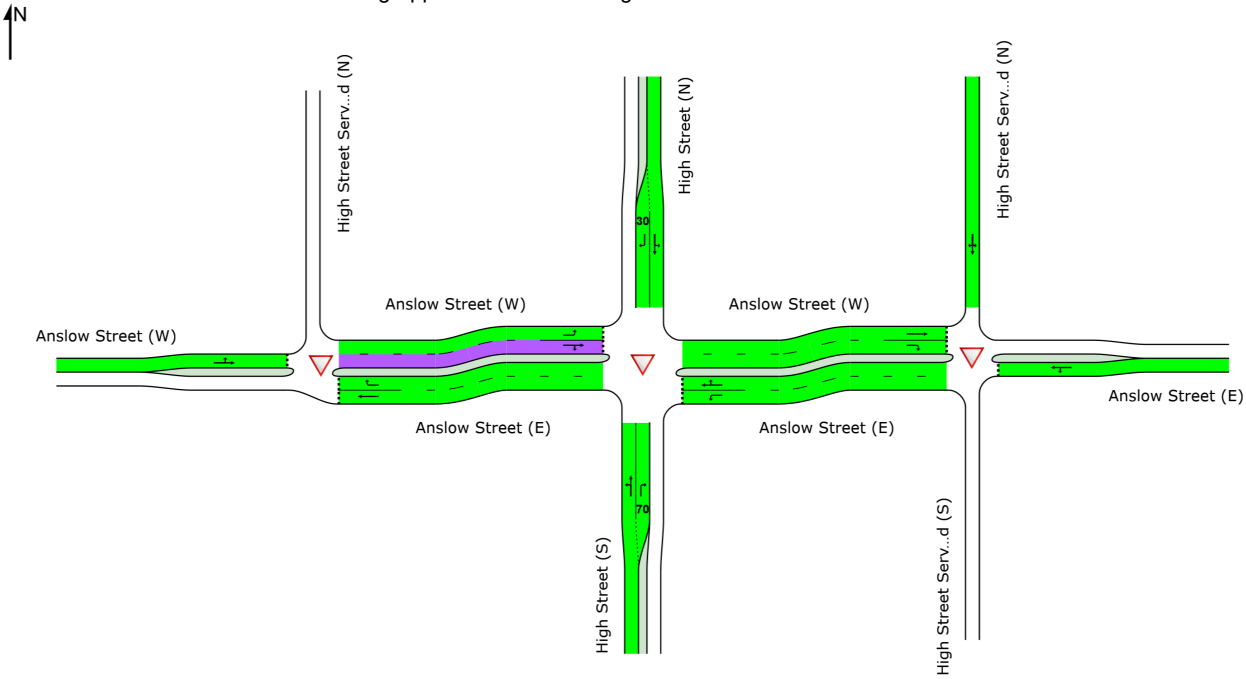
QUEUE STORAGE RATIO (PERCENTILE)

Ratio of the 95% Back of Queue Distance to the available queue storage distance per lane

Network: N101 [I-02A; Anslow Street / High Street - AM Peak (Network Folder: Networked Sites - AM Peak)]

New Network
Network Category: (None)

Short Lanes not included in determining Approach Queue Storage Ratios.



Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0]

Queue Model: SIDRA Standard.

LANE SUMMARY

Site: [I-02A; Anslow Street / High Street - PM Peak - Main Intersection (Site Folder: Networked Sites - PM Peak)]

Network: N101 [I-02A; Anslow Street / High Street - PM Peak (Network Folder: Networked Sites - PM Peak)]

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

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: High Street (S)															
Lane 1	540	6.0	540	6.0	1840	0.293	100	1.6	LOS A	0.0	0.0	Full	430	0.0	0.0
Lane 2	87	6.0	87	6.0	1067	0.082	100	7.6	LOS A	0.3	2.5	Short	70	0.0	NA
Approach	627	6.0	627	6.0		0.293		2.4	NA	0.3	2.5				
East: Anslow Street (E)															
Lane 1	144	6.0	144	6.0	824	0.175	100	4.7	LOS A	0.7	4.8	Full	15	0.0	0.0
Lane 2	66	6.0	66	6.0	163	0.408	100	31.3	LOS D	1.6	11.6	Full	15	0.0	0.0
Approach	211	6.0	211	6.0		0.408		13.1	LOS B	1.6	11.6				
North: High Street (N)															
Lane 1	461	6.0	461	6.0	1858	0.248	100	0.7	LOS A	0.0	0.0	Full	120	0.0	0.0
Lane 2	34	6.0	34	6.0	958	0.035	100	7.9	LOS A	0.1	1.0	Short	30	0.0	NA
Approach	495	6.0	495	6.0		0.248		1.2	NA	0.1	1.0				
West: Anslow Street (W)															
Lane 1	32	6.0	32	6.0	836	0.038	100	4.1	LOS A	0.1	1.0	Full	10	0.0	0.0
Lane 2	109	6.0	109	6.0	120	0.915	100	100.6	LOS F	3.4[N4]	24.9[N4]	Full	10	0.0	49.9
Approach	141	6.0	141	6.0		0.915		79.0	LOS F	3.4	24.9				
Intersection	1474	6.0	1474	6.0		0.915		10.9	NA	3.4	24.9				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network 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).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N4 Average back of queue has been restricted to the available queue storage space.

Approach Lane Flows (veh/h)

South: High Street (S)

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	145	395	-	540	6.0	1840	0.293	100	NA	NA
Lane 2	-	-	87	87	6.0	1067	0.082	100	0.0	1
Approach	145	395	87	627	6.0		0.293			

East: Anslow Street (E)

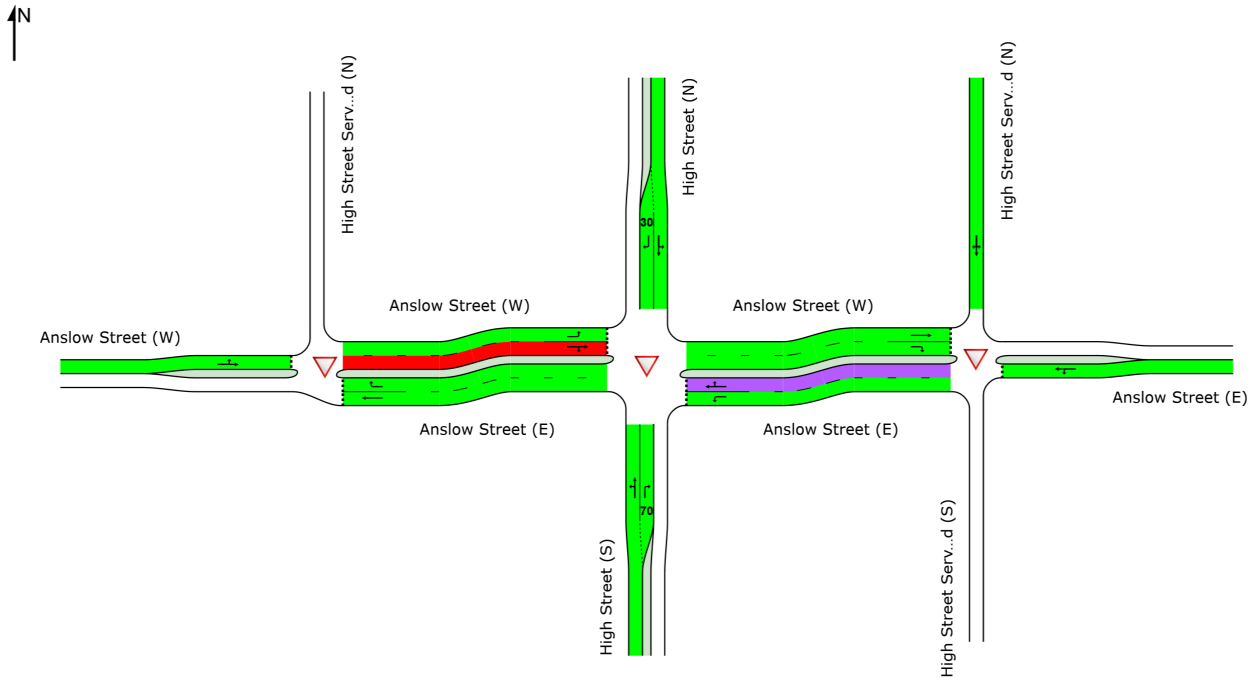
Mov. From E To Exit:	L2 S	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.

