



1 Jacksons Road & 634-648 Wellington Road, Mulgrave

Proposed Rezoning

Transport Impact Assessment

Client // Frondell Properties Pty Ltd
Office // VIC
Reference // V115201
Date // 13/12/18

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1. Introduction

1.1 Overview

A Planning Scheme Amendment (PSA) is currently being sought to rezone land located at 1 Jacksons Road (Wise Wellness site) and 634-648 Wellington Road (OfficeMax site), Mulgrave from a Commercial 2 Zone (C2Z) to a Mixed Use Zone (MUZ).

GTA Consultants (GTA) have previously been commissioned by the Applicant in February 2017 to undertake a Transport Impact Assessment for the proposed rezoning. Since then, a revised rezoning scheme has been prepared which includes updated land use yields (which have been provided to GTA) and is understood will have a layout and access arrangements generally consistent with original scheme. The following report provides an updated Transport Impact Assessment to reflect the proposed new land uses and revised yields.

Noting the above, the ultimate development proposed on the land will incorporate a mix of residential, office, medical centre, childcare centre, aged care, hotel, and retail uses.

Vehicle access to the site is currently via the following unsignalised intersections:

- Jacksons Road – full turning movements
- Wellington Road (1) – left-out only
- Wellington Road (2) – left-in/left-out only

As part of the rezoning and future development, it is not proposed to amend the location of the existing site access points. However, the Jacksons Road access point will be required to be upgraded to a signalised intersection to support the expected site generated traffic under ultimate development conditions (discussed in further detail in Section 4 of this report).

1.2 Purpose of this Report

This report sets out an assessment of the anticipated broad level transport implications of the proposed rezoning and development, including consideration of:

- i The adequacy of the proposed site access arrangements for the proposed future development
- ii The acceptability of the traffic impacts of the proposed rezoning and development to the surrounding road network
- iii The adequacy of the proposed pedestrian, bicycle and public transport access arrangements to the site.

It is important to emphasise that a rezoning application is being sought in the first instance. The nominated development uses and associated access strategy for the site are still being considered and are subject to change. Accordingly, the analysis contained in this report is directed at assisting the Responsible Authority in identifying key traffic development parameters, rather than involving a comprehensive analysis of a specific design which is likely to change as development details are subsequently refined in future planning application submissions.

Nevertheless, it is anticipated that the various traffic issues which have been investigated and are documented in this report will provide necessary technical information to assist with the further assessment of the site.

1.3 References

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

- concept plans and for the proposed rezoning and development
- estimated development yields, provided by the Applicant, dated 3/12/18
- Monash Planning Scheme
- traffic surveys undertaken by GTA Consultants as referenced in the context of this report
- a workshop with Monash City Council on 2 February 2017
- an inspection of the site and its surrounds
- other documents as nominated.

2. Existing Conditions

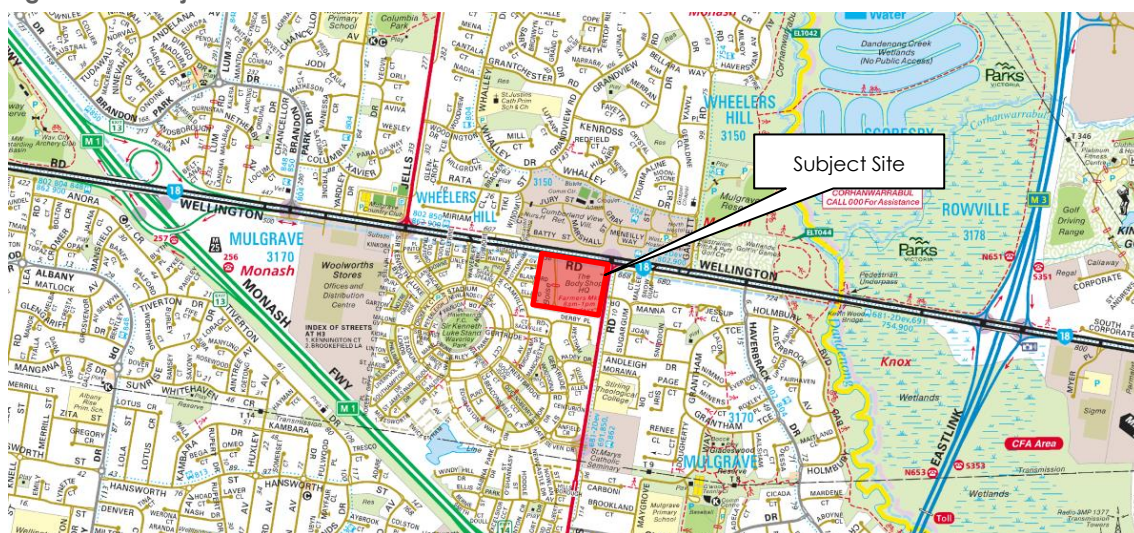
2.1 Subject Site

The subject site is located at 1 Jacksons Road and 634-648 Wellington Road in Mulgrave. The site of approximately 53,200sqm has frontages of 200m to Jacksons Road and 250m to Wellington Road.

The site is located within a Commercial 2 Zone and is currently occupied by an office building, warehouse and childcare centre within 1 Jacksons Road (which is referred to as the Wise Wellness site), whilst the office and warehouse building is located within 634-648 Wellington Road (which is referred to as the OfficeMax site). The surrounding properties are primarily residential in nature, with Waverley Park located to the south-west of the site.

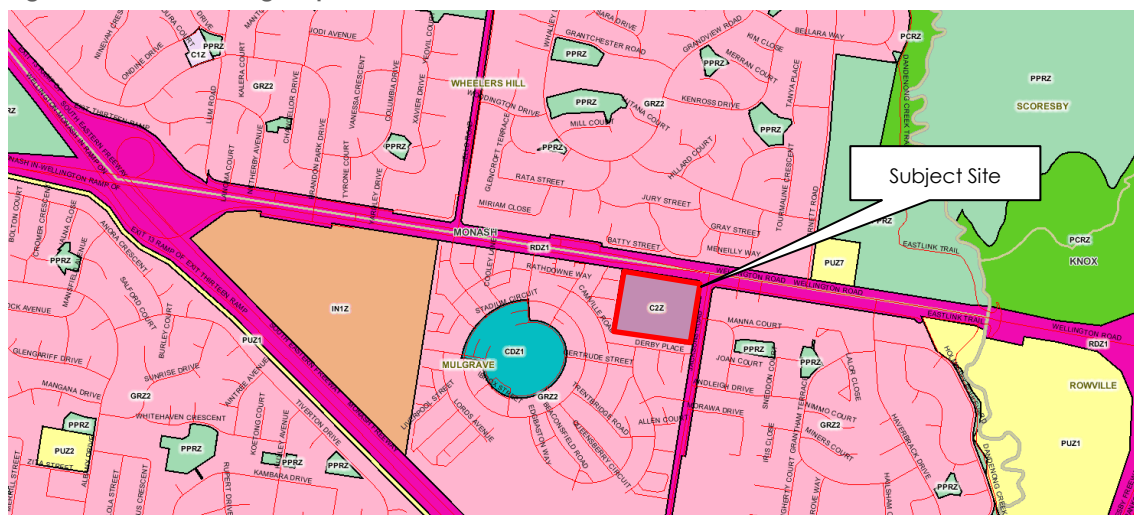
The location of the subject site and the surrounding environs is shown in Figure 2.1, and the land zoning is shown in Figure 2.2.

Figure 2.1: Subject Site and its Environs



(Reproduced with Permission from Melway Publishing Pty Ltd)

Figure 2.2: Land Zoning Map



(Reproduced from Land Channel web site)

2.2 Transport Policy

2.2.1 Design & Development Overlay

As part of the rezoning, a Design and Development Overlay (DDO) has been prepared for submission to Council.

The key traffic and transport objectives of the proposed DDO are reproduced as follows:

“Building form and design:

Developments must be designed to ensure limited visibility of car parking areas and loading bays from Jackson Road and Wellington Road. Car parking, turning areas or other hard stand areas should be located away from primary internal accessways.”

“Circulation and access:

The design and siting of buildings and works should demonstrate a high degree of pedestrian/ cyclist/ vehicle permeability.

Primary vehicle access for the eastern and central parts of the precinct (1 Jacksons Road) should be from Jacksons Road.

Primary vehicle access for the western part of the precinct (634 Wellington Road) should be from Wellington Road.

Pedestrian linkages should be provided to connect all parts of the precinct.”

How the proposed rezoning and development adheres to the above traffic and transport objectives set out in the DDO will be discussed where relevant throughout this report.

2.2.2 SmartRoads Policy

SmartRoads is a VicRoads policy which sets 'modal' priorities on the road network and underpins many of the strategies significant to the operational directions that support broader strategies around land use and transport.

