Genesis Traffic

Traffic Impact Assessment

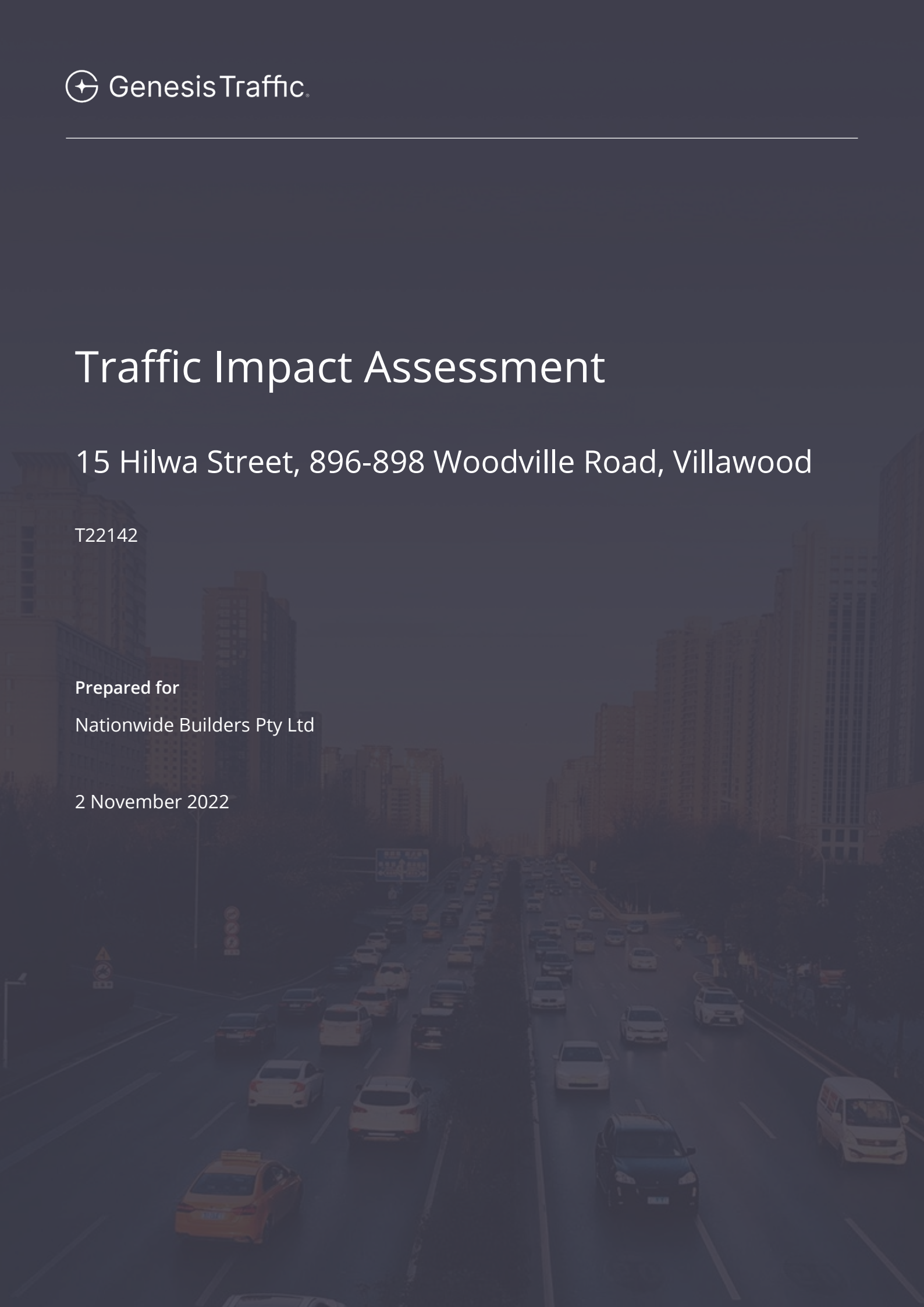
15 Hilwa Street, 896-898 Woodville Road, Villawood

T22142

Prepared for

Nationwide Builders Pty Ltd

2 November 2022



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Document Information

Report	Traffic Impact Assessment
Prepared for	Nationwide Builders Pty Ltd
Architects	Tony Owen Partners,
Project Name	15 Hilwa Street, 896-898 Woodville Road, Villawood
Council	Fairfield City Council
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Version	Effective Date	Description of Revision	Prepared by	Reviewed by
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2	13/07/2022	1	Lamone Ng	Bernard Lo
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4	21/11/2022	For Issue	Lamone Ng	Bernard Lo

Table of Contents

Attachments

Tables

Figures

1 Introduction

1.1 Background

This report has been prepared to accompany a Planning Proposal to Fairfield City Council to increase building height and floor space ratio to permit a mixed-use development on a site at 15 Hilwa Street, 896-898 Woodville Road, Villawood (Figure 1-1).

Figure 1-1 Site

Source: Tony Owen Partners

1.2 Scope of Works

The purpose of this report is to:

- describe the site, its context and the planning proposal

- describe the road network serving the site and the prevailing traffic conditions
- assess the potential traffic implications arising from the intensified uses
- assess the suitability of the envisaged parking provision
- assess, on a high level, the suitability of the envisaged access roads and provision for servicing

1.3 Reference Documents

Reference has been made to the following documents when preparing this report:

- AS2890 (Australian/NZ Standards, 2004)
- Development Control Plan (Fairfield City Council, 2013)
- RMS Guide to Traffic Generating Developments, RTA, 2002
- ARRB 25th Conference Publication Extract, Perth, Australia 2012

2 Existing Conditions

2.1 Site and Surrounding Context

The development site (Figure 2-1) has frontages to Woodville Road (40m), Hilwa Street (18m) and Howatt Street (30m) and occupies an irregularly shaped area of approximately 3,225m^2. This consists of a large rectangular block on the corner of Woodville Road and Howatt Street between Hilwa Street and Woodville Road.

Figure 2-1 Site Context

Source: Nearmap

Adjoining the site is a service station with frontage to Woodville Road. To the north (across Howatt Street) is a multi-storey mixed-use complex also developed by the proponent of this Planning Proposal.

Existing land uses on the site are primarily bulky goods retail. Vehicle accesses are located at Woodville Road and Howatt Street.

2.2 Road Network

The road network serving the site area comprises:

- Hume Highway – a State Highway and arterial route for both inter and intra-state travel
- Woodville Road – a State Road and arterial route connecting Great Western Highway/M4 and Hume Highway
- Henry Lawson Drive – a State Road and sub-arterial route connecting Hume Highway and M5/Milperra Road
- Christina Road – part of a Regional Road and collector route connecting Carramar and Regents Park, which interchanges with Woodville Road (via on/off ramps)
- The Horsley Drive – a sub-arterial road connecting Hume Highway and Cumberland Highway
- Llewellyn Avenue, Villawood Road and Wattle Avenue are minor collector routes connecting Villawood and Carramar.
- Villawood Place/Howatt Street– part of a local road system off Woodville Road providing access to the local Villawood shop
- Kamira Circuit– a local one-way access road connecting Kamira Avenue and Villawood Road
- Kirang Avenue – a collector road connecting local streets to Woodville Road
- Hilwa Street – a local road and a dead-end cul-de-sac

2.3 Traffic Controls

The traffic controls on the road system in the vicinity of the site comprise:

- the traffic signal controls along Woodville Road at the Villawood Road, Binna Burra Street, Kirang Avenue and Hume Highway intersections
- the pedestrian mid-block traffic signals on River Avenue just to the north of the station
- the roundabout at the Llewellyn Avenue and Marple Avenue intersection
- the Bus Only right turn lane from Woodville Road to Howatt Street (southbound)
- the PM (3-7pm) right turn restriction from Woodville Road to Kirang Road (southbound)
- the one-way restriction in the Kamira Circuit carpark and Cheryl Lane

2.4 Public Transport Services

Villawood Railway Station is located 300m to the north on River Avenue. It provides high-frequency train services on the following lines and services:

- T2 line connecting with Parramatta, Leppington and the Sydney CBD

- T3 line connecting with Liverpool CBD, Lidcombe, Bankstown, and Sydney CBD

Local facilities in the railway station include a commuter car park and bicycle racks

3 Proposed Development

A Planning Proposal is to be lodged with Fairfield City Council to change its minimum lot size, building height, floor space ratio (FSR), and zoning.

Under the amended development parameters, it is envisaged that the building envelope could enable the development of the following:

- A retail floor plate of up to 2,350m^2 GFA (plus associated back-of-house facilities)
- Up to 135 residential units in the following mix:
    - 36 x 1 Bed
    - 78 x 2 Bed
    - 16 x 3 Bed
- Dedicated service and loading dock
- Basement car park for retail customers (Class 3)
- Basement car park for residents and visitors (Class 1)

The envisaged vehicle access arrangement would involve:

- a commercial vehicle access at Howatt Street (to the retail car park and loading dock)
- a residential car park access at Hilwa Street

Details of the envisaged development scheme, which are prepared by Tony Owen Partners, are reproduced in part in Attachment 1.

4 Parking Assessment

4.1 Car Parking Requirements

Residential

Due to the site's proximity to the local railway station, the provisions made in the ADG SEPP 65 will be applicable to the proposal's residential component. The relevant parking criteria are summarised in Table 4-1.