LEVEL OF SERVICE

Lane Level of Service

Network: N101 [I-02A; Anslow Street / High Street - PM Peak (Network Folder: Networked Sites - PM Peak)]

New Network
Network Category: (None)



Colour code based on Level of Service

LOS A	LOS B	LOS C	LOS D	LOS E	LOS F

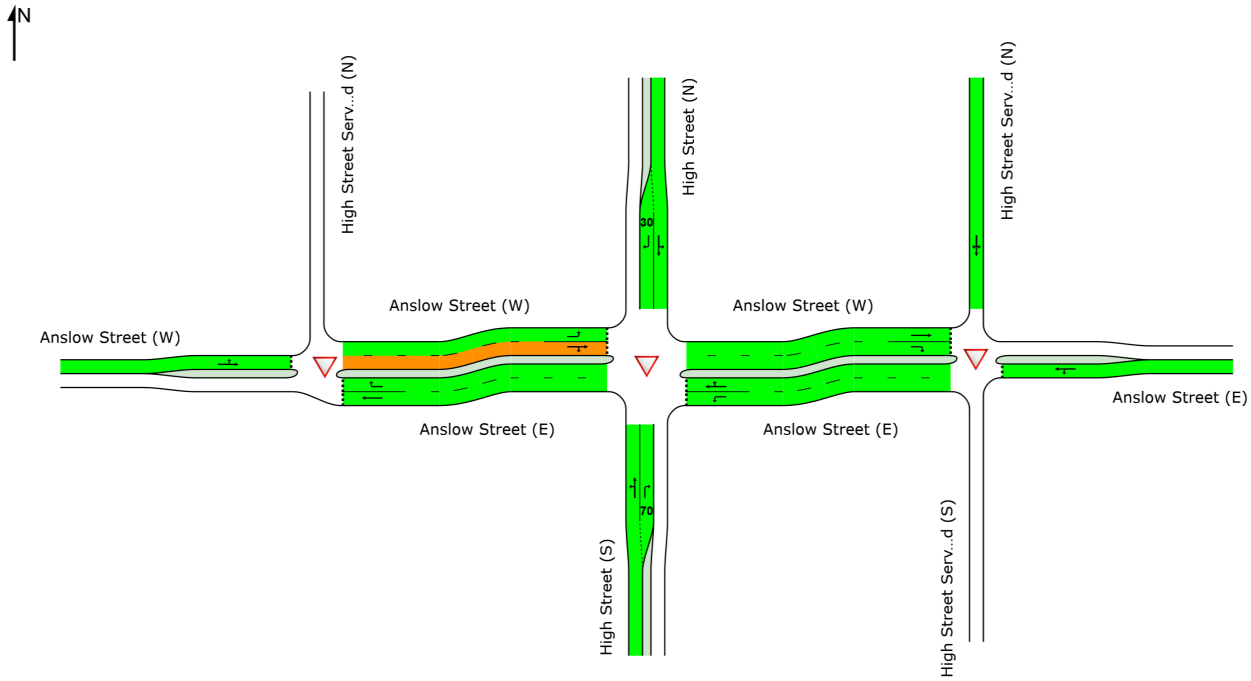
Delay Model: SIDRA Standard (Geometric Delay is included).

DEGREE OF SATURATION

Ratio of Demand Volume to Capacity, v/c ratio per lane

Network: N101 [I-02A; Anslow Street / High Street - PM Peak (Network Folder: Networked Sites - PM Peak)]

New Network
Network Category: (None)



Colour code based on Degree of Saturation

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0]

SIDRA INTERSECTION 9.0 | Copyright © 2000-2020 Akcelik and Associates Pty Ltd | sidrasolutions.com

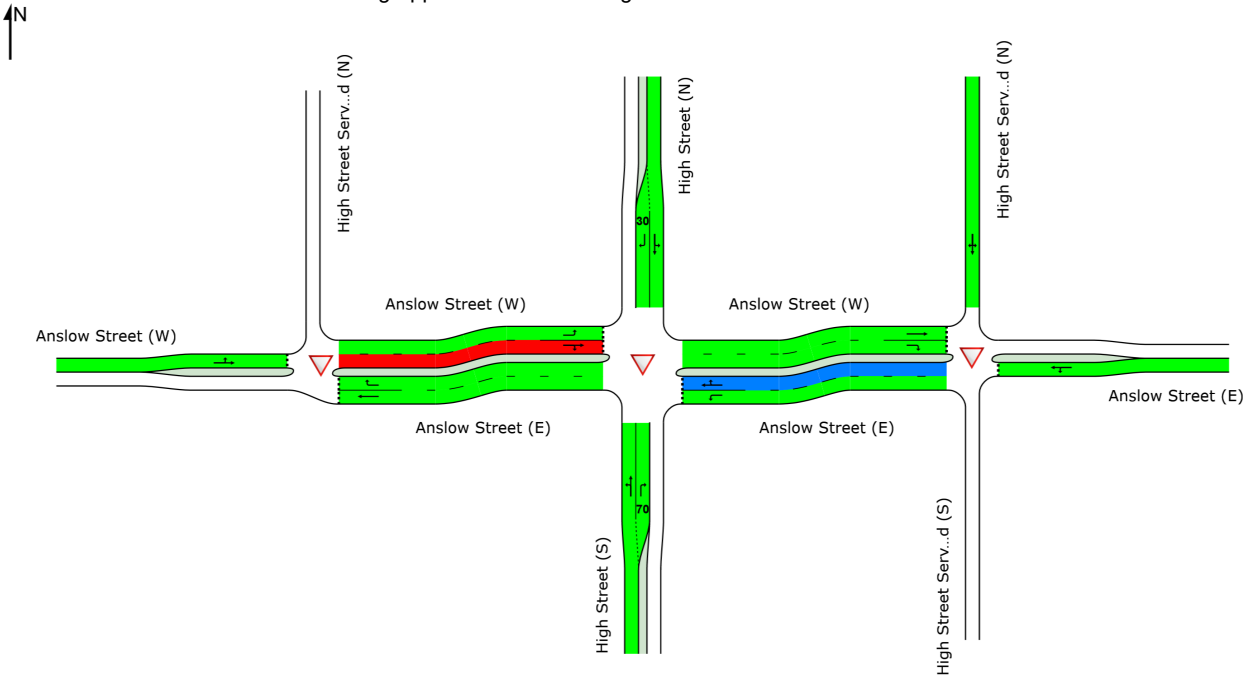
QUEUE STORAGE RATIO (PERCENTILE)

Ratio of the 95% Back of Queue Distance to the available queue storage distance per lane

Network: N101 [I-02A; Anslow Street / High Street - PM Peak (Network Folder: Networked Sites - PM Peak)]

New Network
Network Category: (None)

Short Lanes not included in determining Approach Queue Storage Ratios.



Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0]

Queue Model: SIDRA Standard.