“There is no single solution to managing congestion on our roads. Sustainable management of congestion will require an integrated approach involving better management of the existing network, building new infrastructure, visionary land use planning, encouraging sustainable transport modes, and changes in behaviour by individuals, businesses and a level of government.”¹

All road users will continue to have access to all roads. However, certain routes will be managed to work better for cars while others for public transport, cyclists and pedestrians during the various peak and off-peak periods. In this regard, the following is noted by VicRoads for the various modes assigned to arterial roads across the network that form part of the Network Operating Plans:

- *“Facilitate good pedestrian access into and within activity centres in periods of high demand*
- *Prioritise trams and buses on key public transport routes that link activity centres during morning and afternoon peak periods*
- *Encourage cars to use alternative routes around activity centres to reduce the level of 'through' traffic*
- *Encourage bicycles through further developing the bicycle network*

¹ Sourced from VicRoads

- o "Prioritise trucks on important transport routes that link freight hubs and at times that reduce conflict with other transport modes"

The VicRoads SmartRoads Network Operating Plan for the area surrounding the subject site has been reproduced in Figure 2.3.

Figure 2.3: VicRoads SmartRoads Network Operating Plan

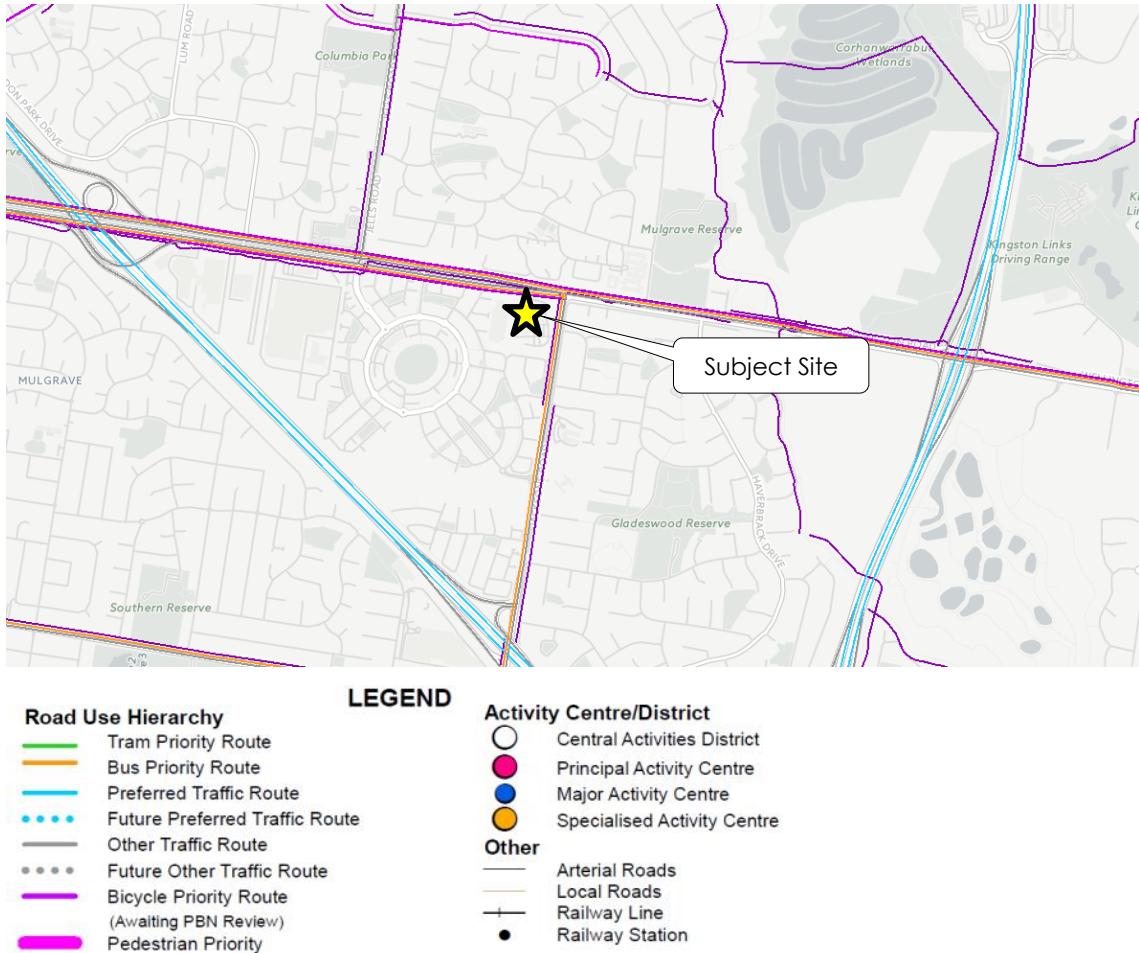


Figure 2.3 illustrates that both Wellington Road and Jacksons Road are nominated as bus priority routes and are part of the Principal Bicycle Network. Based on VicRoads' website, road use priority routes (for buses and trams) have been identified to ensure:

"Trams and buses are given priority on key public transport routes that link activity centres during morning and afternoon peak periods."

2.3 Road Network

2.3.1 Adjoining Roads

Jacksons Road

Jacksons Road functions as a secondary arterial road and is located within a Road Zone (Category 1) in the Monash Planning Scheme. It is a two-way road aligned in a north-south direction and configured generally with a two-lane, 10 metre wide carriageway set within a 35 metre wide road reserve (approx.). There is also a 7.2 metre wide service road running parallel to the eastern side of the main carriageway.

Jacksons Road carries approximately 11,000 vehicles per day² and is shown in Figure 2.4 and Figure 2.5.

Figure 2.4: Jacksons Road (Looking North)



Figure 2.5: Jacksons Road (Looking South)



Wellington Road

Wellington Road functions as a primary arterial road and is located within a Road Zone (Category 1) in the Monash Planning Scheme. It is a two-way divided road aligned in an east-west direction and configured with a three-lane, 11 metre wide carriageway in both directions, set within a 70 metre wide road reserve (approx.).

Wellington Road carries approximately 38,000 vehicles per day² and is shown in Figure 2.6 and Figure 2.7.

Figure 2.6: Wellington Road (Looking East)



Figure 2.7: Wellington Road (Looking West)



2.3.2 Surrounding Intersections

The primary intersection in the vicinity of the site is the signalised intersection of Wellington Road / Jacksons Road, located approximately 150m from the existing site access on Jacksons Road.

2.3.3 Traffic Volumes

GTA Consultants undertook traffic movement counts at the site access intersections on Jacksons Road and Wellington Road on Monday 11 December (PM peak hour) and Tuesday 12 December (AM peak hour) 2016, as part of the original assessment for the proposed rezoning.

² Based on VicRoads SCATS data from the intersection of Wellington Road / Jacksons Road.

It should be noted that the above traffic surveys recorded the turning movements in/out of the site only. In order to obtain the through movements along Wellington Road and Jacksons Road, weekday average volumes have been sourced from a week of VicRoads SCATS data at the intersection of Wellington Road / Jacksons Road, during the AM and PM peak hour periods.

This SCATS data was originally sourced from 24-28 April 2017, as part of the original assessment for the rezoning. Given the updated assessment being completed, more recent SCATS data has been sourced for the signalised intersection from 19-23 November 2018. This fresh data has been used to update the existing traffic volumes through the signals and also used to update the through volumes past the site access points on Jacksons Road and Wellington Road. The site generated vehicle movements in/out of the site access points are assumed to be generally the same as those previously surveyed in December 2016 and therefore have remained unchanged for the existing conditions scenario.

Based on the above, the existing AM and PM peak hour traffic volumes in the vicinity of the site are shown in Figure 2.8 and Figure 2.9, respectively.