Table 4-1 Car Parking Requirements

Element	ADG Rate	Min. Requirement
36 x one-bedroom apartments	0.6	22
78 x two-bedroom apartments	0.9	70
16 x three-bedroom apartments	1.4	22
Residential visitors (127)	0.2	27
Sub Total		**141 spaces**

Retail/Commercial

Council's approved retail parking rate for the adjoining 1 Villawood Place and 47 Pedestrian Plaza is 1 space per 40m^2. On the same basis, the retail GFA of 2,350m^2 would indicate a requirement of 59 spaces.

Thus, the total development car parking requirement is summarised in Table 4-2.

Table 4-2 Parking Requirement

Element	Min. Requirement
Residents	114
Residential visitors	27
Retail/Commercial	59
Total	**200 spaces**

Proposed Provision

It is proposed to provide the necessary quantum of parking spaces in the basement to comply with the above criteria. The residential and commercial/retail car parking area will be separated, with the residential access located at Hilwa Street (a local street) and the commercial access located at Howatt Street (a town centre access road).

4.2 Bicycle Parking Assessment

The DCP specifies the following criteria for bicycle storage:

- Residents 1 space per 3 apartments
- Commercial 1 space per 300 sqm

Application of the above would indicate in Table 4-3:

Table 4-3 Bicycle Parking Requirements

Element	Unit	DCP
Apartments	135	45
Commercial Space	2,350m^2	8
Total		**53 spaces**

The proposed car park will accommodate the necessary quantum of bicycle storage in accordance with the DCP objective.

4.3 Access

The site is fronted by Woodville Road (State Road), Hilwa Street (residential dead-end Local Road), and Howatt Street (Town Centre Local Road).

The TfNSW's design principle is to prohibit site access to State/owned or managed road frontage for sites with a lower-order alternative road frontage. For this reason, the site accesses could only be gained via either Hilwa Street and Howatt Street.

Because Hilwa Street is a residential dead end local road, it is unsuitable for retail traffic. For this reason, it is proposed to assign the residential car park access at Hilwa Street. The retail and commercial car park (including loading dock access) will be located at Howatt Street.

4.4 Internal Circulation & Design

The car park layout has regard to the relevant AS2890.1 and AS2890.2 principles, particularly in relation to:

- Car park geometry
- Driveway width
- Ramp grades & Transitions
- Headroom
- Turning provision

A detailed review of the car park will be undertaken during the DA stage assessment.

5 Servicing Arrangement

A loading area will be provided onsite and accessed via Howatt Street. It is envisaged that the loading area will accommodate a 12.5m Heavy Rigid Vehicle (HRV).

Garbage collection for the commercial development will also occur at the proposed loading bay by a private waste contractor. The largest nominated waste collection vehicle is a 10.5m HRV.

The proposed loading dock will be subject to a detailed design review to ensure compliance with the relevant AS2890.2 criteria in the subsequent Traffic Impact Assessment.

6 Traffic Assessment

6.1 Existing Traffic Circumstance

Traffic surveys were commissioned as part of this assessment to record the AM peak and PM peak traffic flows for the following relevant intersections:

- Woodville Road / Villawood Road
- Villawood Road / Villawood Place
- Woodville Road / Howatt Street
- Woodville Road / Kirang Avenue

An indication of prevailing traffic operations at these intersections is provided in the SIDRA assessment (Table 6-1).

Table 6-1 Existing Intersection Traffic Circumstance

Intersection	AM Peak		PM Peak	
	LOS	AVD	LOS	AVD
Woodville Road / Villawood Road	B	15.1s	D	40.4s
Villawood Road / Villawood Place	A	4.2s	A	4.5s
Woodville Road / Howatt Street	B	15.9s	B	13.1s
Woodville Road / Kirang Avenue	A	14.3s	B	18.1s

Details of the model output are reproduced in Attachment 2.

The assessment found the intersections to operate satisfactorily under the Council's models' traffic demand and there is no apparent capacity constraint in the local road network.

6.2 Existing Site Traffic Generation

The RMS Guide to Traffic Generating Development (RMSGTGD) reveals a peak hour traffic generation rate for a single dwelling of 0.88 vehicle trips per hour (vtph). Therefore, the two dwellings currently on the site would generate up to 2 vtph.

The existing commercial premises on the site is approximately 800 sqm in GFA. The RMSGTGD provides a rate of 2 vtph per 100 sqm GFA. On this basis, the existing uses would generate some 16 vtph.

The total existing traffic generation outcome is assessed to be approximately 18 vtph.

6.3 Development Traffic Generation

Residential

The updated Technical Direction TDT 2013/04a provides revised trip generation rates for high-density residential apartment blocks. The relevant trip rates are as follows:

- 0.19 vtph per unit during the morning peak hour
- 0.15 vtph per unit during the evening peak hour

Application of these trip rates to the 135 proposed residential units would indicate a peak hour traffic generation outcome in Table 6-2.

Table 6-2 Traffic Generation During Peak Hour

Period	Total	In	Out
AM peak	25 vtph	5 vtph	20 vtph
PM peak	20 vtph	15 vtph	5 vtph

Retail

The RMSGTTD provides a peak evening peak traffic generation rate of 12.5 vtph per 100m^2 GFA for retail floor space. Retail peak traffic does not coincide with the AM peak. Application of the RMS rate to the proposed commercial floor space would indicate a peak hour traffic generation outcome of 293 vtph.

It is pertinent to note that the traffic generation is largely associated with the retail supermarket. A unique feature of supermarket developments is that their traffic generation are typically not entirely new to the road network. A proportion of the patronage will be associated with traffic movements that are already existing on the network at present. A Study published by the Australian Road Research Board (ARRB)[1] reveals the trip composition for supermarkets in Table 6-3.

Table 6-3 Proportion of Supermarket Traffic Generation

Trip type	Proportion	Function
Primary	35-45%	Sole purpose – new trip
Pass-by	20-25%	Passing trip (along the way)
Diverted	40%	Passing trip (a diversion from nearby road network)

Based on the above, the 'new' traffic is comprised of the 'primary' and 'diverted' trips, i.e., 85% (45% + 40%). On this basis, the retail traffic generation is projected as 250 vtph or 125 vtph each way during the PM peak.

[1] ARRB 25th Conference, Perth, Australia 2012

6.4 Overall Traffic Generation

Having regard to the above, the net traffic generation outcome is tabulated in Table 6-4.

Table 6-4 Net Peak Hour Traffic Generation

	AM Peak (vtph)		PM Peak (vtph)	
Period	In	Out	In	Out
(Existing)	0	-2	-2	0
Residential	5	19	15	4
Commercial	-*	-*	125	125
Net Traffic	**5**	**17**	**138**	**138**

**Supermarket retail does not peak during the AM peak*

6.5 Traffic Distribution

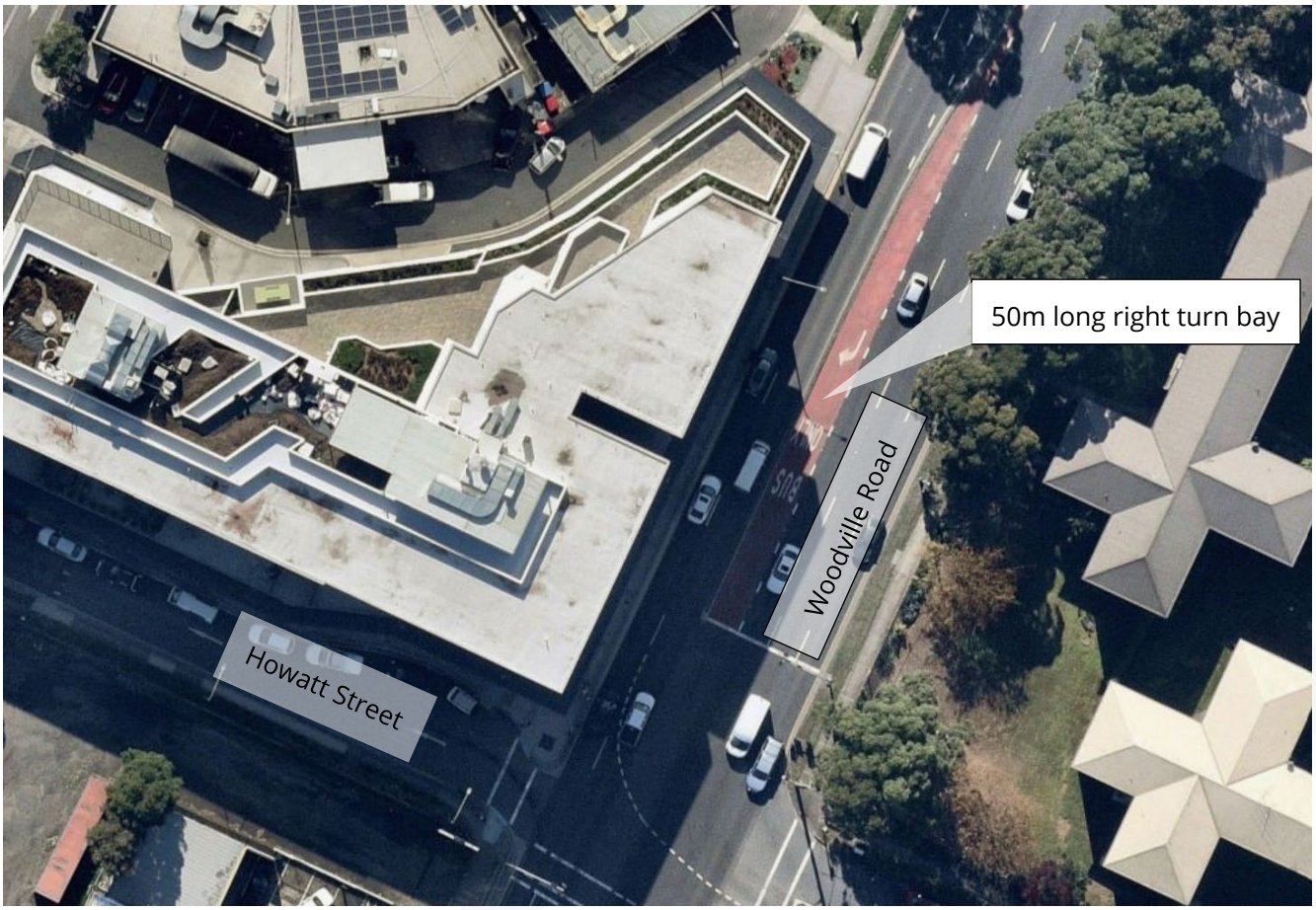
Reference is made to the Council's commissioned Stantec mesoscopic model (as published in the Traffwise TIA) which reveals the following predominant in/outbound directions in Table 6-5.