LANE SUMMARY

Site: [I-02A; Anslow Street / High Street - Sat Peak - Main Intersection (Site Folder: Networked Sites - Sat Peak)]

Network: N101 [I-02A; Anslow Street / High Street - Sat Peak (Network Folder: Networked Sites - Sat Peak)]

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

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: High Street (S)															
Lane 1	603	6.0	603	6.0	1835	0.329	100	1.9	LOS A	0.0	0.0	Full	430	0.0	0.0
Lane 2	63	6.0	63	6.0	1235	0.051	100	6.9	LOS A	0.2	1.6	Short	70	0.0	NA
Approach	666	6.0	666	6.0		0.329		2.4	NA	0.2	1.6				
East: Anslow Street (E)															
Lane 1	118	6.0	118	6.0	947	0.125	100	3.8	LOS A	0.5	3.4	Full	15	0.0	0.0
Lane 2	54	6.0	54	6.0	210	0.256	100	21.0	LOS C	0.9	6.9	Full	15	0.0	0.0
Approach	172	6.0	172	6.0		0.256		9.2	LOS A	0.9	6.9				
North: High Street (N)															
Lane 1	342	6.0	342	6.0	1851	0.185	100	0.8	LOS A	0.0	0.0	Full	120	0.0	0.0
Lane 2	20	6.0	20	6.0	874	0.023	100	8.4	LOS A	0.1	0.7	Short	30	0.0	NA
Approach	362	6.0	362	6.0		0.185		1.2	NA	0.1	0.7				
West: Anslow Street (W)															
Lane 1	29	6.0	29	6.0	824	0.036	100	4.2	LOS A	0.1	0.9	Full	10	0.0	0.0
Lane 2	83	6.0	83	6.0	153	0.542	100	37.8	LOS E	2.3	16.7	Full	10	0.0	23.2
Approach	113	6.0	113	6.0		0.542		29.0	LOS D	2.3	16.7				
Intersection	1313	6.0	1313	6.0		0.542		5.2	NA	2.3	16.7				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network 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).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Approach Lane Flows (veh/h)

South: High Street (S)

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	198	405	-	603	6.0	1835	0.329	100	NA	NA
Lane 2	-	-	63	63	6.0	1235	0.051	100	0.0	1
Approach	198	405	63	666	6.0		0.329			

East: Anslow Street (E)

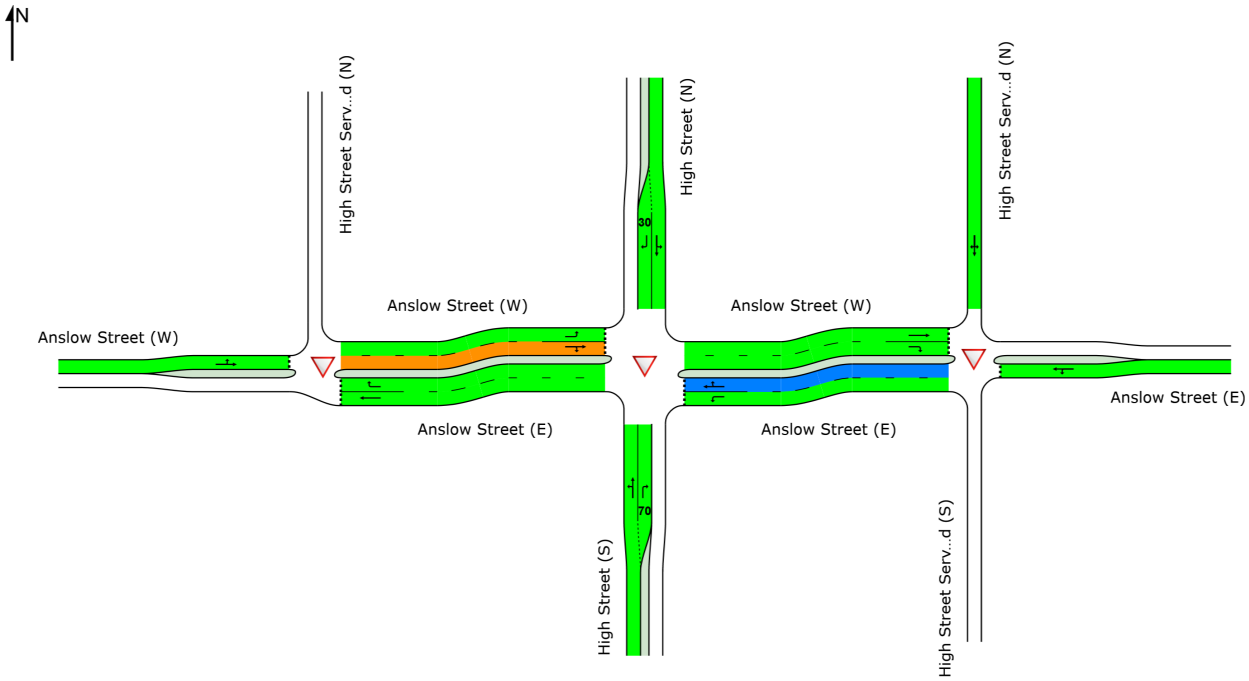
Mov. From E To Exit:	L2 S	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	118	-	-	118	6.0	947	0.125	100	NA	NA

LEVEL OF SERVICE

Lane Level of Service

Network: N101 [I-02A; Anslow Street / High Street - Sat Peak (Network Folder: Networked Sites - Sat Peak)]

New Network
Network Category: (None)



Colour code based on Level of Service

LOS A	LOS B	LOS C	LOS D	LOS E	LOS F

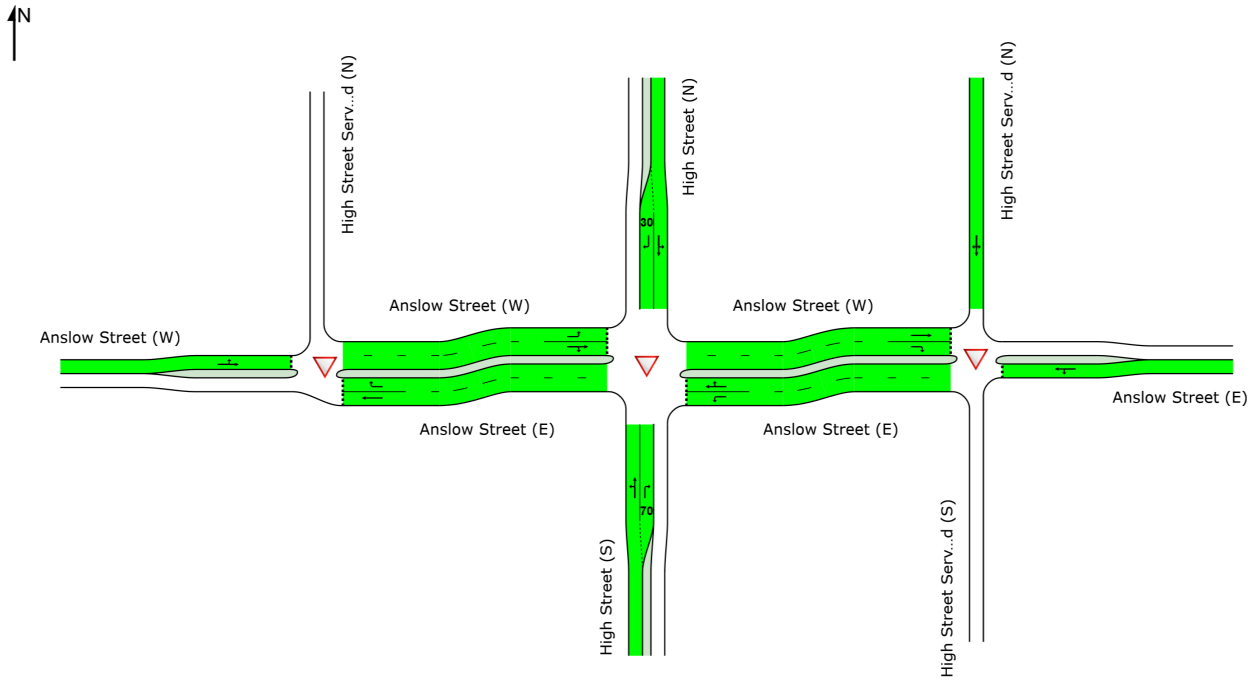
Delay Model: SIDRA Standard (Geometric Delay is included).