Figure 2.8: Existing Traffic Volumes – AM Peak Hour (November 2018)

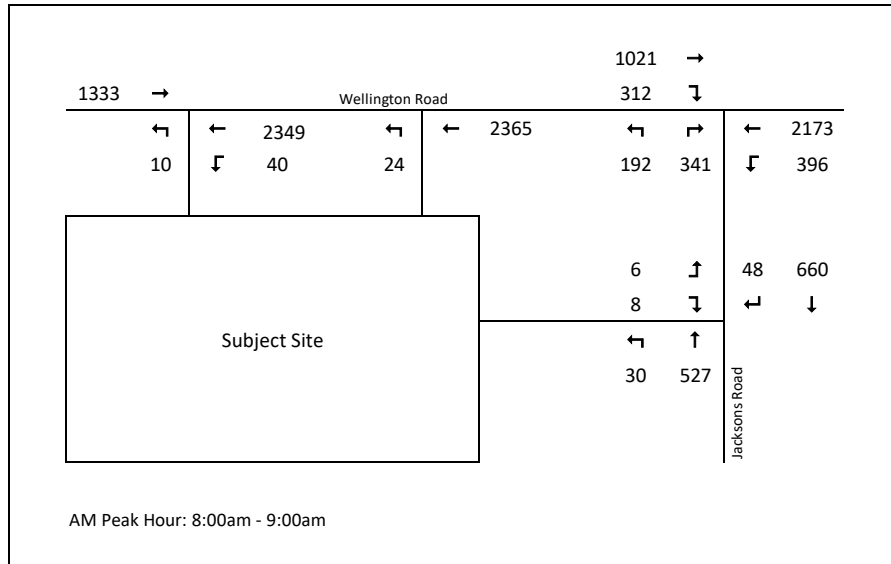
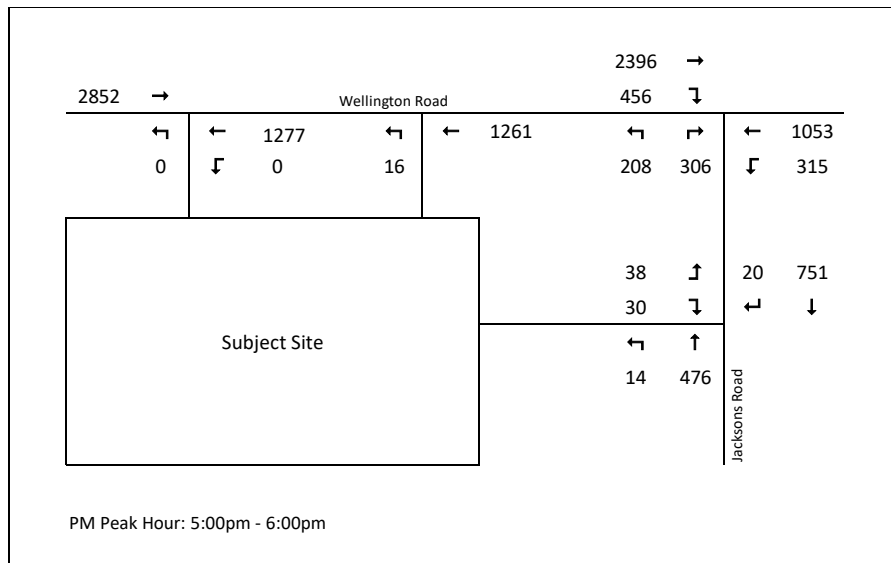


Figure 2.9: Existing Traffic Volumes – PM Peak Hour (November 2018)



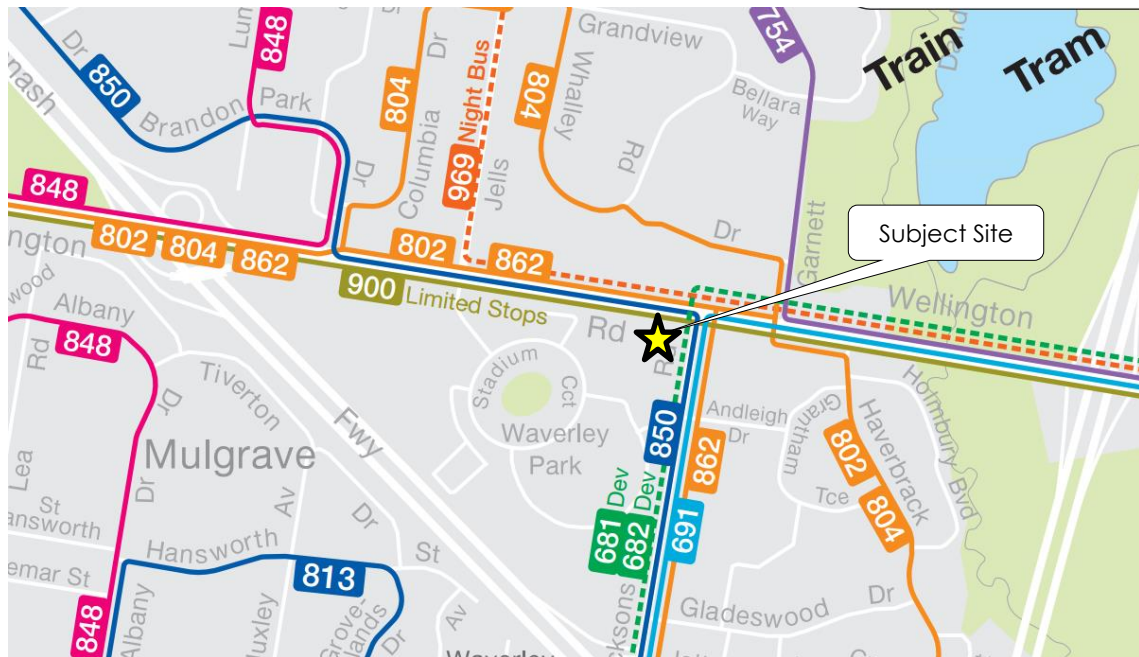
Note: The OfficeMax site access to Wellington Road is closed during the PM peak period.

2.4 Sustainable Transport Infrastructure

2.4.1 Public Transport

Figure 2.10 shows the subject site in relation to existing public transport routes within its vicinity whilst Table 2.1 summarises the road-based routes and major destinations that can be reached using these services.

Figure 2.10: Public Transport Map



Source: PTV Website

Table 2.1: Road Based Public Transport Provision

Service	Route Nos	Route Description	Distance to Nearest Stop
Bus	691	Boronia – Waverley Gardens via Ferntree Gully, Stud Park	0 m [1]
	850	Dandenong – Glen Waverley via Mulgrave, Brandon Park	0 m [1]
	862	Dandenong – Chadstone via North Dandenong, Oakleigh	0 m [1]
	802	Dandenong – Chadstone via Mulgrave, Oakleigh	0 m [1]
	900	Rowville – Caulfield via Monash Uni, Chadstone	0 m [1]
	681/682	Lysterfield – Knox City via Wantima, Scoresby, Rowville	0 m [1]

[1] There are bus stops located along the sites frontages to both Wellington Road and Jacksons Road, which service the above bus routes.

2.4.2 Pedestrian Infrastructure

There are existing pedestrian paths provided along the site's frontages to both Wellington Road and Jacksons Road. The signalised intersection of Wellington Road / Jacksons Road provides a pedestrian crossing opportunity in either direction. There is also a zebra crossing treatment provided over the western Wellington Road site access. Additionally, an off-road shared path is provided within the reserve on the northern side of Wellington Road.

2.4.3 Cycle Infrastructure

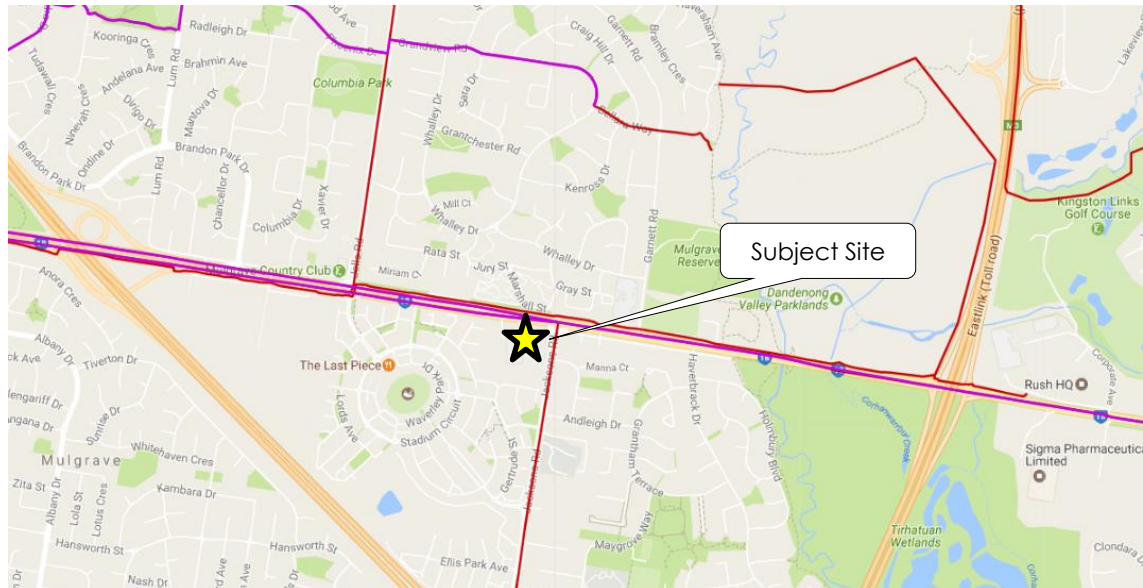
The Principal Bicycle Network (PBN) is a network of on and off-road cycling corridors that have been identified to support cycling for transport and access major destinations in metropolitan Melbourne. The PBN was reviewed and updated in 2012 by VicRoads and all local Councils.