Table 6-5 Proportion of Inbound and Outbound Traffic

Direction	Inbound	Outbound
Woodville Road (north)	34%	42%
Binna Burra Street (east)	2%	-
Woodville Road (south & west)	64%	58%

It is noted that the southbound right-turn movement from Woodville Road to Howatt Street is currently restricted to buses only (details in Figure 6-1 overleaf). The assessment recommends amending this restriction to allow other vehicles to use the 50m long right turn bay.

Figure 6-1 Intersection of Woodville Road and Howatt Street



Source: Nearmap

On this basis, a SIDRA assessment was undertaken to quantify the development's PM peak traffic impact (worst-case scenario) on the existing road network.

Based on the above, the development's projected traffic distribution is diagrammatically indicated in Figures 6-2 (Residential) and 6-3 (Commercial).

Figure 6-2 Development Traffic Distribution (Residential)

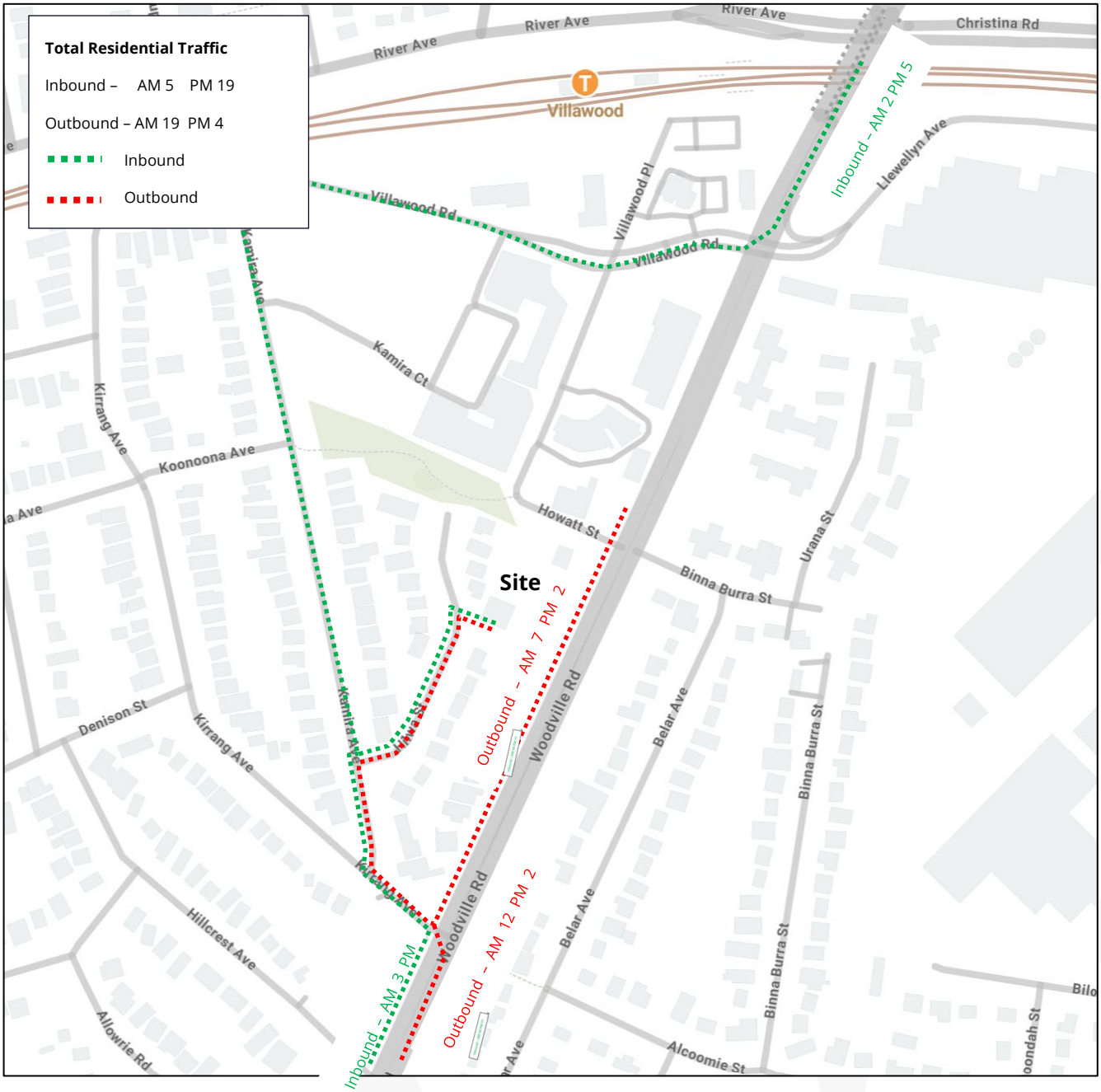


Image Source: Mecone

Figure 6-3 Development Traffic Distribution (Commercial)

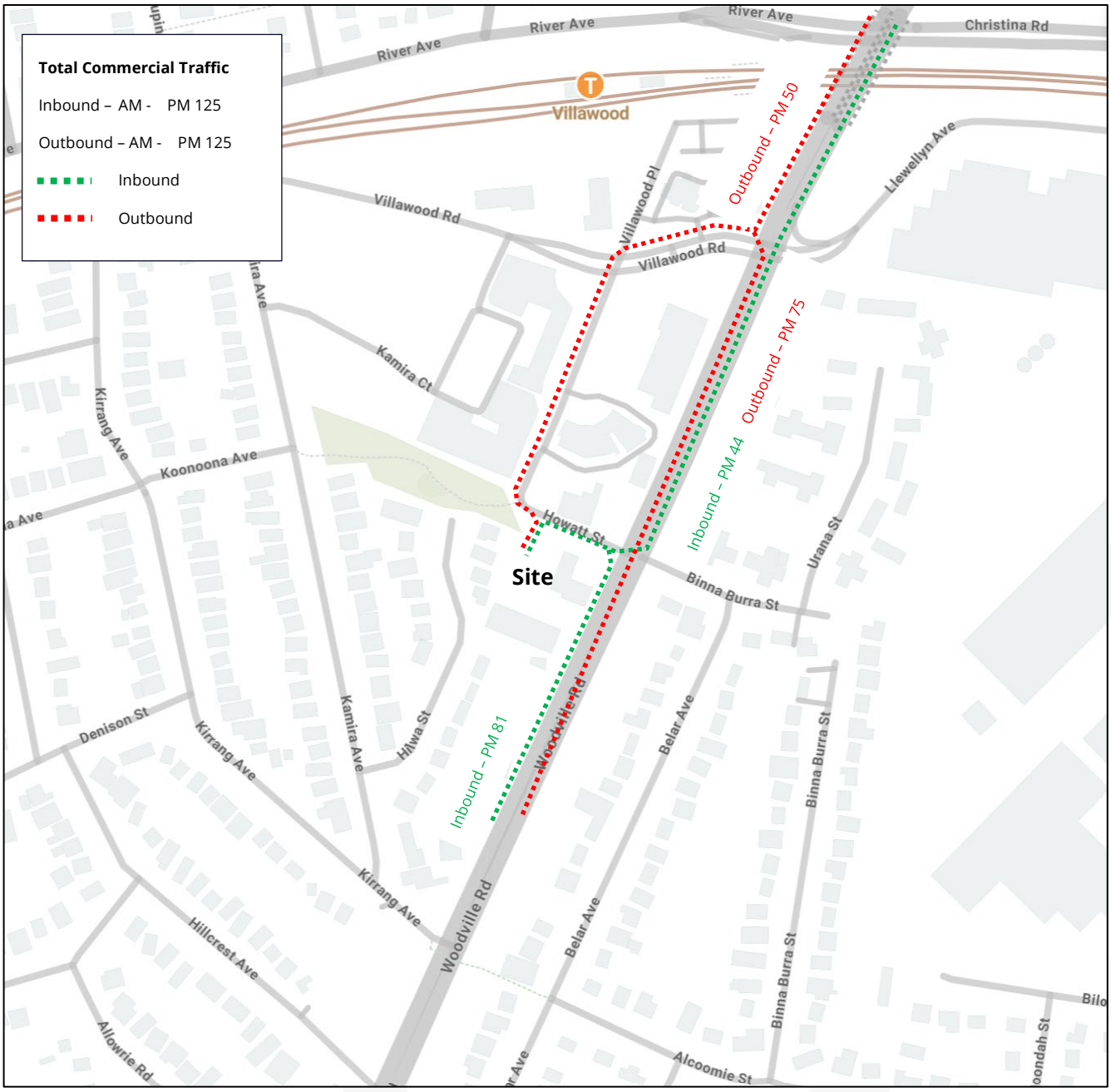


Image Source: Mecone

The assessment outcome is provided in Attachment 2 and summarised in Table 6-6.