DEGREE OF SATURATION

Ratio of Demand Volume to Capacity, v/c ratio per lane

Network: N101 [I-02A; Anslow Street / High Street - Sat Peak (Network Folder: Networked Sites - Sat Peak)]

New Network
Network Category: (None)



Colour code based on Degree of Saturation

[< 0.6]	[0.6 – 0.7]	[0.7 – 0.8]	[0.8 – 0.9]	[0.9 – 1.0]	[> 1.0]

SIDRA INTERSECTION 9.0 | Copyright © 2000-2020 Akcelik and Associates Pty Ltd | sidrasolutions.com
Organisation: IMPACT TRAFFIC ENGINEERING | Licence: NETWORK / 1PC | Processed: Tuesday, 9 August 2022 1:40:09 PM
Project: C:\IMPACT Dropbox\01. Projects\2021\IMP2105097 - Woodend Integrated Transport Plan (Macedon Ranges Council)\6. ENGINEERING\02 Analysis\IMP2105097SID01.sip9

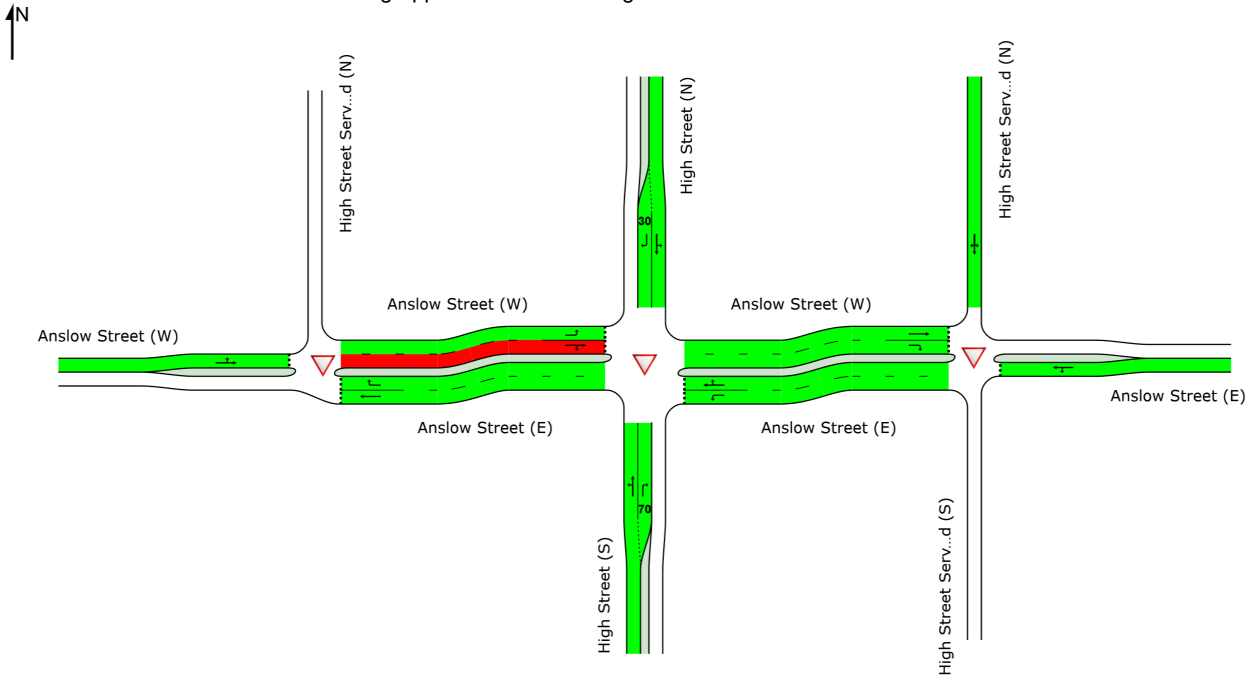
QUEUE STORAGE RATIO (PERCENTILE)

Ratio of the 95% Back of Queue Distance to the available queue storage distance per lane

Network: N101 [I-02A; Anslow Street / High Street - Sat Peak (Network Folder: Networked Sites - Sat Peak)]

New Network
Network Category: (None)

Short Lanes not included in determining Approach Queue Storage Ratios.



Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0]

Queue Model: SIDRA Standard.

LANE SUMMARY

Site: [I-01A; Urquhart Street / High Street - AM Peak - Main Intersection (Site Folder: Networked Sites - AM Peak)]

Network: N101 [I-01A; Urquhart Street / High Street - AM Peak (Network Folder: Networked Sites - AM Peak)]

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

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: High Street (S)															
Lane 1	62	6.0	62	6.0	1781	0.035	100	5.6	LOS A	0.0	0.0	Short	60	0.0	NA
Lane 2	371	6.0	371	6.0	1865	0.199	100	0.0	LOS A	0.0	0.0	Full	300	0.0	0.0
Lane 3	131	6.0	131	6.0	1272	0.103	100	6.8	LOS A	0.5	3.4	Short	40	0.0	NA
Approach	563	6.0	563	6.0		0.199		2.2	NA	0.5	3.4				
East: Urquhart Street (E)															
Lane 1	67	6.0	67	6.0	414	0.163	100	9.6	LOS A	0.6	4.1	Full	18	0.0	0.0
Lane 2	36	6.0	36	6.0	309	0.116	100	12.4	LOS B	0.4	2.7	Full	18	0.0	0.0
Approach	103	6.0	103	6.0		0.163		10.6	LOS B	0.6	4.1				
North: High Street (N)															
Lane 1	317	6.0	317	6.0	1852	0.171	100	0.5	LOS A	0.0	0.0	Full	250	0.0	0.0
Lane 2	93	6.0	93	6.0	862	0.107	100	7.9	LOS A	0.4	3.1	Short	30	0.0	NA
Approach	409	6.0	409	6.0		0.171		2.2	NA	0.4	3.1				
West: Urquhart Street (W)															
Lane 1	84	6.0	84	6.0	591	0.143	100	7.7	LOS A	0.5	3.7	Full	40	0.0	0.0
Lane 2	38	6.0	38	6.0	308	0.123	100	13.5	LOS B	0.4	2.8	Full	40	0.0	0.0
Approach	122	6.0	122	6.0		0.143		9.5	LOS A	0.5	3.7				
Intersection	1198	6.0	1198	6.0		0.199		3.7	NA	0.6	4.1				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network 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).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Approach Lane Flows (veh/h)

South: High Street (S)

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	62	-	-	62	6.0	1781	0.035	100	0.0	2
Lane 2	-	371	-	371	6.0	1865	0.199	100	NA	NA
Lane 3	-	-	131	131	6.0	1272	0.103	100	0.0	2
Approach	62	371	131	563	6.0		0.199			

East: Urquhart Street (E)