The PBN is also a 'bicycle infrastructure planning tool' to guide State investment in the planning and development of the future metropolitan Melbourne bicycle network. In this regard, a subset of the PBN has been identified and elevated to a higher level of priority, mainly on the basis of potential for separation from motorised traffic, making these routes more attractive to less experienced bike riders. These cycling corridors are referred to as Bicycle Priority Routes (BPRs) and form part of the modal priorities for the road network set out in the VicRoads SmartRoads framework. Strategic Cycle Corridors (SCC) form another subset of the PBN, and represent an initiative outlined in Plan Melbourne to support walking and cycling in Central Melbourne. SCCs are intended to be corridors designed to provide high quality bicycle infrastructure to, and around, major activity areas in metropolitan Melbourne. Plan Melbourne outlines a subset of the SCCs for the proposed expanded central city area.

It is noted that the type of bicycle facility (i.e. on or off-road and separated or shared) has not been indicated as part of the PBN and BPRs. Rather, the PBN and BPRs show the proposed cycling network. The associated facilities should be delivered in accordance with the relevant standards and guidelines, such as the Australian Standards, Austroads Guides and VicRoads' Cycle Notes.

The PBN and BPRs in the vicinity of the study area are shown in Figure 2.11³.

Figure 2.11: VicRoads Principal Bicycle Network and Bicycle Priority Routes



Source(www.maps.vic.gov.au/TransMaps/)

As indicated in Figure 2.11, the PBN and BPRs run along both Wellington Road and Jacksons Road in the immediate vicinity of the site.

³ Further information regarding the PBN and BPRs is available at <https://www.vicroads.vic.gov.au/traffic-and-road-use/cycling/bicycle-network-planning>

3. Development Site

3.1 Development Summary

Subject to the proposed rezoning, the overall site is proposed to be developed with the indicative land uses outlined in Table 3.1. Redevelopment of the site is anticipated to take place across multiple stages. It is noted that the following development yields are rounded estimates for the purpose of the rezoning application.

The exact development schedule will be determined at the planning permit stage, however is expected to be generally in accordance with the below total estimates for the overall site.

Table 3.1: Development Summary (Indicative Only)

Site Parcel	Use	Size/No.
Wise Wellness Site (1 Jacksons Road)	Childcare Centre	100 children
	Medical Centre	20 practitioners [1]
	Office	7,000 sqm NLA [2]
	Residential	400 dwellings
	Retail	1,800 sqm
	Community / Place of Assembly	75 patrons [3]
	Hotel	100 rooms
OfficeMax Site (634-648 Wellington Road)	Aged Care Facility	100 rooms
	Residential	220 dwellings

- [1] Estimate based on the total floor area for medical centre with the revised scheme and the average floor are per practitioner with the original scheme.
- [2] The total office floor area comprises new office floor area within the Stage 1 medical centre buildings and the retention of the existing 2,239sqm standalone office buildings.
- [3] Assumed cap of 75 patrons, based on a consistent floor area per patron with the original scheme, adopted for the new proposed Community floor space.

3.2 Site Access Strategy

The proposal will maintain the existing access arrangements to the site, being the left-in/left-out access from Wellington Road to the OfficeMax site, and the Wise Wellness site's left-out access to Wellington Road and full turning movement access to Jacksons Road.

The abovementioned access points are illustrated on an aerial image in Figure 3.1.

Figure 3.1: Site Access Points



Source: Nearthmap

It is noted that the left-in/left-out access to Wellington Road currently provides access to the OfficeMax site only (634-648 Wellington Road), and it is not proposed to provide any internal connection between the two lots (i.e. the residential buildings within the OfficeMax site will not be able to gain vehicle access to the site from Jacksons Road). There will only be internal pedestrian connections between the OfficeMax and Wise Wellness sites.

Ultimately it is proposed to signalise the existing site access to Jacksons Road to accommodate the additional site generated traffic volumes, as this will be the primary access point for the Wise Wellness site. However, as the development of the site will be staged, it is proposed to maintain the unsignalised access until the site generated traffic is of sufficient volume to warrant the upgrade.

The above is discussed in further detail within Section 4 of this report.

4. Traffic Impact Assessment

4.1 Preamble

The following traffic assessment has been completed assuming full development of the overall site. The impact of the site generated traffic on the following intersections during the AM and PM peak hours has been assessed using *SIDRA INTERSECTION 7*⁴:

- Jacksons Road / Site Access
- Wellington Road / Wise Wellness Site Access
- Wellington Road / OfficeMax Site Access
- Wellington Road / Jacksons Road.

4.2 Traffic Generation

4.2.1 Childcare Centre

Traffic generation estimates for the childcare centre use have been sought from the RTA 'Guide to Traffic Generating Developments' (2002). The RTA Guide outlines rates of 0.8 and 0.7 vehicle movements per child during the AM and PM peak hours respectively.

Application of these rates to the development proposal equates to 80 and 70 vehicle movements generated by the childcare centre during the AM and PM peak hours, respectively.

A childcare centre typically operates with high turnover of pick-up/drop-off movements. Therefore, it has been assumed that there will be an in/out ratio of 50:50 during both the AM and PM peaks.

4.2.2 Medical Centre

Traffic generation estimates for the medical centre have been sought from traffic surveys of various similar uses around Victoria. The data indicates rates of 4.7 and 5.8 vehicle movements per practitioner during the AM and PM peak hours respectively.

Application of these rates to the development proposal equates to 94 vehicle movements generated by the medical centre during the AM peak hour and 116 during the PM peak hour.

Medical centre consultations typically take an hour or less. Therefore, it has been assumed that there will be an in/out ratio of 50:50 during both the AM and PM peaks.

4.2.3 Office

Traffic generation estimates for the office land use have been sought from the RTA 'Guide to Traffic Generating Developments' (2002). The RTA Guide outlines a rate of 2.0 vehicle movements per 100sqm during both the AM and PM peak hours.

Application of this rate to the development proposal (both existing office building that will be retained and the new office floor area) equates to 140 vehicle movements generated by the office use during any peak hour.

Due to typical arrival and departure tendencies for an office, it has been assumed that there will be an in/out ratio of 80:20 during the AM peak and 20:80 during the PM peak.

⁴ Program used under license from Akcelik & Associates Pty Ltd.

4.2.4 Residential

Traffic generation estimates for the residential component of the development have been sought from the Victorian Integrated Survey of Travel 2009/10 (VISTA 09). The VISTA data indicates that on average, dwellings in the municipality of Monash generate 5.1 vehicle movements per day. Assuming a 10% peak to daily ratio, this equates to 0.51 vehicle movements per dwelling during any peak hour.

For the purpose of this assessment, a rate of 0.5 movements per dwelling has been adopted. Application of this rate to the development proposal equates to a total of 310 vehicle movements during any peak hour, including 200 generated by the Wise Wellness site and 110 generated by the OfficeMax site.

For the residential use, it has been assumed that there will be an in/out ratio of 20:80 during the AM peak and 60:40 during the PM peak.

4.2.5 Retail

Traffic generation estimates for the small retail tenancy within the medical centre building have been sought from the RTA 'Guide to Traffic Generating Developments' (2002). The RTA Guide outlines a rate of 5.6 vehicle movements per 100sqm during both the AM and PM peak hours, assuming a specialty shop use.

Application of this rate to the development proposal equates to 100 vehicle movements generated by the retail tenancy during any peak hour.

It has been assumed that the retail outlet will be quick turnover and there will be an in/out ratio of 50:50 during the AM and PM peaks.

4.2.6 Community / Function Centre

Information provided to GTA indicates that the community area will function as a place of assembly land use. On this basis, in order to determine a traffic generation estimate, reference has been made to surveys of other function centre uses. The data indicates a traffic generation estimate of 0.09 vehicle movements per patron during the PM peak hour.

Application of this rate to the proposal equates to up to seven vehicle movements in a peak hour. Function centres / places of assembly land uses would typically generate more traffic in the evenings, outside the AM and PM peak hours.

It has been assumed that the place of assembly will have an in/out ratio of 80:20 during the AM peak (people primarily arriving in the morning) and 50:50 during the PM peak (mix of people departing day functions and arriving for evening functions).

4.2.7 Hotel

Traffic generation estimates for the hotel component have been sought from the RTA 'Guide to Traffic Generating Developments' (2002) for a motel land use. It is noted the proposal includes a hotel development however based on the location of the site and its accessibility via public transport, motel traffic generation rates it is considered to be appropriate in this instance.