Table 6-6 Existing and Post Development Traffic Generation Outcome

Intersection	AM Peak		PM Peak	
	LOS	AVD	LOS	AVD
Existing				
Woodville Road / Villawood Road	B	15.1s	D	40.4s
Villawood Road / Villawood Place	A	4.2s	A	4.5s
Woodville Road / Howatt Street	B	15.9s	B	13.1s
Woodville Road / Kirang Avenue	A	7.6s	A	8.6s
Post Development				
Woodville Road / Villawood Road	*Not critical in assessment period*		E	78.7s
Villawood Road / Villawood Place			A	4.8s
Woodville Road / Howatt Street			B	15.6s
Woodville Road / Kirang Avenue			A	8.7s

The assessment found the intersection of Woodville Road and Villawood Road to downgrade from LOS D to LOS E following the development's occupation. Other intersections in the road network will continue to operate with ample spare capacity.

7 Conclusion

The traffic and parking assessment undertaken for the proposed Planning Proposal at 15 Hilwa Street, 896-898 Woodville Road, Villawood has concluded that:

- the site benefits from good accessibility to local transport services and connectivity to the Villawood Town Centre
- the existing intersections in the vicinity of the site have been shown to operate with adequate levels of service and minimal delays
- the envisaged parking provision will be consistent with the SEPP 65 and DCP criteria
- the projected traffic generation outcome will be some 138 vtph each way during the busiest PM peak
- the existing road network will remain within capacity following the development, although the Woodville Road/ Villawood Road intersection will operate near capacity during the busier PM peak
- it is recommended that the existing bus-only right turn bay from Woodville Road to Howatt Street be modified to permit all vehicles to turn right
- the proposed site access arrangement represents an outcome that complies with the TfNSW's planning principles and preservation of residential amenities at Hilwa Street.
- the proposed access design, internal circulation and service arrangement will have regard for the relevant AS2890 design requirements.

Attachment 1

Architectural Plans

Residential
Commercial
Retail
Service

WOODVILLE RD

HOWATT ST

POTENTIAL BREAKTHROUGH FOR
ACCESS TO NEIGHBOUR'S SITE
FOR PARKING AREA

TYPICAL RESIDENTIAL PARKING

RAMP

PLANT

6000
6000
6000
6000
6000
6000
6000
6000
6671
3000
3000

0 5 10 20

Rev.	Description	By	Date
A	PLANNING PROPOSAL SUBMISSION	DL	06/2022
B	REVISION	AI	10/2022

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BUILDER TO CHECK ALL SITE DIMENSIONS PRIOR TO FABRICATION OF FITMENTS

Legend

DRAWING LABEL

BASEMENT B3 PLAN

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Project
896 WOODVILLE ROAD
VILLAWOOD

Project address

Key plan

Scale
Date October 2022

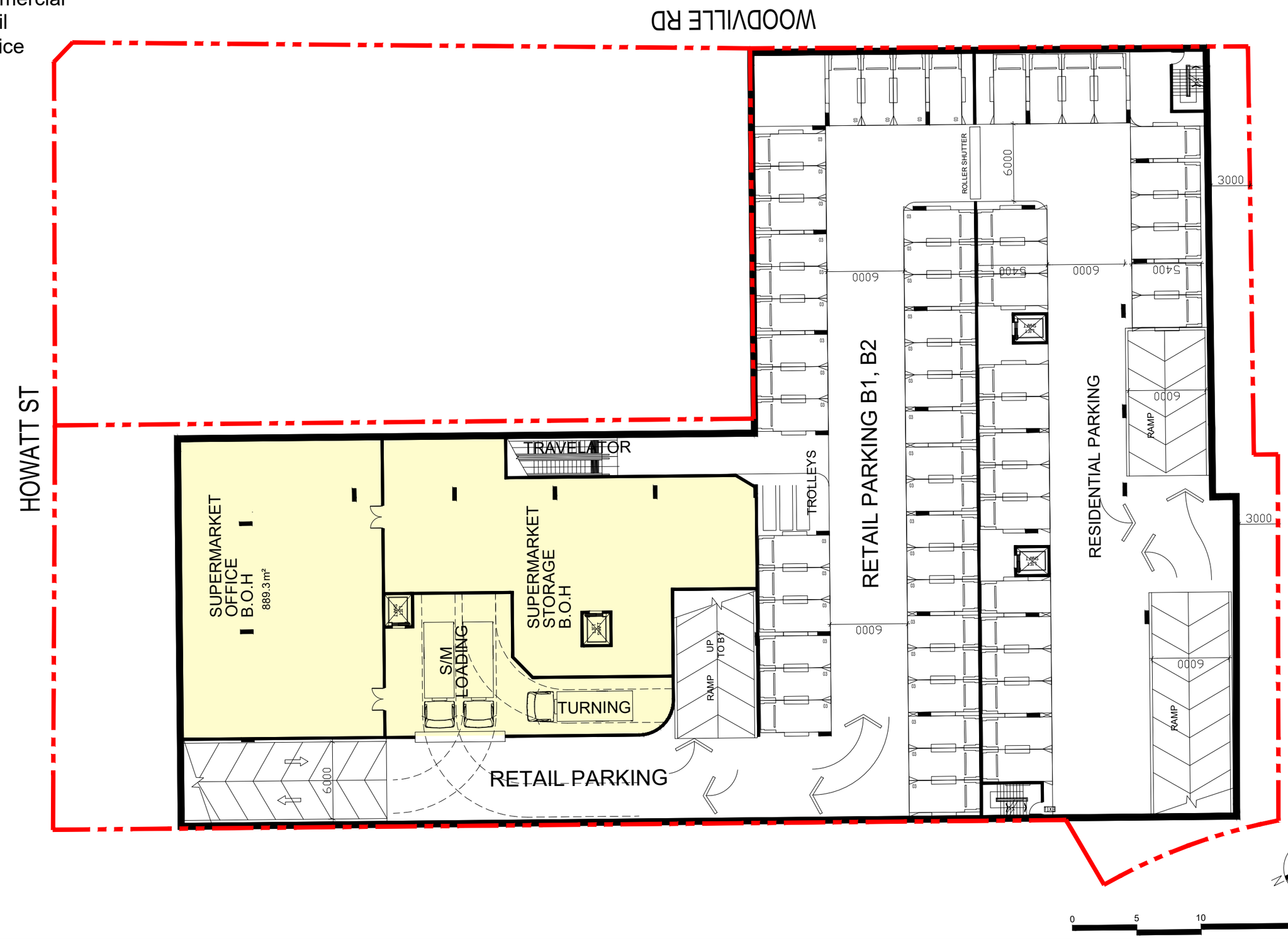
Drawing title

Project no. 1051
Drawing no.

Drawn DL

Drawing status
PLANNING PROPOSAL

Residential
Commercial
Retail
Service



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Legend

DRAWING LABEL

BASEMENT B1/B2 PLAN

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Project
896 WOODVILLE ROAD VILLAWOOD