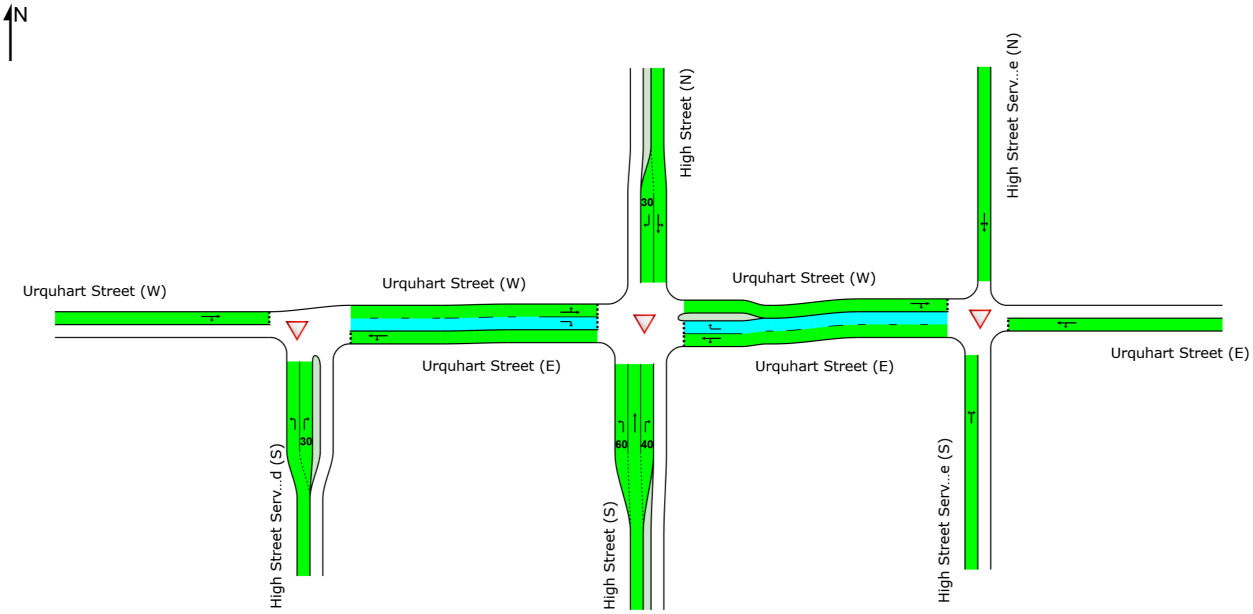
Mov. From E	L2	T1	R2	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL Ov.	Ov. Lane

LEVEL OF SERVICE

Lane Level of Service

Network: N101 [I-01A; Urquhart Street / High Street - AM Peak (Network Folder: Networked Sites - AM Peak)]

New Network
Network Category: (None)



Colour code based on Level of Service

LOS A	LOS B	LOS C	LOS D	LOS E	LOS F

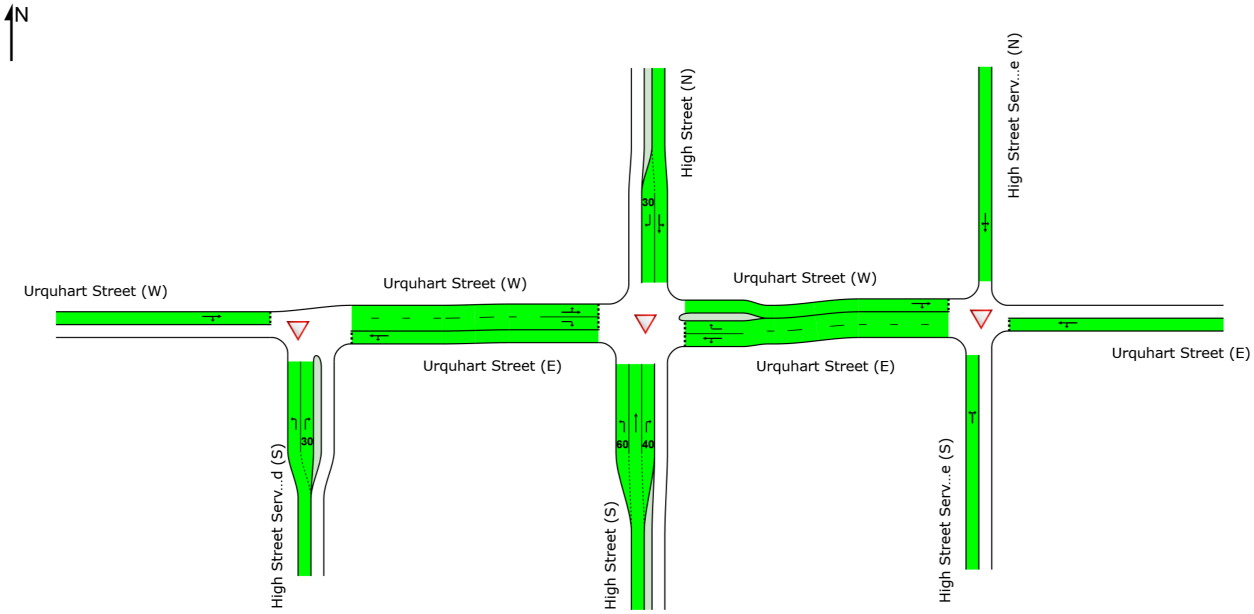
Delay Model: SIDRA Standard (Geometric Delay is included).

DEGREE OF SATURATION

Ratio of Demand Volume to Capacity, v/c ratio per lane

Network: N101 [I-01A; Urquhart Street / High Street - AM Peak (Network Folder: Networked Sites - AM Peak)]

New Network
Network Category: (None)



Colour code based on Degree of Saturation

[< 0.6]	[0.6 – 0.7]	[0.7 – 0.8]	[0.8 – 0.9]	[0.9 – 1.0]	[> 1.0]

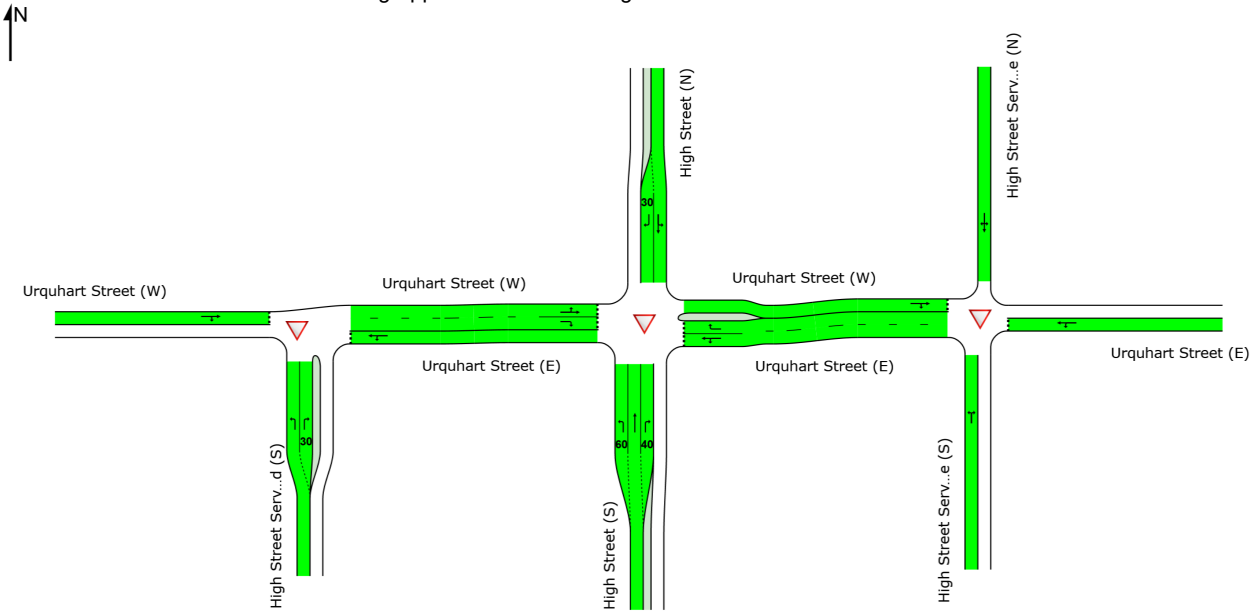
QUEUE STORAGE RATIO (PERCENTILE)

Ratio of the 95% Back of Queue Distance to the available queue storage distance per lane

Network: N101 [I-01A; Urquhart Street / High Street - AM Peak (Network Folder: Networked Sites - AM Peak)]

New Network
Network Category: (None)

Short Lanes not included in determining Approach Queue Storage Ratios.



Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0]

Queue Model: SIDRA Standard.