Application of this rate to the development proposal equates to 40 vehicle movements generated by the hotel tenancy during the AM and PM peak hours.

It has been assumed that the hotel will have an in/out ratio of 40:60 during the AM peak (people primarily departing after checking out in the morning) and 60:40 during the PM peak (people primarily arriving in the evening to check in).

4.2.8 Aged Care Facility

Traffic generation estimates for the aged care facility been sought from the RTA 'Guide to Traffic Generating Developments' (2002). The RTA Guide outlines a rate of 0.1-0.2 vehicle movements per dwelling during the PM peak hour. It has been assumed that the AM peak hour will have a similar rate.

Application of a rate of 0.2 vehicle movements for dwelling to the development proposal equates up to a maximum of 20 vehicle movements generated by the aged care facility during the AM and PM peak hours.

For the aged care facility, it has been assumed that there will be an in/out ratio of 70:30 during the AM peak and 30:70 during the PM peak. This is based on survey data collected throughout existing aged care facilities in Victoria and the fact that the majority of vehicle movements from an aged care facility are by staff who mostly arrive in the morning and depart at night.

4.2.9 Traffic Generation Summary

Based on the anticipated traffic generation for each of the uses in the development proposal, presents a summary of the total traffic generation for the site following full development.

Table 4.1: Traffic Generation Summary

Use	AM Peak Hour		PM Peak Hour	
	In	Out	In	Out
Wise Wellness Site				
Childcare	40 vph	40 vph	35 vph	35 vph
Medical	47 vph	47 vph	58 vph	58 vph
Office	76 vph	19 vph	19 vph	76 vph
Retail	50 vph	50 vph	50 vph	50 vph
Community / Function Centre	5 vph	1 vph	3 vph	3 vph
Residential	40 vph	160 vph	120 vph	80 vph
Aged Care	14 vph	6 vph	6 vph	14 vph
Hotel	16 vph	24 vph	24 vph	16 vph
Sub-Totals	325 vph	357 vph	325 vph	369 vph
OfficeMax Site				
Residential	22 vph	88 vph	66 vph	44 vph
Total	347 vph	445 vph	391 vph	413 vph

It is noted that the above values include some rounding to present whole numbers of vehicle movements
vph denotes vehicles per hour

It is important to note that the above traffic generation estimates are considered to be conservative on the high side as no discount has been applied to multi-purpose trips within the site or the potential of a resident/office worker utilising the childcare or medical centres in the same vehicle trips.

4.3 Traffic Distribution and Assignment

The directional distribution and assignment of traffic generated by the proposed development will be influenced by a number of factors, including the:

- i configuration of the arterial road network in the immediate vicinity of the site
- ii existing operation of intersections providing access between the local and arterial road network

- iii distribution of households in the vicinity of the site
- iv surrounding employment centres, retail centres and schools in relation to the site
- v likely distribution of employee's residences in relation to the site
- vi configuration of access points to the site.

As there will be no internal vehicle connection between the Wise Wellness and OfficeMax sites, 100% of the traffic generated by the OfficeMax site will turn left-in and left-out to/from Wellington Road.

With regard to the Wise Wellness site, as previously outlined GTA has undertaken surveys at the existing site access points. Having consideration to the above factors and the existing surveyed vehicle distributions, the following directional distributions have been assumed through the site access points for the Wise Wellness site, as summarised in .

Table 4.2: Wise Wellness Site – Directional Distributions of Traffic

Entry / Exit	Movement	AM	PM
Entry Movements	Jacksons Road Left-In	40%	40%
	Jacksons Road Right-In	60%	60%
Exit Movements	Wellington Road Left-Out	45%	10%
	Jacksons Road Left-Out	30%	50%
	Jacksons Road Right-Out	25%	40%

Based on the above, and have been prepared to show the estimated site generated turning movements in the vicinity of the subject property following full site development. It is noted that the distribution of the site generated traffic volumes through the adjacent signalised intersection of Wellington Road / Jacksons Road has been based on existing vehicle movements through the intersection.

Figure 4.1: AM Peak Hour Site Generated Traffic Volumes

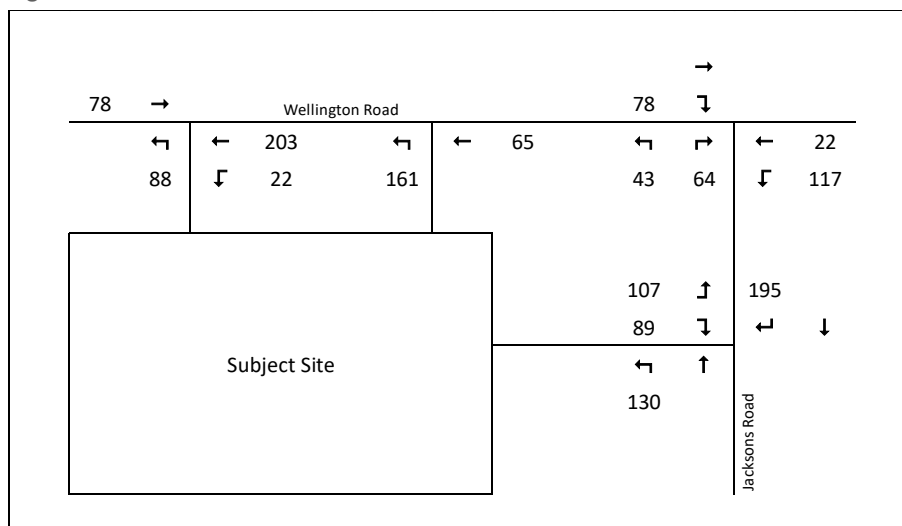
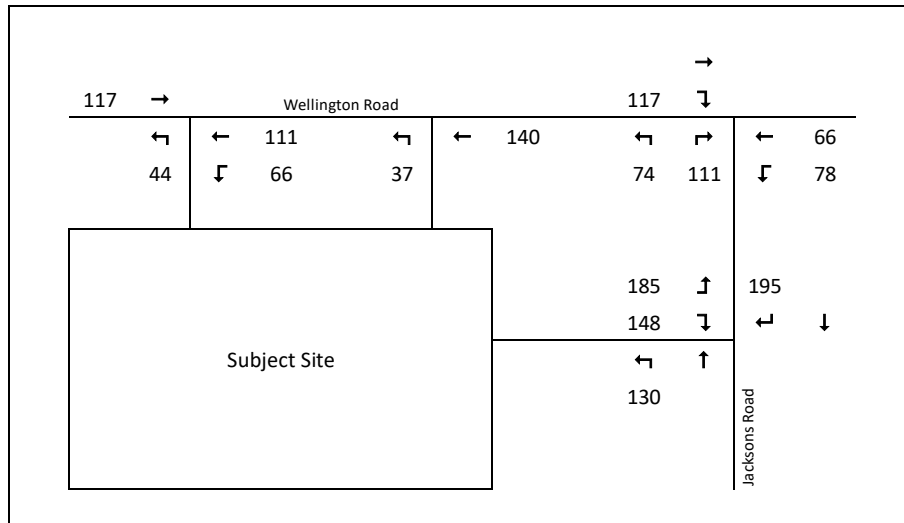


Figure 4.2: PM Peak Hour Site Generated Traffic Volumes



4.4 Traffic Impact

4.4.1 Existing Conditions

The existing operation of the key intersections has been assessed using *SIDRA INTERSECTION 7*, a computer based modelling package which calculates intersection performance.

The commonly used measure of intersection performance is referred to as the Degree of Saturation (*DOS*). The *DOS* represents the flow-to-capacity ratio for the most critical movement on each leg of the intersection. A *DOS* of around 0.95 for signalised intersections and 0.90 for unsignalised intersections, has been typically considered the 'ideal' limit, beyond which queues and delays increase disproportionately⁵.

presents a summary of the existing operation of the intersections, with full results presented in Appendix A of this report. It is noted that these existing operating conditions have been based on the updated existing traffic volumes from November 2018.