Project address

Key plan

Scale
Date October 2022
Drawing title
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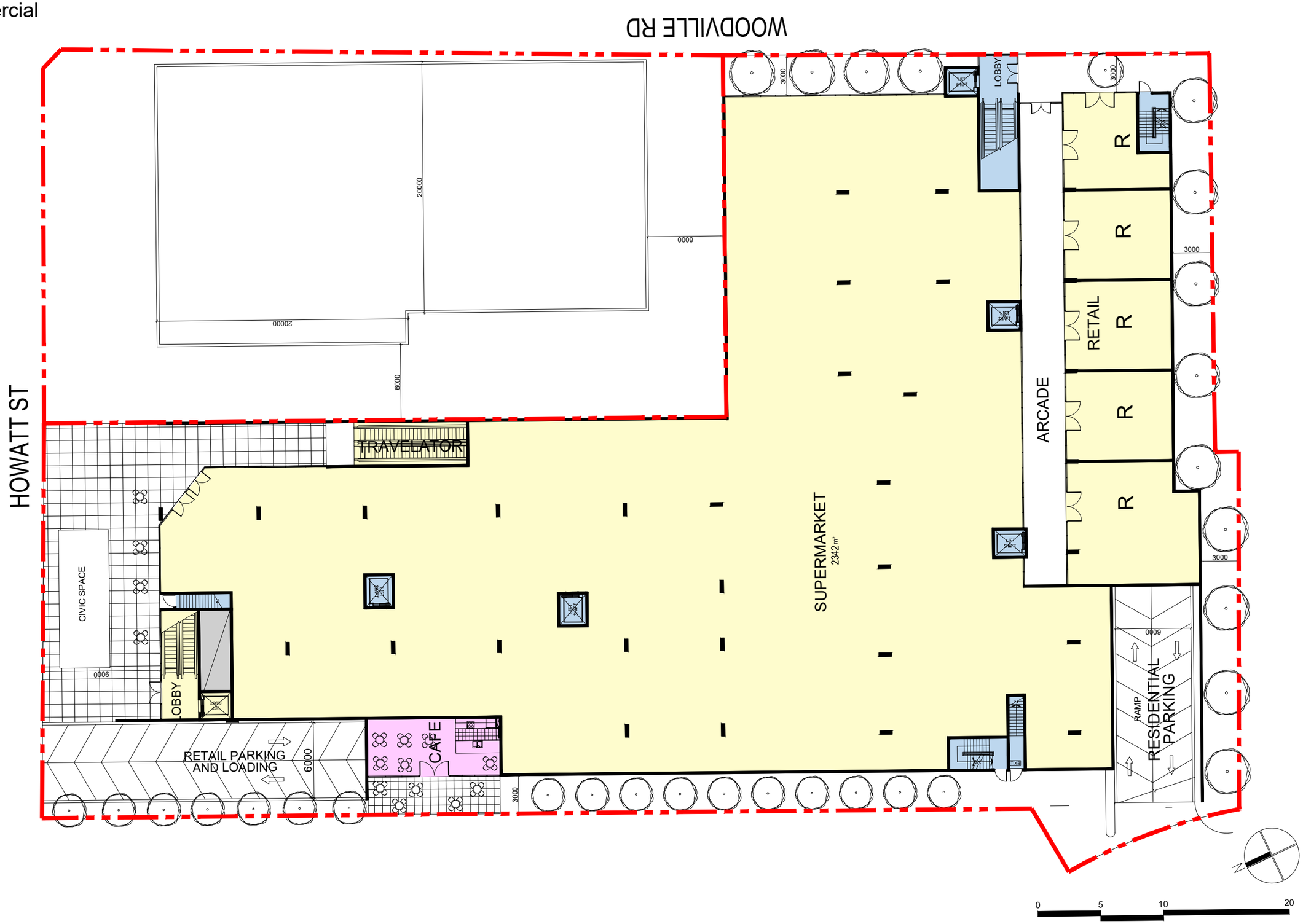

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Legend

DRAWING LABEL

GROUND FLOOR PLAN

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Project

896 WOODVILLE ROAD VILLAWOOD

Project address

Key plan

Scale

Date October 2022

Drawing title

Project no. 1051

Drawing no.

Drawn DL

Drawing status

PLANNING PROPOSAL

Attachment 2

SIDRA Assessment

MOVEMENT SUMMARY

Site: 1 [WOODVILLE RD | VILLAWOOD RD | LLEWELLYN AVE AM EX (Site Folder: General)]

WOODVILLE ROAD & VILLAWOOD ROAD & LLEWELLYN AVENUE
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: WOODVILLE ROAD (SOUTH)														
1	L2	9	2.0	9	2.0	*0.755	19.8	LOS B	37.4	266.5	0.73	0.68	0.73	33.6
2	T1	1767	2.0	1860	2.0	0.755	13.7	LOS B	37.4	266.5	0.71	0.66	0.71	45.6
3	R2	68	2.0	72	2.0	0.512	33.6	LOS C	3.3	23.2	0.77	0.78	0.77	30.1
Approach		1844	2.0	1941	2.0	0.755	14.5	LOS B	37.4	266.5	0.71	0.66	0.71	44.8
East: LLEWELLYN AVENUE (EAST)														
4	L2	29	2.0	31	2.0	0.125	54.7	LOS D	1.6	11.4	0.91	0.72	0.91	23.5
5	T1	12	2.0	13	2.0	*0.308	52.4	LOS D	3.2	23.0	0.94	0.75	0.94	21.4
6	R2	44	2.0	46	2.0	0.308	57.0	LOS E	3.2	23.0	0.94	0.75	0.94	28.6
Approach		85	2.0	89	2.0	0.308	55.5	LOS E	3.2	23.0	0.93	0.74	0.93	26.1
North: WOODVILLE ROAD (NORTH)														
7	L2	117	2.0	123	2.0	0.641	17.6	LOS B	18.1	129.0	0.62	0.62	0.62	45.6
8	T1	1310	2.0	1379	2.0	0.641	8.3	LOS A	24.9	176.9	0.54	0.52	0.54	50.0
9	R2	48	2.0	51	2.0	*0.288	36.9	LOS D	2.4	17.1	0.82	0.78	0.82	29.9
Approach		1475	2.0	1553	2.0	0.641	10.0	LOS B	24.9	176.9	0.55	0.53	0.55	48.6
West: VILLAWOOD ROAD (WEST)														
10	L2	103	2.0	108	2.0	0.254	45.1	LOS D	5.2	37.0	0.86	0.76	0.86	26.5
11	T1	22	2.0	23	2.0	0.090	49.7	LOS D	1.2	8.6	0.91	0.65	0.91	23.0
12	R2	32	2.0	34	2.0	0.178	56.7	LOS E	1.8	12.9	0.93	0.73	0.93	15.6
Approach		157	2.0	165	2.0	0.254	48.1	LOS D	5.2	37.0	0.88	0.74	0.88	23.9
All Vehicles		3561	2.0	3748	2.0	0.755	15.1	LOS B	37.4	266.5	0.66	0.61	0.66	44.1

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: WOODVILLE ROAD (SOUTH)												
P1	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	223.9	220.5	0.98
East: LLEWELLYN AVENUE (EAST)												
P2	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	221.3	217.2	0.98
West: VILLAWOOD ROAD (WEST)												

P4	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	220.6	216.2	0.98
All Pedestrians		150	158	54.3	LOS E	0.2	0.2	0.95	0.95	221.9	218.0	0.98

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1 [WOODVILLE RD | VILLAWOOD RD | LLEWELLYN AVE PM EX (Site Folder: General)]

WOODVILLE ROAD & VILLAWOOD ROAD & LLEWELLYN AVENUE
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 140 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: WOODVILLE ROAD (SOUTH)														
1	L2	36	2.0	38	2.0	0.571	13.2	LOS B	23.7	168.5	0.47	0.45	0.47	40.4
2	T1	1544	2.0	1625	2.0	0.571	7.6	LOS A	23.7	168.9	0.47	0.44	0.47	50.9
3	R2	24	2.0	25	2.0	* 0.186	67.5	LOS E	1.7	11.9	0.95	0.73	0.95	21.1
Approach		1604	2.0	1688	2.0	0.571	8.7	LOS A	23.7	168.9	0.47	0.44	0.47	49.8
East: LLEWELLYN AVENUE (EAST)														
4	L2	53	2.0	56	2.0	0.125	48.8	LOS D	3.0	21.0	0.82	0.73	0.82	24.9
5	T1	48	2.0	51	2.0	* 0.983	107.4	LOS F	13.0	92.2	1.00	1.18	1.67	13.8
6	R2	87	2.0	92	2.0	0.983	111.9	LOS F	13.0	92.2	1.00	1.18	1.67	19.7
Approach		188	2.0	198	2.0	0.983	93.0	LOS F	13.0	92.2	0.95	1.06	1.43	19.1
North: WOODVILLE ROAD (NORTH)														
7	L2	164	2.0	173	2.0	0.970	73.1	LOS E	75.0	534.3	1.00	1.17	1.31	26.3
8	T1	1803	2.0	1898	2.0	* 0.970	56.8	LOS E	103.3	735.7	1.00	1.12	1.23	26.0
9	R2	52	2.0	55	2.0	0.493	33.4	LOS C	2.7	19.3	0.71	0.77	0.71	31.3
Approach		2019	2.0	2125	2.0	0.970	57.6	LOS E	103.3	735.7	0.99	1.12	1.22	26.1
West: VILLAWOOD ROAD (WEST)														
10	L2	140	2.0	147	2.0	0.512	63.7	LOS E	9.4	66.7	0.97	0.80	0.97	21.8
11	T1	29	2.0	31	2.0	0.101	54.5	LOS D	1.8	12.7	0.89	0.66	0.89	21.8
12	R2	79	2.0	83	2.0	0.693	77.5	LOS E	5.9	42.3	1.00	0.84	1.12	12.4
Approach		248	2.0	261	2.0	0.693	67.0	LOS E	9.4	66.7	0.97	0.80	1.01	18.9
All Vehicles		4059	2.0	4273	2.0	0.983	40.4	LOS D	103.3	735.7	0.78	0.83	0.92	30.7

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: WOODVILLE ROAD (SOUTH)												
P1	Full	50	53	64.3	LOS F	0.2	0.2	0.96	0.96	233.9	220.5	0.94
East: LLEWELLYN AVENUE (EAST)												
P2	Full	50	53	64.3	LOS F	0.2	0.2	0.96	0.96	231.3	217.2	0.94