LANE SUMMARY

Site: [I-01A; Urquhart Street / High Street - PM Peak - Main Intersection (Site Folder: Networked Sites - PM Peak)]

Network: N101 [I-01A; Urquhart Street / High Street - PM Peak (Network Folder: Networked Sites - PM Peak)]

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

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: High Street (S)															
Lane 1	106	6.0	106	6.0	1781	0.060	100	5.6	LOS A	0.0	0.0	Short	60	0.0	NA
Lane 2	432	6.0	432	6.0	1868	0.231	100	0.0	LOS A	0.0	0.0	Full	300	0.0	0.0
Lane 3	115	6.0	115	6.0	988	0.116	100	8.0	LOS A	0.5	3.6	Short	40	0.0	NA
Approach	653	6.0	653	6.0		0.231		2.3	NA	0.5	3.6				
East: Urquhart Street (E)															
Lane 1	113	6.0	113	6.0	219	0.514	100	27.6	LOS D	2.3	17.0	Full	18	0.0	3.3
Lane 2	37	6.0	37	6.0	163	0.226	100	24.9	LOS C	0.7	5.1	Full	18	0.0	0.0
Approach	149	6.0	149	6.0		0.514		27.0	LOS D	2.3	17.0				
North: High Street (N)															
Lane 1	518	6.0	518	6.0	1858	0.279	100	0.5	LOS A	0.0	0.0	Full	250	0.0	0.0
Lane 2	132	6.0	132	6.0	751	0.175	100	8.9	LOS A	0.7	5.1	Short	30	0.0	NA
Approach	649	6.0	649	6.0		0.279		2.2	NA	0.7	5.1				
West: Urquhart Street (W)															
Lane 1	176	6.0	176	6.0	489	0.359	100	11.0	LOS B	1.6	11.7	Full	40	0.0	0.0
Lane 2	48	6.0	48	6.0	171	0.283	100	25.9	LOS D	0.9	6.6	Full	40	0.0	0.0
Approach	224	6.0	224	6.0		0.359		14.2	LOS B	1.6	11.7				
Intersection	1676	6.0	1676	6.0		0.514		6.1	NA	2.3	17.0				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network 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).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Approach Lane Flows (veh/h)

South: High Street (S)

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	106	-	-	106	6.0	1781	0.060	100	0.0	2
Lane 2	-	432	-	432	6.0	1868	0.231	100	NA	NA
Lane 3	-	-	115	115	6.0	988	0.116	100	0.0	2
Approach	106	432	115	653	6.0		0.231			

East: Urquhart Street (E)

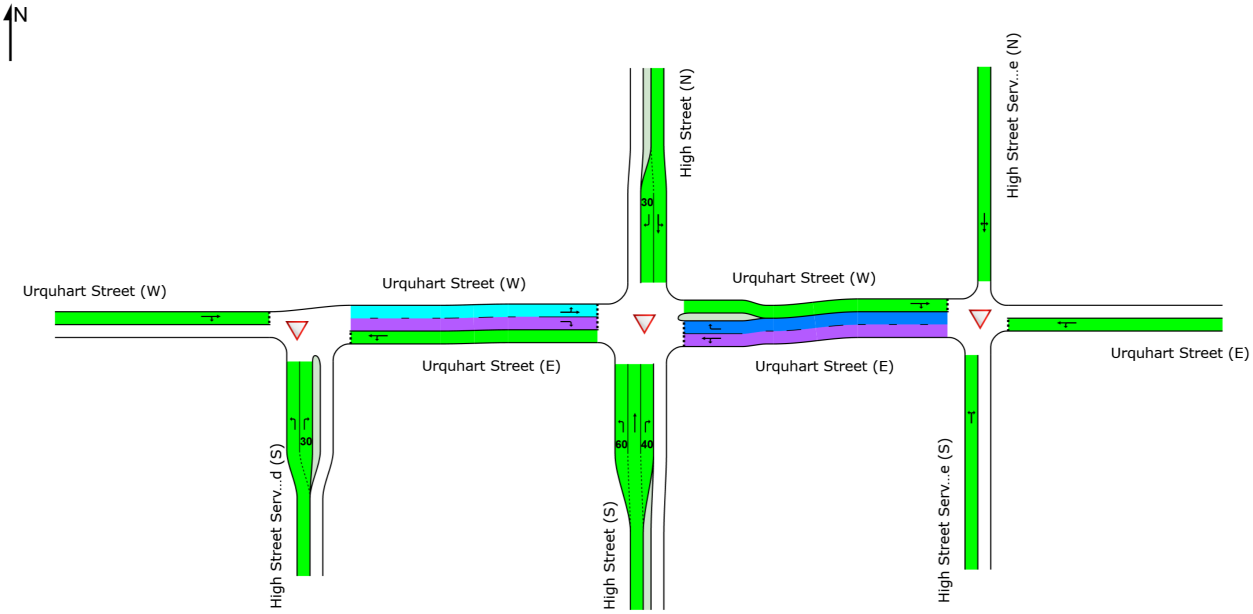
Mov. From E	L2	T1	R2	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL Ov.	Ov. Lane

LEVEL OF SERVICE

Lane Level of Service

Network: N101 [I-01A; Urquhart Street / High Street - PM Peak (Network Folder: Networked Sites - PM Peak)]

New Network
Network Category: (None)



Colour code based on Level of Service

LOS A	LOS B	LOS C	LOS D	LOS E	LOS F

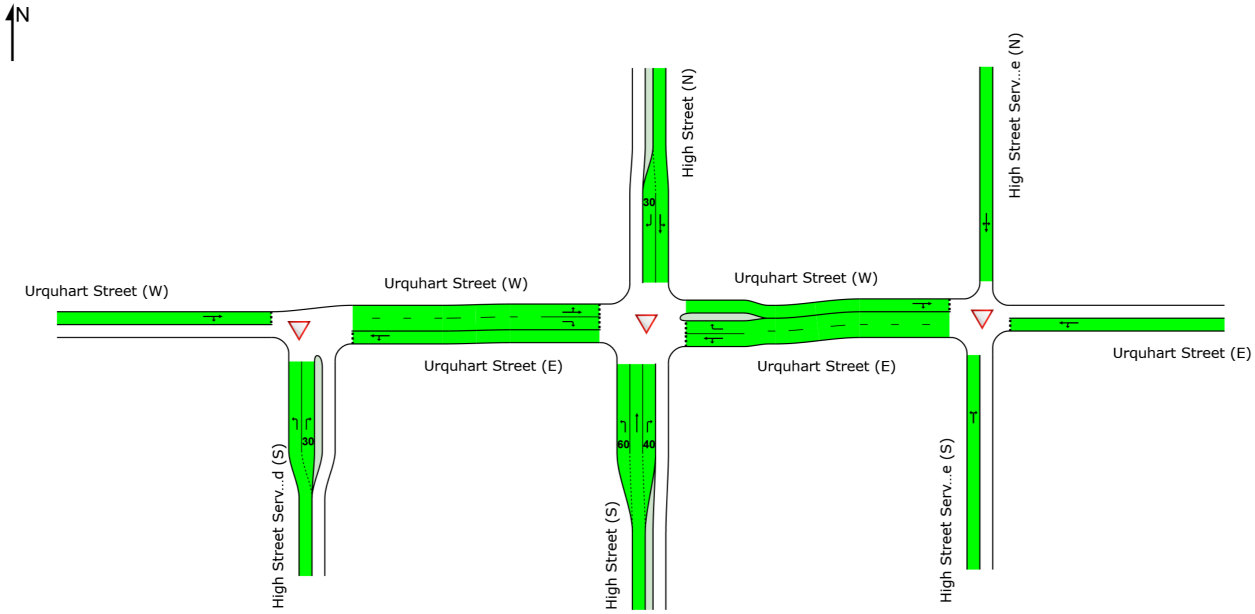
Delay Model: SIDRA Standard (Geometric Delay is included).