Table 4.3: Existing Intersection Operation

Intersection	Peak Hour	Approach	DOS	Average Delay (sec)	95 th Percentile Queue (m)
Jacksons Road / Site Access	AM	Jacksons Road (South)	# 0.29	0 sec	0 m
		Jacksons Road (North)	0.27	1 sec	6 m
		Site Access (West)	0.06	13 sec	1 m
	PM	Jacksons Road (South)	# 0.27	0 sec	0 m
		Jacksons Road (North)	0.27	0 sec	2 m
		Site Access (West)	0.23	12 sec	6 m

⁵ SIDRA INTERSECTION adopts the following criteria for Level of Service assessment:

Level of Service		Intersection Degree of Saturation (DOS)		
		Unsignalised Intersection	Signalised Intersection	Roundabout
A	Excellent	<=0.60	<=0.60	<=0.60
B	Very Good	0.60-0.70	0.60-0.70	0.60-0.70
C	Good	0.70-0.80	0.70-0.90	0.70-0.85
D	Acceptable	0.80-0.90	0.90-0.95	0.85-0.95
E	Poor	0.90-1.00	0.95-1.00	0.95-1.00
F	Very Poor	>=1.0	>=1.0	>=1.0

Intersection	Peak Hour	Approach	DOS	Average Delay (sec)	95 th Percentile Queue (m)
Wellington Road / Wise Wellness Site Access	AM	Wise Wellness Site Access (South)	0.04	10 sec	1 m
		Wellington Road (East)	# 0.44	0 sec	0 m
	PM	Wise Wellness Site Access (South)	0.02	7 sec	1 m
		Wellington Road (East)	# 0.23	0 sec	0 m
Wellington Road / OfficeMax Site Access [1]	AM	OfficeMax Site Access (South)	0.02	11sec	1 m
		Wellington Road (East)	# 0.44	0 sec	0 m
Wellington Road / Jacksons Road	AM	Jacksons Road (South)	0.46	37 sec	56 m
		Wellington Road (East)	# 0.91	36 sec	345 m
		Wellington Road (West)	0.83	20 sec	65 m
	PM	Jacksons Road (South)	0.37	19 sec	25 m
		Wellington Road (East)	0.82	21 sec	74 m
		Wellington Road (West)	# 0.86	22 sec	168 m

DOS – Degree of Saturation, # - Intersection DOS

[1] It is noted that the OfficeMax site is currently closed and the access gated off during the PM peak hour.

indicates that all three of the site access intersections currently operate well with minimal queues and delays on all approaches.

The signalised intersection of Wellington Road / Jacksons Road operates with a 'good' level of service, noting that the intersection is shown to experience queues in the order of 350m on its eastern approach during the AM peak period. This is consistent with on-site observations.

4.4.2 Post Development Conditions

By adding the development traffic to the existing traffic flows we can obtain the Post-Development traffic volumes. These post development traffic volumes are outlined in and .

Figure 4.3: Post-Development AM Peak Hour Traffic Volumes

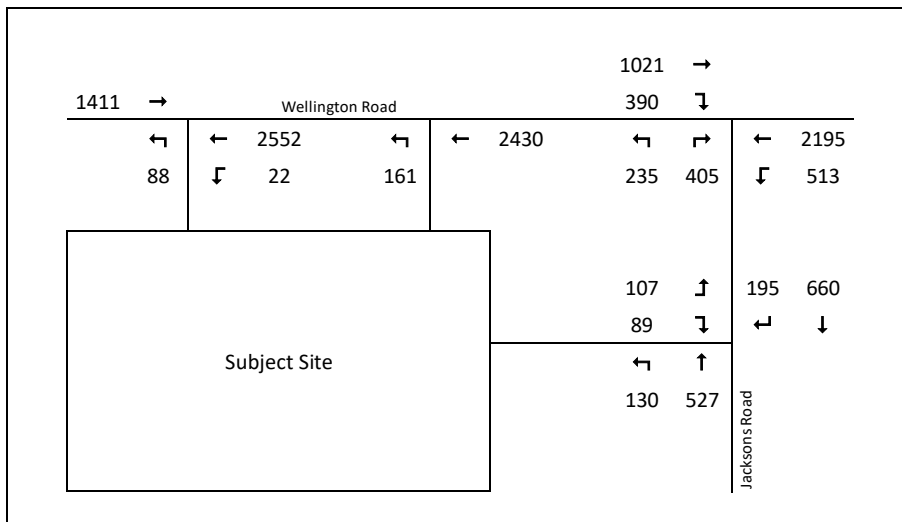
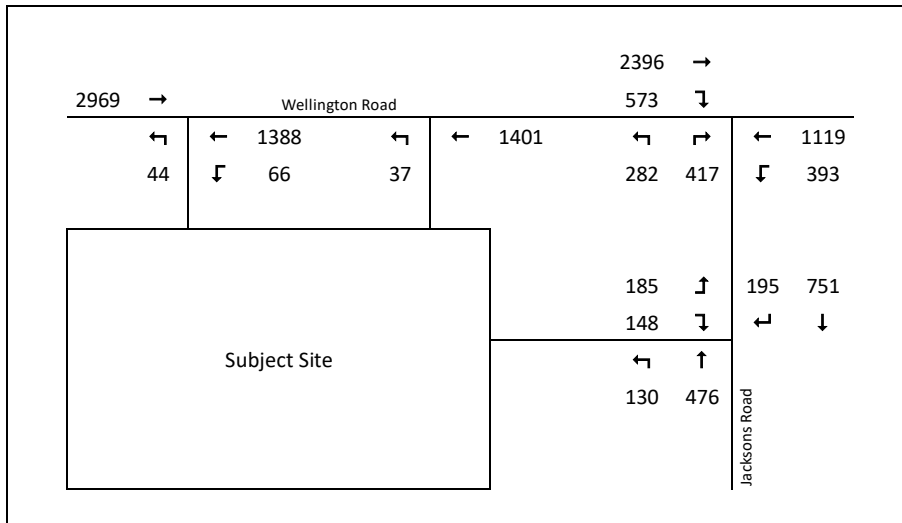


Figure 4.4: Post-Development PM Peak Hour Traffic Volumes



The impact of the development traffic upon intersections in the vicinity of the site immediately following the full site development was assessed using SIDRA INTERSECTION.

On the basis of the turning movement estimates presented above, presents a summary of the anticipated future operation of the nominated intersections following the full development of the site. Also included in brackets is a +/- comparison with the corresponding results from the existing operating conditions of each intersection, to clearly indicate the change in operation. It is noted that these results assume no upgrade to the site access intersection with Jacksons Road.

Detailed results of this analysis are provided in Appendix A of this report.

Table 4.4: Post-Development Intersection Operation

Intersection	Peak Hour	Approach	DOS	Average Delay (sec)	95 th Percentile Queue (m)
Jacksons Road / Site Access	AM	Jacksons Road (South)	0.29 (+0.00)	1 sec (+1 sec)	0 m (+0 m)
		Jacksons Road (North)	0.42 (+0.15)	4 sec (+3 sec)	20 m (+14 m)
		Site Access (West)	# 0.92 (+0.86)	65 sec (+52 sec)	63 m (+62 m)
	PM	Jacksons Road (South)	0.27 (+0.00)	1 sec (+1 sec)	0 m (+0 m)
		Jacksons Road (North)	0.44 (+0.17)	4 sec (+4 sec)	23 m (+21 m)
		Site Access (West)	# 1.53 (+1.30)	508 sec (+498 sec)	593 m (+587 m)
Wellington Road / Wise Wellness Site Access	AM	Wise Wellness Site Access (South)	0.26 (+0.22)	11 sec (+1 sec)	8 m (+7 m)
		Wellington Road (East)	# 0.45 (+0.01)	0 sec (+0 sec)	0 m (+0 m)
	PM	Wise Wellness Site Access (South)	0.04 (+0.02)	7 sec (+0 sec)	1 m (+1 m)
		Wellington Road (East)	# 0.26 (+0.03)	0 sec (+0 sec)	0 m (+0 m)
Wellington Road / OfficeMax Site Access	AM	OfficeMax Site Access (South)	0.20 (+0.18)	13 sec (+2 sec)	5 m (+4 m)
		Wellington Road (East)	# 0.47 (+0.03)	0 sec (+0 sec)	0 m (+0 m)
	PM	OfficeMax Site Access (South)	0.06 (N/A)	8 sec (N/A)	2 m (N/A)
		Wellington Road (East)	# 0.26 (N/A)	0 sec (N/A)	0 m (N/A)
Wellington Road / Jacksons Road	AM	Jacksons Road (South)	0.59 (+0.13)	46 sec (+9 sec)	84 m (+28 m)
		Wellington Road (East)	# 0.90 (-0.01)	35 sec (-1 sec)	400 m (+55 m)
		Wellington Road (West)	0.86 (+0.03)	25 sec (+5 sec)	97 m (+32 m)
	PM	Jacksons Road (South)	0.53 (+0.16)	22 sec (+3 sec)	43 m (+18 m)
		Wellington Road (East)	0.83 (+0.01)	24 sec (+3 sec)	94 m (+20 m)
		Wellington Road (West)	# 0.79 (-0.07)	18 sec (-4 sec)	155 m (-13 m)

DOS – Degree of Saturation, # - Intersection DOS

Note: This model is based on an existing conditions model which has not been calibrated and signalised intersection models have been set to SIDRA's 'Practical Cycle Time' setting. Therefore, these results are only appropriate for comparative purposes to understand the extent of changes that occur in the operation of the intersection with the additional site generated traffic.