West: VILLAWOOD ROAD (WEST)											
P4 Full	50	53	64.3	LOS F	0.2	0.2	0.96	0.96	230.6	216.2	0.94
All Pedestrians	150	158	64.3	LOS F	0.2	0.2	0.96	0.96	231.9	218.0	0.94

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1 [WOODVILLE RD | VILLAWOOD RD | LLEWELLYN AVE PM DEV (Site Folder: General)]

WOODVILLE ROAD & VILLAWOOD ROAD & LLEWELLYN AVENUE
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: WOODVILLE ROAD (SOUTH)														
1	L2	36	2.0	38	2.0	0.618	17.6	LOS B	31.1	221.5	0.57	0.54	0.57	35.4
2	T1	1546	2.0	1627	2.0	0.618	11.9	LOS B	31.1	221.5	0.56	0.53	0.56	47.0
3	R2	24	2.0	25	2.0	* 0.201	77.5	LOS E	1.8	13.0	0.98	0.69	0.98	19.4
Approach		1606	2.0	1691	2.0	0.618	13.0	LOS B	31.1	221.5	0.57	0.53	0.57	45.9
East: LLEWELLYN AVENUE (EAST)														
4	L2	53	2.0	56	2.0	0.104	45.5	LOS D	2.9	20.9	0.76	0.72	0.76	25.8
5	T1	48	2.0	51	2.0	0.776	74.0	LOS E	10.9	77.3	1.00	0.91	1.16	17.7
6	R2	87	2.0	92	2.0	0.776	78.6	LOS E	10.9	77.3	1.00	0.91	1.16	24.4
Approach		188	2.0	198	2.0	0.776	68.1	LOS E	10.9	77.3	0.93	0.86	1.05	23.0
North: WOODVILLE ROAD (NORTH)														
7	L2	164	2.0	173	2.0	1.067	139.1	LOS F	106.3	756.6	1.00	1.40	1.66	16.9
8	T1	1847	2.0	1944	2.0	* 1.067	128.3	LOS F	152.4	1085.3	1.00	1.41	1.61	14.9
9	R2	57	2.0	60	2.0	0.620	51.2	LOS D	4.0	28.5	0.85	0.85	0.95	25.2
Approach		2068	2.0	2177	2.0	1.067	127.1	LOS F	152.4	1085.3	1.00	1.39	1.60	15.2
West: VILLAWOOD ROAD (WEST)														
10	L2	190	2.0	200	2.0	0.512	60.8	LOS E	13.0	92.3	0.94	0.81	0.94	22.4
11	T1	29	2.0	31	2.0	0.074	50.2	LOS D	1.8	12.6	0.83	0.62	0.83	22.8
12	R2	154	2.0	162	2.0	* 1.052	155.2	LOS F	18.4	131.3	1.00	1.23	1.85	6.9
Approach		373	2.0	393	2.0	1.052	99.0	LOS F	18.4	131.3	0.95	0.97	1.31	13.8
All Vehicles		4235	2.0	4458	2.0	1.067	78.7	LOS E	152.4	1085.3	0.83	1.00	1.16	20.7

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: WOODVILLE ROAD (SOUTH)												
P1	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	238.9	220.5	0.92
East: LLEWELLYN AVENUE (EAST)												
P2	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	236.3	217.2	0.92
West: VILLAWOOD ROAD (WEST)												

P4	Full	50	53	69.3	LOS F	0.2	0.2	0.96	0.96	235.6	216.2	0.92
All Pedestrians		150	158	69.3	LOS F	0.2	0.2	0.96	0.96	236.9	218.0	0.92

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 3 [WOODVILLE RD | HOWATT ST | BINNA BURRA ST AM EX (Site Folder: General)]

WOODVILLE ROAD & HOWATT STREET & BINNA BURRA STREET
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: WOODVILLE ROAD (SOUTH)														
1	L2	35	2.0	37	2.0	0.859	28.5	LOS C	39.7	282.3	0.91	0.91	1.00	29.5
2	T1	1778	2.0	1872	2.0	* 0.859	22.9	LOS C	39.7	282.7	0.91	0.91	1.00	33.8
Approach		1813	2.0	1908	2.0	0.859	23.0	LOS C	39.7	282.7	0.91	0.91	1.00	33.8
East: BINNA BURRA STREET (EAST)														
4	L2	17	2.0	18	2.0	0.137	40.7	LOS D	1.5	11.0	0.90	0.70	0.90	28.5
5	T1	17	2.0	18	2.0	* 0.137	36.1	LOS D	1.5	11.0	0.90	0.70	0.90	25.2
6	R2	41	2.0	43	2.0	0.137	40.7	LOS D	1.5	11.0	0.90	0.72	0.90	26.8
Approach		75	2.0	79	2.0	0.137	39.6	LOS D	1.5	11.0	0.90	0.71	0.90	26.9
North: WOODVILLE ROAD (NORTH)														
7	L2	45	2.0	47	2.0	0.368	11.0	LOS B	8.5	60.4	0.42	0.41	0.42	46.0
8	T1	1389	2.0	1462	2.0	0.368	5.4	LOS A	8.5	60.7	0.42	0.39	0.42	50.6
9	R2	5	100.0	5	100.0	* 0.073	52.9	LOS D	0.2	3.1	0.96	0.66	0.96	15.6
Approach		1439	2.3	1515	2.3	0.368	5.7	LOS A	8.5	60.7	0.42	0.39	0.42	50.1
All Vehicles		3327	2.1	3502	2.1	0.859	15.9	LOS B	39.7	282.7	0.70	0.68	0.75	39.0

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: WOODVILLE ROAD (SOUTH)												
P1	Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	210.4	222.5	1.06
East: BINNA BURRA STREET (EAST)												
P2	Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	206.4	217.2	1.05
West: HOWATT STREET (WEST)												
P4	Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	197.2	205.3	1.04
All Pedestrians		150	158	39.3	LOS D	0.1	0.1	0.94	0.94	204.7	215.0	1.05

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 3 [WOODVILLE RD | HOWATT ST | BINNA BURRA ST PM EX (Site Folder: General)]

WOODVILLE ROAD & HOWATT STREET & BINNA BURRA STREET
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: WOODVILLE ROAD (SOUTH)														
1	L2	50	2.0	53	2.0	0.810	24.6	LOS C	28.8	204.7	0.89	0.85	0.94	31.9
2	T1	1539	2.0	1620	2.0	* 0.810	19.1	LOS B	28.8	205.2	0.89	0.85	0.94	36.5
Approach		1589	2.0	1673	2.0	0.810	19.2	LOS B	28.8	205.2	0.89	0.85	0.94	36.3
East: BINNA BURRA STREET (EAST)														
4	L2	15	2.0	16	2.0	0.191	36.7	LOS D	2.0	14.6	0.90	0.70	0.90	30.4
5	T1	41	2.0	43	2.0	* 0.191	32.1	LOS C	2.0	14.6	0.90	0.70	0.90	27.1
6	R2	53	2.0	56	2.0	0.188	36.7	LOS D	1.9	13.8	0.90	0.73	0.90	28.1
Approach		109	2.0	115	2.0	0.191	34.9	LOS C	2.0	14.6	0.90	0.72	0.90	28.1
North: WOODVILLE ROAD (NORTH)														
7	L2	98	2.0	103	2.0	0.520	12.1	LOS B	12.8	91.5	0.53	0.52	0.53	44.7
8	T1	1856	2.0	1954	2.0	0.520	6.5	LOS A	12.9	92.2	0.52	0.49	0.52	48.9
9	R2	2	100.0	2	100.0	* 0.026	46.4	LOS D	0.1	1.1	0.95	0.62	0.95	17.0
Approach		1956	2.1	2059	2.1	0.520	6.8	LOS A	12.9	92.2	0.53	0.49	0.53	48.6
All Vehicles		3654	2.1	3846	2.1	0.810	13.1	LOS B	28.8	205.2	0.69	0.65	0.72	41.5

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: WOODVILLE ROAD (SOUTH)												
P1	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	205.5	222.5	1.08
East: BINNA BURRA STREET (EAST)												
P2	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	201.4	217.2	1.08
West: HOWATT STREET (WEST)												
P4	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	192.2	205.3	1.07
All Pedestrians		150	158	34.3	LOS D	0.1	0.1	0.93	0.93	199.7	215.0	1.08

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 3 [WOODVILLE RD | HOWATT ST | BINNA BURRA ST PM DEV (Site Folder: General)]

WOODVILLE ROAD & HOWATT STREET & BINNA BURRA STREET
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: WOODVILLE ROAD (SOUTH)														
1	L2	131	2.0	138	2.0	0.854	29.0	LOS C	33.9	241.6	0.92	0.94	1.04	28.8
2	T1	1541	2.0	1622	2.0	* 0.854	23.4	LOS C	34.1	243.1	0.92	0.94	1.04	33.3
Approach		1672	2.0	1760	2.0	0.854	23.8	LOS C	34.1	243.1	0.92	0.94	1.04	33.0
East: BINNA BURRA STREET (EAST)														
4	L2	15	2.0	16	2.0	0.191	36.7	LOS D	2.0	14.6	0.90	0.70	0.90	30.4
5	T1	41	2.0	43	2.0	* 0.191	32.1	LOS C	2.0	14.6	0.90	0.70	0.90	27.1
6	R2	53	2.0	56	2.0	0.188	36.7	LOS D	1.9	13.8	0.90	0.73	0.90	28.1
Approach		109	2.0	115	2.0	0.191	34.9	LOS C	2.0	14.6	0.90	0.72	0.90	28.1
North: WOODVILLE ROAD (NORTH)														
7	L2	98	2.0	103	2.0	0.523	12.1	LOS B	13.0	92.3	0.53	0.52	0.53	44.7
8	T1	1856	2.0	1954	2.0	0.523	6.5	LOS A	13.1	93.0	0.52	0.49	0.52	48.9
9	R2	47	2.0	49	2.0	* 0.360	46.3	LOS D	2.0	14.1	0.99	0.74	0.99	18.0
Approach		2001	2.0	2106	2.0	0.523	7.7	LOS A	13.1	93.0	0.54	0.50	0.54	47.3
All Vehicles		3782	2.0	3981	2.0	0.854	15.6	LOS B	34.1	243.1	0.72	0.70	0.77	39.0