DEGREE OF SATURATION

Ratio of Demand Volume to Capacity, v/c ratio per lane

Network: N101 [I-01A; Urquhart Street / High Street - PM Peak (Network Folder: Networked Sites - PM Peak)]

New Network
Network Category: (None)



Colour code based on Degree of Saturation

[< 0.6]	[0.6 – 0.7]	[0.7 – 0.8]	[0.8 – 0.9]	[0.9 – 1.0]	[> 1.0]

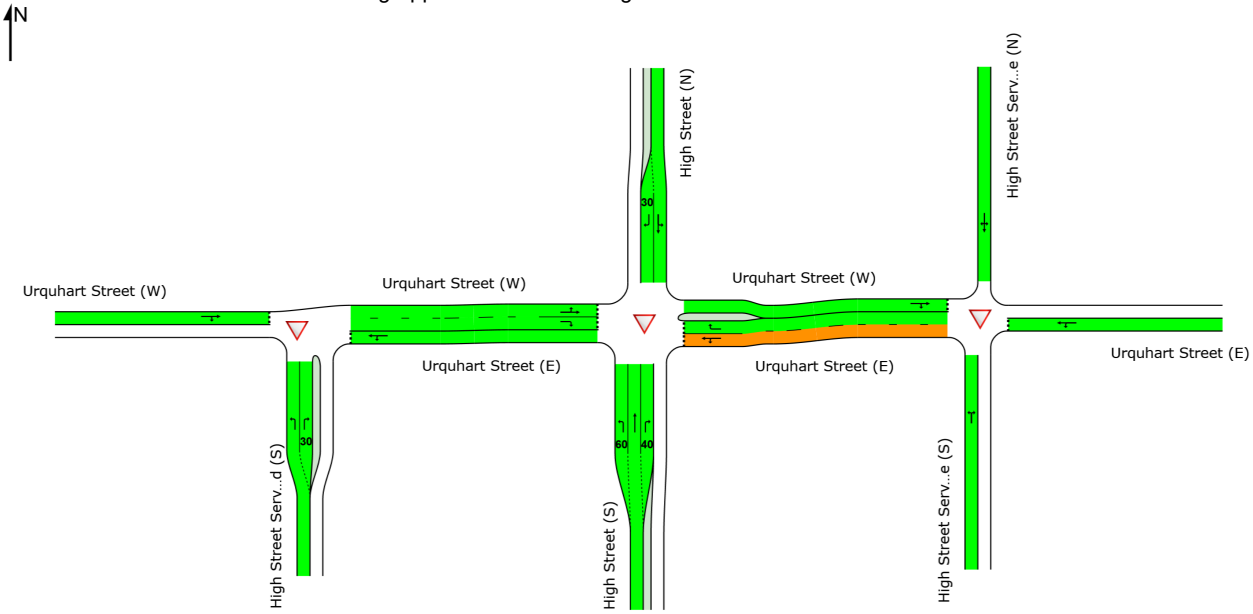
QUEUE STORAGE RATIO (PERCENTILE)

Ratio of the 95% Back of Queue Distance to the available queue storage distance per lane

Network: N101 [I-01A; Urquhart Street / High Street - PM Peak (Network Folder: Networked Sites - PM Peak)]

New Network
Network Category: (None)

Short Lanes not included in determining Approach Queue Storage Ratios.



Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0]

Queue Model: SIDRA Standard.

LANE SUMMARY

Site: [I-01A; Urquhart Street / High Street - Sat Peak - Main Intersection (Site Folder: Networked Sites - Sat Peak)]

Network: N101 [I-01A; Urquhart Street / High Street - Sat Peak (Network Folder: Networked Sites - Sat Peak)]

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

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: High Street (S)															
Lane 1	95	6.0	95	6.0	1781	0.053	100	5.6	LOS A	0.0	0.0	Short	60	0.0	NA
Lane 2	462	6.0	462	6.0	1873	0.247	100	0.0	LOS A	0.0	0.0	Full	300	0.0	0.0
Lane 3	58	6.0	58	6.0	1146	0.051	100	7.2	LOS A	0.2	1.6	Short	40	0.0	NA
Approach	615	6.0	615	6.0		0.247		1.6	NA	0.2	1.6				
East: Urquhart Street (E)															
Lane 1	93	6.0	93	6.0	276	0.336	100	17.5	LOS C	1.3	9.7	Full	18	0.0	0.0
Lane 2	38	6.0	38	6.0	204	0.186	100	19.4	LOS C	0.6	4.2	Full	18	0.0	0.0
Approach	131	6.0	131	6.0		0.336		18.0	LOS C	1.3	9.7				
North: High Street (N)															
Lane 1	404	6.0	404	6.0	1858	0.218	100	0.4	LOS A	0.0	0.0	Full	250	0.0	0.0
Lane 2	137	6.0	137	6.0	729	0.188	100	9.1	LOS A	0.7	5.5	Short	30	0.0	NA
Approach	541	6.0	541	6.0		0.218		2.6	NA	0.7	5.5				
West: Urquhart Street (W)															
Lane 1	183	6.0	183	6.0	578	0.317	100	9.0	LOS A	1.4	10.0	Full	40	0.0	0.0
Lane 2	61	6.0	61	6.0	221	0.276	100	20.5	LOS C	0.9	6.7	Full	40	0.0	0.0
Approach	244	6.0	244	6.0		0.317		11.9	LOS B	1.4	10.0				
Intersection	1531	6.0	1531	6.0		0.336		5.0	NA	1.4	10.0				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network 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).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Approach Lane Flows (veh/h)

South: High Street (S)

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	95	-	-	95	6.0	1781	0.053	100	0.0	2
Lane 2	-	462	-	462	6.0	1873	0.247	100	NA	NA
Lane 3	-	-	58	58	6.0	1146	0.051	100	0.0	2
Approach	95	462	58	615	6.0		0.247			

East: Urquhart Street (E)

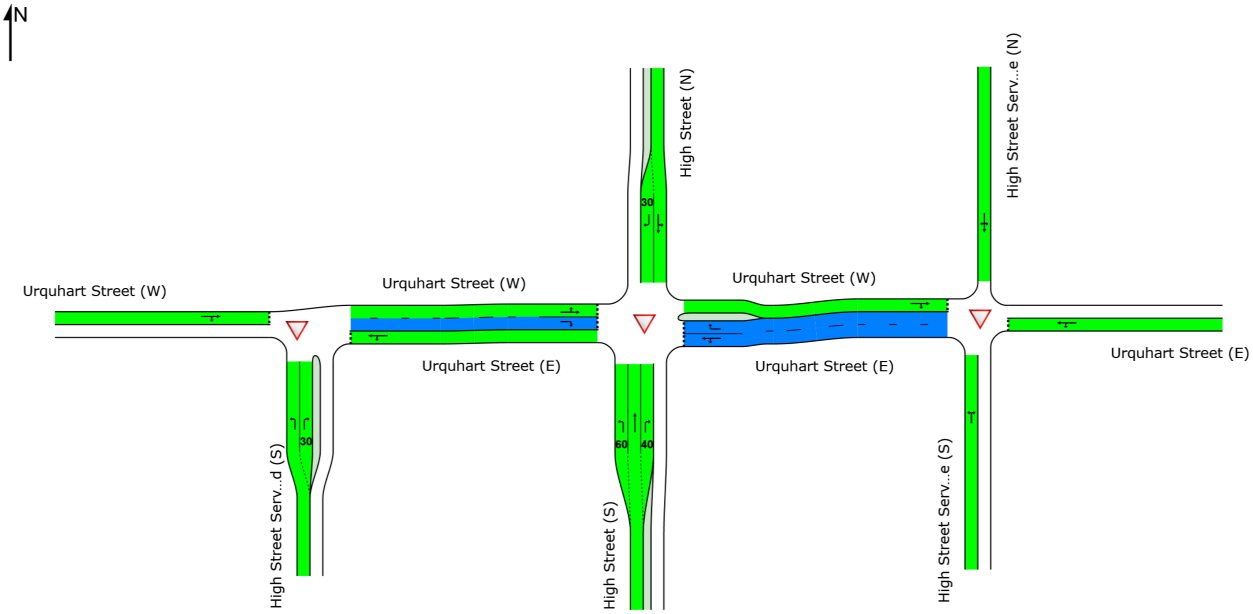
Mov. From E	L2	T1	R2	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL Ov.	Ov. Lane