As described earlier, a DOS of around 0.95 for signalised intersections and 0.90 for unsignalised intersections has traditionally been considered the practical limit beyond which intersection performance is unsatisfactory, as beyond this value queues and delays increase disproportionately.

Based on the results presented in , both of the site access points to Wellington Road are expected to operate with minimal queues and delays. In addition, the site generated traffic is expected to have only a small impact on the operation of the signalised intersection of Wellington Road / Jacksons Road.

However, during the PM peak the Jacksons Road site access is expected exceed its theoretical capacity following full development of the site, with the critical movement being the right turn out of the site at a DOS of 1.53. The 95th percentile queues also theoretically would extend back 593m into the site, which is not feasible and cannot be physically accommodated in the site. On this basis, it is clear that the intersection will need to be upgraded to accommodate the additional traffic generated by full development of the site. As the critical movement is the right turn-out, there are limited upgrade options that will be beneficial without signalling the intersection.

4.4.3 Jacksons Road Site Access – Signalised Intersection Assessment

As outlined by the results presented in the previous section, the Jacksons Road site access is required to be upgraded to a signalised intersection to accommodate the anticipated site generated traffic. Therefore, a SIDRA assessment has been undertaken for a signalised intersection scenario during the critical PM peak hour when there will be a larger number of vehicles exiting the site.

For the purposes of this assessment, a basic two-phase set up has been utilised for the proposed signals. A cycle time of 60 seconds was adopted to match the SIDRA output for the signalised intersection of Wellington Road / Jacksons Road. It should be noted that coordination will ultimately be required with the phasing and timing between these two intersections, which will be subject to further future analysis.

Notwithstanding, to provide an indication of the proposed signalised intersection's performance, summarises the results of the SIDRA assessment. Also included in the table for comparison is the +/- difference between the signalised result and the unsignalised post development results. Full results are included in Appendix A.

Table 4.5: Post-Development Operation – Jacksons Road / Site Access Signalised Intersection Upgrade

Peak Hour	Approach	DOS	Average Delay (sec)	95 th Percentile Queue (m)
PM	Jacksons Road (South)	0.49 (+0.22)	8 sec (+6 sec)	64 m (+64 m)
	Jacksons Road (North)	0.81 (+0.37)	16 sec (+12 sec)	102 m (+79 m)
	Site Access (West)	0.81 (-0.72)	29 sec (-479 sec)	79 m (-514 m)

DOS – Degree of Saturation, # - Intersection DOS

As presented in , following signalisation the Jacksons Road site access intersection is expected to operate with a 'good' level of service, presenting a significant improvement from the unsignalised intersection results.

While the performance of the northern and southern approaches is partially compromised due to the delays involved with a controlled signalised intersection, the western approach (and therefore the overall intersection results) are improved substantially. The 95th percentile queues into the site are reduced from 593m to 79m, which will be a major reduction to the impacts on the internal circulation within the site. While this is still approximately 20m more than the desirable 50m that has been previously outlined in this report, more detailed traffic analysis will be undertaken at the planning permit stages of development. Further options can be explored to improve capacity on the site access approach once more detailed land use and yield information is available, which will better inform the anticipated site generated traffic volumes.

4.4.4 Trigger for Signalisation Upgrade to Jacksons Road Access

Further to the above assessment of the proposed signalised access intersection, given that development of the site will take place in stages, it must be determined at what stage the upgrade to signals will be required.

With full development of the site, the existing unsignalised intersection would be expected to operate with a DOS of 1.53, as per Table 4.4.

As previously outlined, for unsignalised intersections, a DOS of 0.90 is normally considered the 'ideal' limit, beyond which queues and delays increase disproportionately. Additionally, due to the anticipated internal layout, queues beyond approximately 50m into the site are expected to compromise the internal operation and are consequently considered to be unacceptable. On this basis, the point of development of the site that the intersection reaches a DOS of 0.90 or 95th

percentile queues into the site exceed approximately 50m (whichever occurs first) is considered to be the trigger point for signalisation of the intersection.

Through iterative testing of the existing unsignalised intersection model in SIDRA, it has been determined that 65% development of the ultimate yield (considering the Wise Wellness site only) will be the trigger point at which signalisation of the site access will be required. This equates to a total of 451 vehicle movements generated by the Wise Wellness site during the PM peak hour. With this volume of traffic, the site access intersection reaches a DOS of 0.88 with a 95th percentile queues into the site are 57m long. This is close to capacity for the west approach and is in the order of the maximum queue length considered acceptable in this instance. For reference, with full development the Wise Wellness site is expected to generate 694 vehicle movements in the PM peak hour.

It is noted that different land uses exhibit different traffic tendencies (i.e. in/out ratios and variations in AM/PM generation rates), which means that removing different uses from the ultimate yield will have different impacts on when the trigger point for signals will occur. Therefore, for simplicity at this stage, the trigger point has been determined as a percentage of full development. It is recommended that further assessment be undertaken to determine the exact stage of development the trigger point will occur during the future planning permit processes for the site.

4.4.5 Jacksons Road Signalised Access – Concept Layout Plan

Having regard to the above discussions and analysis, GTA has prepared a concept plan for the potential design layout for the construction of traffic signals on Jacksons Road following the future development of the subject site.

The concept layout plan (GTA Drawing No. V115200-01P1) is provided in Appendix B of this report.

4.4.6 Summary

Based on the above assessments, the two northern site access intersections to Wellington Road are expected to operate adequately following full development of the site.

Moreover, the anticipated site generated traffic is also expected to only have a small impact on the operation of the signalised intersection of Wellington Road / Jacksons Road.

The existing unsignalised Jacksons Road site access intersection is expected to fail following ultimate development of the subject site. As such, an upgrade will be required to this intersection to provide traffic signals at this location.

Based on a preliminary traffic assessment, the traffic signal upgrade is expected to improve the overall operation of the intersection to a 'good' level of service and contain appropriate queues and delays for the site access approach. It is noted that more detailed analysis of this intersection would be required once more detailed land use and yield information is available at the planning permit stages. This will help to more accurately inform the intersection upgrade requirements.

5. Other Considerations

5.1 Walking and Cycling Network

5.1.1 External

There are pedestrian paths located along the site's frontages to both Wellington Road and Jacksons Road. There are also signalised pedestrian crossing options available at the intersection of Wellington Road / Jacksons Road, connecting the site to an off-road shared path that runs within the reserve on the northern side of Wellington Road.

As shown in the concept layout plan for the future Jacksons Road signalised access point within Appendix B, the provision of signals will also allow a future east-west connection across Jacksons Road for convenient pedestrian connectivity to/from the site to the existing resident catchment to the east.

In addition to the shared path, the PBN and BPRs run along both Wellington Road and Jacksons Road in the vicinity of the site.

5.1.2 Internal

It is important to note that whilst there will be no vehicular connection between the eastern and western sites, internal pathways will be provided that will allow a good level of east-west connectivity. Furthermore, all internal roadways will also provide pedestrian connections to the external network.

5.2 Public Transport

As previously outlined in Section 2.4, the subject site has good access to public transport options. There are multiple bus lines operating past the site, including two bus stops located on the site's frontages to Wellington Road and Jacksons Road.

It is recommended that consultation occur with PTV and the local bus provider (during the planning permit stages) regarding the potential upgrade to the existing bus stop on Jacksons Road (in close proximity to Wellington Road) to allow both an improved facility for patrons utilising the bus network and accessibility to/from the subject site using this service.

5.3 Car Parking Requirements

The car parking requirements associated with the ultimate development are subject to the individual planning permit applications and are not considered as part of the rezoning application.

It is anticipated that car parking will generally be provided in accordance with the statutory car parking requirements set out in Clause 52.06 of the Monash Planning Scheme, unless otherwise supported by empirical evidence.

For reference, the statutory car parking rates for the proposed land uses are outlined below⁸:

- Childcare Centre: 0.22 spaces per child
- Medical Centre: 3.5 spaces per 100sqm LFA

⁸ Noting that Column B rates apply to the land as it is located within 400m of the Principal Public Transport Network Area.

- Office: 3.0 spaces per 100sqm NFA
- Residential: 1 space per 1 or 2 bedroom dwelling
2 spaces per 3+ bedroom dwelling
0 visitor spaces for every 5 dwellings or more
- Retail (shop): 3.5 spaces per 100sqm LFA
- Function Centre: 0.3 spaces per patron admitted
- Aged Care: 0.3 spaces per lodging room
- Hotel: 1 space per unit and one to each manager dwelling, plus 50 per cent of the relevant requirement of any ancillary use

5.4 Bicycle Parking Requirements

Similar to the above components, bicycle parking requirements will be considered with the individual planning permit applications.