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: WOODVILLE ROAD (SOUTH)												
P1	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	205.5	222.5	1.08
East: BINNA BURRA STREET (EAST)												
P2	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	201.4	217.2	1.08
West: HOWATT STREET (WEST)												
P4	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	192.2	205.3	1.07
All Pedestrians		150	158	34.3	LOS D	0.1	0.1	0.93	0.93	199.7	215.0	1.08

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 4 [WOODVILLE RD | KIRRANG AVE AM EX (Site Folder: General)]

WOODVILLE ROAD & KIRRANG AVENUE
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: WOODVILLE ROAD (SOUTH)														
1	L2	12	2.0	13	2.0	0.325	10.4	LOS B	8.7	61.8	0.35	0.32	0.35	49.5
2	T1	1784	2.0	1878	2.0	* 0.485	6.3	LOS A	15.5	110.3	0.40	0.37	0.40	52.8
Approach		1796	2.0	1891	2.0	0.485	6.3	LOS A	15.5	110.3	0.40	0.36	0.40	52.8
North: WOODVILLE ROAD (NORTH)														
8	T1	1383	2.0	1456	2.0	0.335	4.9	LOS A	9.1	64.5	0.35	0.31	0.35	53.6
9	R2	1	2.0	1	2.0	0.335	10.5	LOS B	8.9	63.1	0.35	0.31	0.35	52.8
Approach		1384	2.0	1457	2.0	0.335	4.9	LOS A	9.1	64.5	0.35	0.31	0.35	53.6
West: KIRRANG AVENUE (WEST)														
10	L2	19	2.0	20	2.0	0.077	56.0	LOS E	1.0	7.3	0.90	0.70	0.90	26.1
12	R2	101	2.0	106	2.0	* 0.410	56.3	LOS E	5.8	41.4	0.96	0.78	0.96	27.8
Approach		120	2.0	126	2.0	0.410	56.3	LOS E	5.8	41.4	0.95	0.77	0.95	27.6
All Vehicles		3300	2.0	3474	2.0	0.485	7.6	LOS A	15.5	110.3	0.40	0.36	0.40	50.9

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: WOODVILLE ROAD (SOUTH)												
P1	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	225.7	222.8	0.99
All Pedestrians		50	53	54.3	LOS E	0.2	0.2	0.95	0.95	225.7	222.8	0.99

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 4 [WOODVILLE RD | KIRRANG AVE PM EX (Site Folder: General)]

WOODVILLE ROAD & KIRRANG AVENUE
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: WOODVILLE ROAD (SOUTH)														
1	L2	38	2.0	40	2.0	0.294	10.9	LOS B	7.9	56.1	0.36	0.35	0.36	48.8
2	T1	1549	2.0	1631	2.0	0.439	6.5	LOS A	13.7	97.7	0.40	0.37	0.40	52.3
Approach		1587	2.0	1671	2.0	0.439	6.6	LOS A	13.7	97.7	0.40	0.37	0.40	52.1
North: WOODVILLE ROAD (NORTH)														
8	T1	1859	2.0	1957	2.0	*0.457	6.4	LOS A	14.6	103.9	0.42	0.39	0.42	52.0
Approach		1859	2.0	1957	2.0	0.457	6.4	LOS A	14.6	103.9	0.42	0.39	0.42	52.0
West: KIRRANG AVENUE (WEST)														
10	L2	38	2.0	40	2.0	0.138	54.0	LOS D	2.0	14.5	0.90	0.73	0.90	26.4
12	R2	121	2.0	127	2.0	*0.439	54.8	LOS D	6.9	49.0	0.95	0.79	0.95	28.2
Approach		159	2.0	167	2.0	0.439	54.6	LOS D	6.9	49.0	0.94	0.77	0.94	27.8
All Vehicles		3605	2.0	3795	2.0	0.457	8.6	LOS A	14.6	103.9	0.44	0.40	0.44	49.7

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: WOODVILLE ROAD (SOUTH)												
P1	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	225.7	222.8	0.99
All Pedestrians		50	53	54.3	LOS E	0.2	0.2	0.95	0.95	225.7	222.8	0.99

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 4 [WOODVILLE RD | KIRRANG AVE PM DEV (Site Folder: General)]

WOODVILLE ROAD & KIRRANG AVENUE
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: WOODVILLE ROAD (SOUTH)														
1	L2	52	2.0	55	2.0	0.297	11.0	LOS B	8.0	56.7	0.36	0.37	0.36	48.7
2	T1	1549	2.0	1631	2.0	0.443	6.5	LOS A	13.9	99.1	0.40	0.38	0.40	52.2
Approach		1601	2.0	1685	2.0	0.443	6.7	LOS A	13.9	99.1	0.40	0.38	0.40	52.0
North: WOODVILLE ROAD (NORTH)														
8	T1	1859	2.0	1957	2.0	*0.457	6.4	LOS A	14.6	103.9	0.42	0.39	0.42	52.0
Approach		1859	2.0	1957	2.0	0.457	6.4	LOS A	14.6	103.9	0.42	0.39	0.42	52.0
West: KIRRANG AVENUE (WEST)														
10	L2	40	2.0	42	2.0	0.145	54.0	LOS D	2.1	15.3	0.90	0.73	0.90	26.4
12	R2	123	2.0	129	2.0	*0.447	54.8	LOS D	7.0	49.9	0.95	0.79	0.95	28.2
Approach		163	2.0	172	2.0	0.447	54.6	LOS D	7.0	49.9	0.94	0.77	0.94	27.8
All Vehicles		3623	2.0	3814	2.0	0.457	8.7	LOS A	14.6	103.9	0.44	0.40	0.44	49.6

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: WOODVILLE ROAD (SOUTH)												
P1	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	225.7	222.8	0.99
All Pedestrians		50	53	54.3	LOS E	0.2	0.2	0.95	0.95	225.7	222.8	0.99

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 2 [VILLAWOOD RD | VILLAWOOD PL AM EX (Site Folder: General)]

VILLAWOOD ROAD & VILLAWOOD PLACE
Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: VILLAWOOD PL (SOUTH)														
1	L2	30	2.0	32	2.0	0.089	4.8	LOS A	0.3	2.3	0.21	0.53	0.21	44.9
2	T1	1	2.0	1	2.0	0.089	4.6	LOS A	0.3	2.3	0.21	0.53	0.21	41.7
3	R2	59	2.0	62	2.0	0.089	5.5	LOS A	0.3	2.3	0.21	0.53	0.21	40.1
Approach		90	2.0	95	2.0	0.089	5.3	LOS A	0.3	2.3	0.21	0.53	0.21	42.4
East: VILLAWOOD RD (EAST)														
4	L2	17	2.0	18	2.0	0.046	4.6	LOS A	0.0	0.0	0.00	0.47	0.00	42.8
5	T1	65	2.0	68	2.0	0.046	3.4	LOS A	0.0	0.0	0.00	0.47	0.00	45.9
6	R2	2	2.0	2	2.0	0.046	4.6	LOS A	0.0	0.0	0.00	0.47	0.00	40.1
Approach		84	2.0	88	2.0	0.046	3.7	NA	0.0	0.0	0.00	0.47	0.00	45.4
North: VILLAWOOD PL (NORTH)														
7	L2	1	2.0	1	2.0	0.003	4.7	LOS A	0.0	0.1	0.16	0.48	0.16	38.6
8	T1	1	2.0	1	2.0	0.003	4.6	LOS A	0.0	0.1	0.16	0.48	0.16	42.3
9	R2	1	2.0	1	2.0	0.003	5.6	LOS A	0.0	0.1	0.16	0.48	0.16	44.8
Approach		3	2.0	3	2.0	0.003	4.9	LOS A	0.0	0.1	0.16	0.48	0.16	42.6
West: VILLAWOOD RD (WEST)														
10	L2	2	2.0	2	2.0	0.027	4.6	LOS A	0.0	0.0	0.00	0.46	0.00	45.8
11	T1	96	2.0	101	2.0	0.027	3.4	LOS A	0.0	0.0	0.00	0.45	0.00	46.0
12	R2	15	2.0	16	2.0	0.017	5.3	LOS A	0.1	0.4	0.25	0.53	0.25	44.5
Approach		113	2.0	119	2.0	0.027	3.7	LOS A	0.1	0.4	0.03	0.46	0.03	45.8
All Vehicles		290	2.0	305	2.0	0.089	4.2	NA	0.3	2.3	0.08	0.49	0.08	44.7