LEVEL OF SERVICE

Lane Level of Service

Network: N101 [I-01A; Urquhart Street / High Street - Sat Peak (Network Folder: Networked Sites - Sat Peak)]

New Network
Network Category: (None)



Colour code based on Level of Service

LOS A	LOS B	LOS C	LOS D	LOS E	LOS F

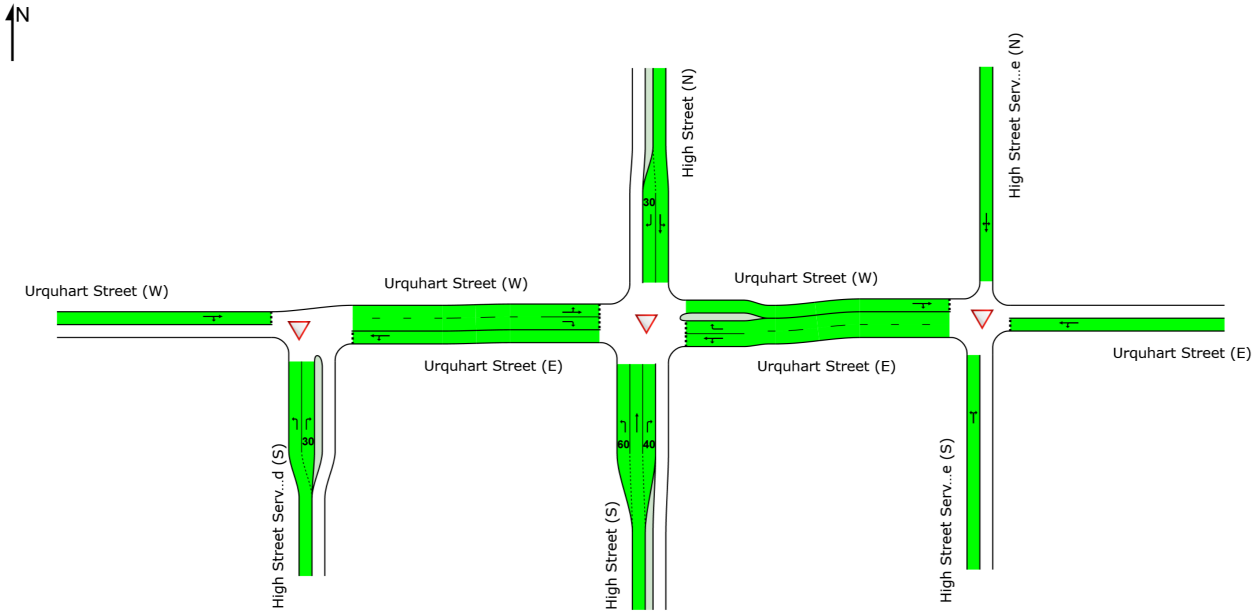
Delay Model: SIDRA Standard (Geometric Delay is included).

DEGREE OF SATURATION

Ratio of Demand Volume to Capacity, v/c ratio per lane

Network: N101 [I-01A; Urquhart Street / High Street - Sat Peak (Network Folder: Networked Sites - Sat Peak)]

New Network
Network Category: (None)



Colour code based on Degree of Saturation

[< 0.6]	[0.6 – 0.7]	[0.7 – 0.8]	[0.8 – 0.9]	[0.9 – 1.0]	[> 1.0]

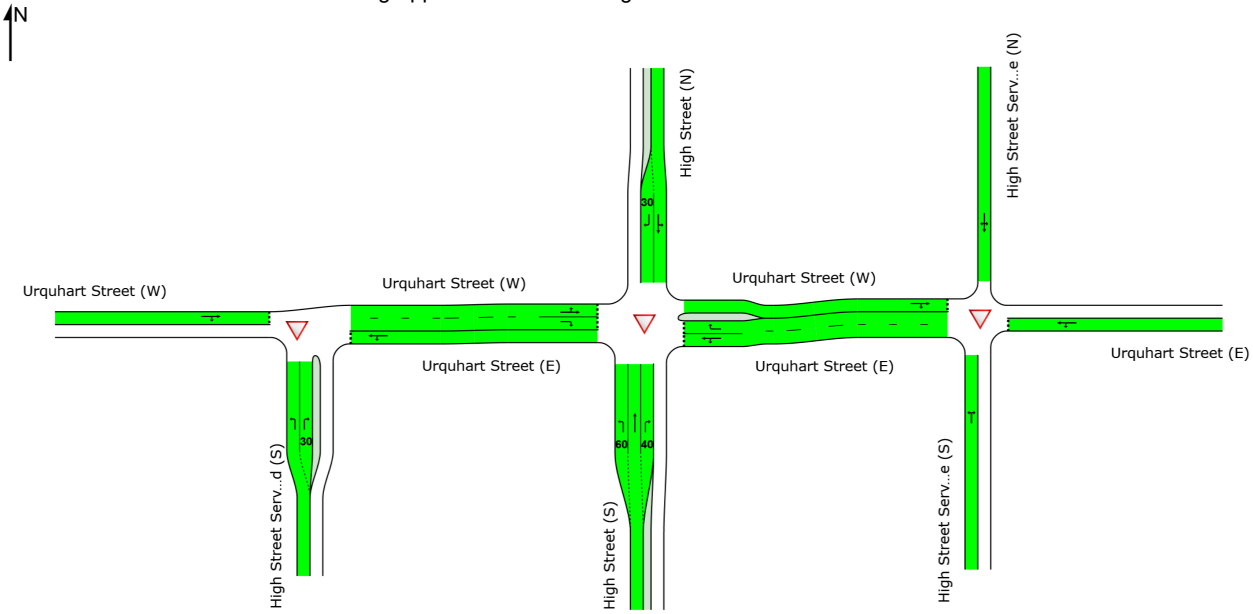
QUEUE STORAGE RATIO (PERCENTILE)

Ratio of the 95% Back of Queue Distance to the available queue storage distance per lane

Network: N101 [I-01A; Urquhart Street / High Street - Sat Peak (Network Folder: Networked Sites - Sat Peak)]

New Network
Network Category: (None)

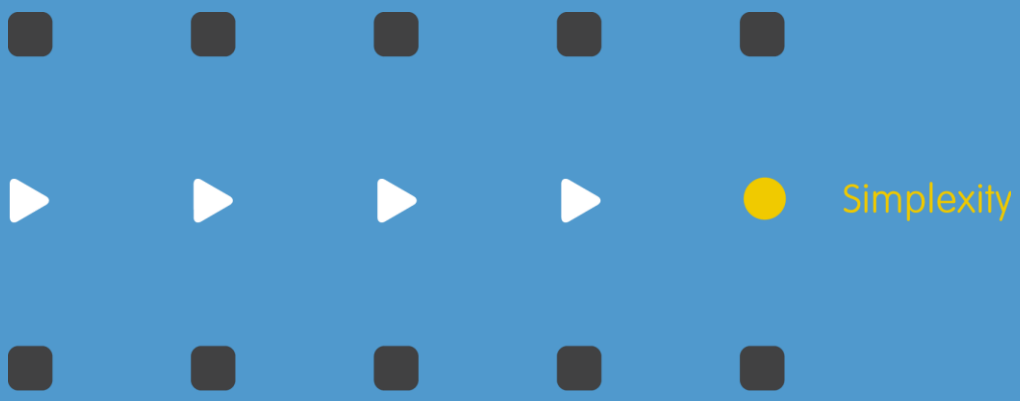
Short Lanes not included in determining Approach Queue Storage Ratios.



Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0]

Queue Model: SIDRA Standard.


Simplexity