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

MOVEMENT SUMMARY

Site: 2 [VILLAWOOD RD | VILLAWOOD PL PM EX (Site Folder: General)]

VILLAWOOD ROAD & VILLAWOOD PLACE
Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: VILLAWOOD PL (SOUTH)														
1	L2	49	2.0	52	2.0	0.133	5.2	LOS A	0.5	3.5	0.34	0.59	0.34	44.4
2	T1	7	2.0	7	2.0	0.133	5.5	LOS A	0.5	3.5	0.34	0.59	0.34	40.9
3	R2	64	2.0	67	2.0	0.133	6.7	LOS A	0.5	3.5	0.34	0.59	0.34	39.3
Approach		120	2.0	126	2.0	0.133	6.0	LOS A	0.5	3.5	0.34	0.59	0.34	42.2
East: VILLAWOOD RD (EAST)														
4	L2	15	2.0	16	2.0	0.125	4.6	LOS A	0.0	0.0	0.00	0.48	0.00	42.8
5	T1	166	2.0	175	2.0	0.125	3.5	LOS A	0.0	0.0	0.00	0.48	0.00	45.8
6	R2	45	2.0	47	2.0	0.125	4.6	LOS A	0.0	0.0	0.00	0.48	0.00	40.0
Approach		226	2.0	238	2.0	0.125	3.8	NA	0.0	0.0	0.00	0.48	0.00	45.0
North: VILLAWOOD PL (NORTH)														
7	L2	16	2.0	17	2.0	0.047	4.7	LOS A	0.2	1.2	0.16	0.53	0.16	37.3
8	T1	2	2.0	2	2.0	0.047	5.4	LOS A	0.2	1.2	0.16	0.53	0.16	41.2
9	R2	23	2.0	24	2.0	0.047	6.9	LOS A	0.2	1.2	0.16	0.53	0.16	44.0
Approach		41	2.0	43	2.0	0.047	6.0	LOS A	0.2	1.2	0.16	0.53	0.16	42.2
West: VILLAWOOD RD (WEST)														
10	L2	10	2.0	11	2.0	0.030	4.6	LOS A	0.0	0.0	0.00	0.47	0.00	45.6
11	T1	99	2.0	104	2.0	0.030	3.4	LOS A	0.0	0.0	0.00	0.46	0.00	46.0
12	R2	19	2.0	20	2.0	0.024	6.1	LOS A	0.1	0.6	0.35	0.58	0.35	44.1
Approach		128	2.0	135	2.0	0.030	3.9	LOS A	0.1	0.6	0.05	0.48	0.05	45.6
All Vehicles		515	2.0	542	2.0	0.133	4.5	NA	0.5	3.5	0.11	0.51	0.11	44.3

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

MOVEMENT SUMMARY

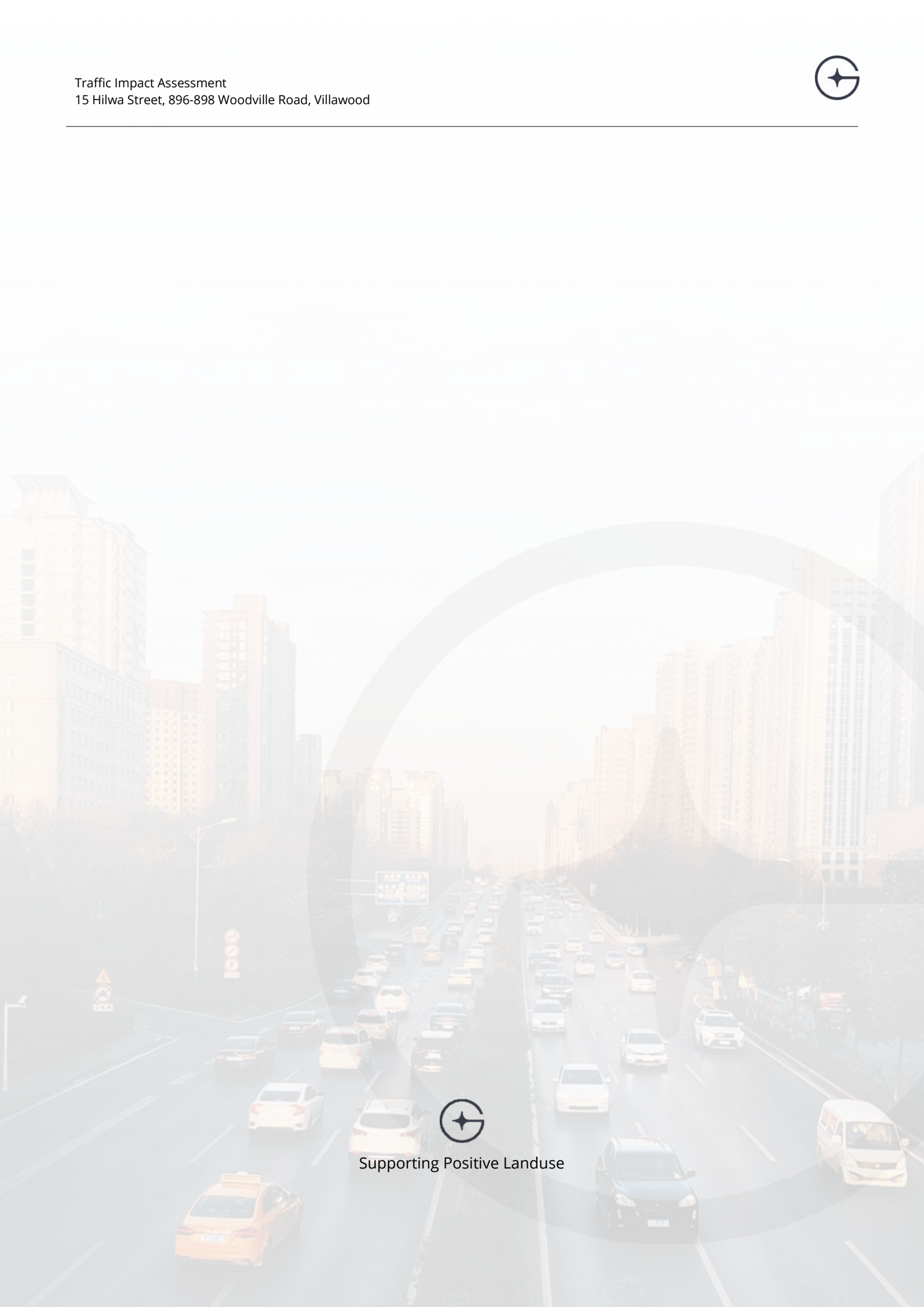
Site: 2 [VILLAWOOD RD | VILLAWOOD PL PM DEV (Site Folder: General)]

VILLAWOOD ROAD & VILLAWOOD PLACE
Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: VILLAWOOD PL (SOUTH)														
1	L2	49	2.0	52	2.0	0.203	5.3	LOS A	0.8	5.5	0.39	0.63	0.39	44.1
2	T1	7	2.0	7	2.0	0.203	5.7	LOS A	0.8	5.5	0.39	0.63	0.39	40.5
3	R2	114	2.0	120	2.0	0.203	6.9	LOS A	0.8	5.5	0.39	0.63	0.39	38.9
Approach		170	2.0	179	2.0	0.203	6.4	LOS A	0.8	5.5	0.39	0.63	0.39	41.2
East: VILLAWOOD RD (EAST)														
4	L2	15	2.0	16	2.0	0.128	4.6	LOS A	0.0	0.0	0.00	0.48	0.00	42.8
5	T1	171	2.0	180	2.0	0.128	3.5	LOS A	0.0	0.0	0.00	0.48	0.00	45.8
6	R2	45	2.0	47	2.0	0.128	4.6	LOS A	0.0	0.0	0.00	0.48	0.00	40.0
Approach		231	2.0	243	2.0	0.128	3.8	NA	0.0	0.0	0.00	0.48	0.00	45.1
North: VILLAWOOD PL (NORTH)														
7	L2	16	2.0	17	2.0	0.047	4.7	LOS A	0.2	1.2	0.16	0.53	0.16	37.2
8	T1	2	2.0	2	2.0	0.047	5.4	LOS A	0.2	1.2	0.16	0.53	0.16	41.1
9	R2	23	2.0	24	2.0	0.047	7.0	LOS A	0.2	1.2	0.16	0.53	0.16	44.0
Approach		41	2.0	43	2.0	0.047	6.0	LOS A	0.2	1.2	0.16	0.53	0.16	42.2
West: VILLAWOOD RD (WEST)														
10	L2	10	2.0	11	2.0	0.030	4.6	LOS A	0.0	0.0	0.00	0.47	0.00	45.6
11	T1	99	2.0	104	2.0	0.030	3.4	LOS A	0.0	0.0	0.00	0.46	0.00	46.0
12	R2	19	2.0	20	2.0	0.026	6.4	LOS A	0.1	0.6	0.39	0.60	0.39	43.8
Approach		128	2.0	135	2.0	0.030	4.0	LOS A	0.1	0.6	0.06	0.48	0.06	45.6
All Vehicles		570	2.0	600	2.0	0.203	4.8	NA	0.8	5.5	0.14	0.53	0.14	43.9

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



Supporting Positive Landuse