It is anticipated that bicycle parking will be provided in accordance with the statutory rates set out in Clause 52.34 of the Monash Planning Scheme.

For reference, these rates are outlined below for the proposed land uses:

- Childcare Centre: none
- Aged Care Facility: none
- Hotel: 1 employee space to each 40 rooms
- Medical Centre: 1 employee space per 8 practitioners
1 visitor space per 4 practitioners
- Office: 1 employee space per 300sqm NFA
1 visitor space per 1000sqm NFA
- Residential: 1 resident space per 5 dwellings
1 visitor space per 10 dwellings
- Retail: 1 employee space per 300sqm LFA
1 visitor space per 500sqm LFA
- Function Centre: 1 employee space per 1,500sqm NFA
2 visitor spaces, plus 1 space per 1,500sqm NFA

5.5 Loading & Waste Collection

The loading requirements are considered as part of the individual town planning permits. Other than the small retail component, the proposed uses do not generally generate a requirement for an on-site loading area. In this regard, the appropriateness of an on-site loading facility will be assessed with each stage of development, including consideration of the site layout to accommodate loading.

Waste collection is expected to occur on-site for the overall development, however will also be considered as part of the planning permit applications for each stage.

6. Conclusion

Based on the analysis and discussions presented within this report, the following conclusions are made:

- i The site is expected to generate up to 792 and 804 vehicle movements in the AM and PM peak hours respectively. It should be noted that this is considered to be a conservative assessment as no discount has been adopted for multi-purpose trips within the site.
- ii The two northern site access intersections to Wellington Road are expected to operate satisfactorily following development of the site.
- iii The anticipated site generated traffic is expected to have only a small impact on the operation of the signalised intersection of Wellington Road / Jacksons Road.
- iv The existing unsignalised Jacksons Road site access intersection is expected to fail following full development of the site, due to lack of opportunities to exit the site to the south.
- v It is proposed to upgrade this intersection to a signalised intersection as part of the ultimate development of the site. Based on a preliminary SIDRA assessment, the proposed signalised intersection is expected to improve the overall operation of the intersection to a 'good' level of service and the queues and delays for the site access approach would be reduced to acceptable levels.
- vi Through iterative testing of the existing unsignalised intersection model in SIDRA, it has been determined that 65% development of the ultimate yield (considering the Wise Wellness site only) will be the trigger point at which signalisation of the site access will be required. This equates to a total of 451 vehicle movements generated by the Wise Wellness site during the PM peak hour.
- vii While car parking, bicycle parking and loading provisions will all be considered at the planning permit stages, it is expected that these components will be provided in accordance with the statutory requirements, unless there is empirical evidence to support otherwise.

Appendix A

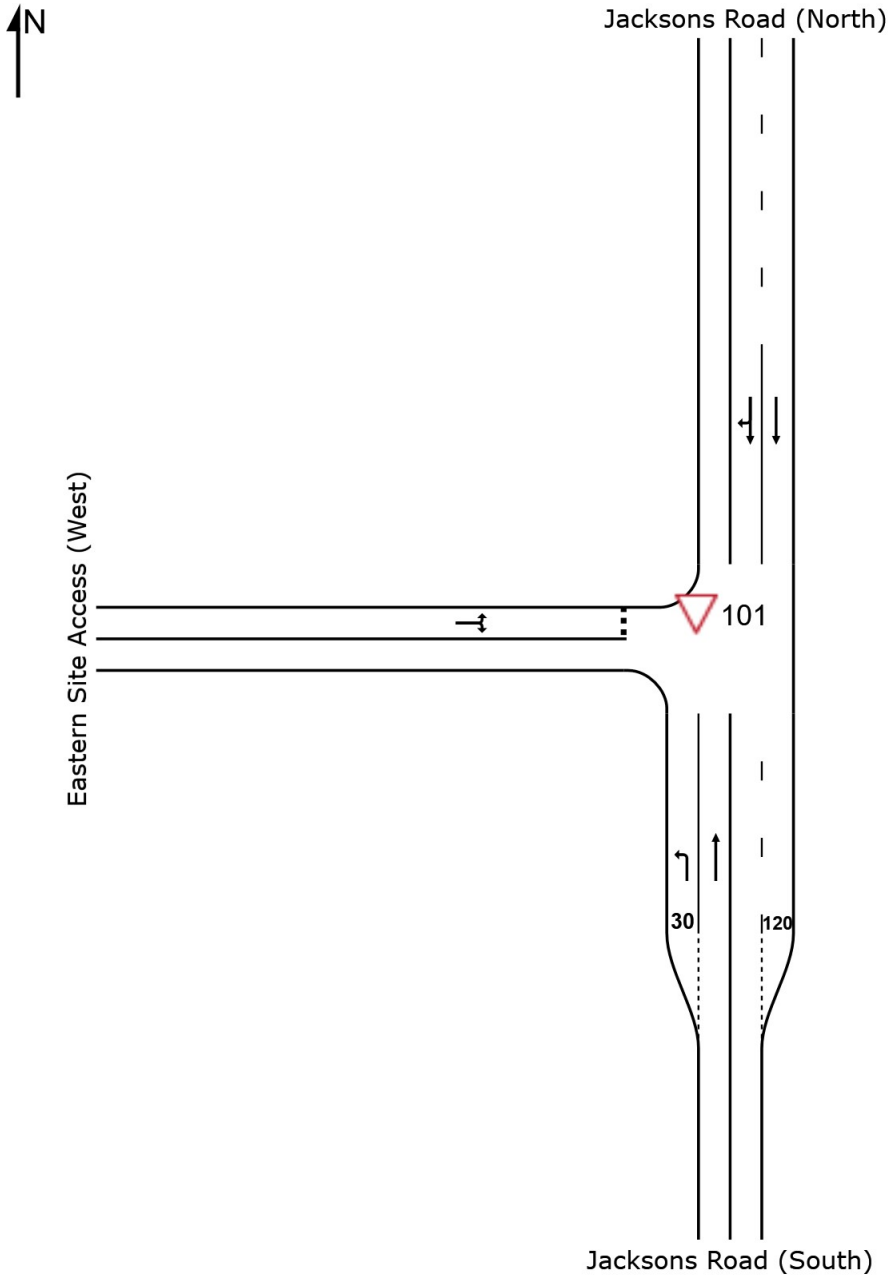
SIDRA Intersection Results

A.1 Existing Conditions

SITE LAYOUT

▽ Site: 101 [Jacksons Road / Site Access - Exg - AM]

Jacksons Road / Eastern Site Access
Giveaway / Yield (Two-Way)



MOVEMENT SUMMARY

▽ Site: 101 [Jacksons Road / Site Access - Exg - AM]

Jacksons Road / Eastern Site Access
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
		Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m		per veh	km/h
South: Jacksons Road (South)											
1	L2	32	0.0	0.017	6.4	LOS A	0.0	0.0	0.00	0.61	59.7
2	T1	555	5.0	0.294	0.0	LOS A	0.0	0.0	0.00	0.00	69.9
Approach		586	4.7	0.294	0.4	NA	0.0	0.0	0.00	0.03	69.3
North: Jacksons Road (North)											
8	T1	695	5.0	0.269	0.6	LOS A	0.8	5.8	0.12	0.05	68.4
9	R2	51	0.0	0.269	10.6	LOS B	0.8	5.8	0.21	0.09	31.2
Approach		745	4.7	0.269	1.3	NA	0.8	5.8	0.12	0.05	63.2
West: Eastern Site Access (West)											
10	L2	6	0.0	0.058	3.0	LOS A	0.2	1.3	0.76	0.73	27.2
12	R2	8	0.0	0.058	20.8	LOS C	0.2	1.3	0.76	0.73	27.2
Approach		15	0.0	0.058	13.2	LOS B	0.2	1.3	0.76	0.73	27.2
All Vehicles		1346	4.6	0.294	1.0	NA	0.8	5.8	0.08	0.05	64.8

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.

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

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

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

MOVEMENT SUMMARY

▽ Site: 101 [Jacksons Road / Site Access - Exg - PM]

Jacksons Road / Eastern Site Access
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Jacksons Road (South)											
1	L2	15	0.0	0.008	6.4	LOS A	0.0	0.0	0.00	0.61	59.7
2	T1	501	5.0	0.265	0.0	LOS A	0.0	0.0	0.00	0.00	69.9
Approach		516	4.9	0.265	0.2	NA	0.0	0.0	0.00	0.02	69.6
North: Jacksons Road (North)											
8	T1	791	5.0	0.274	0.2	LOS A	0.3	2.3	0.04	0.02	69.4
9	R2	21	0.0	0.274	9.9	LOS A	0.3	2.3	0.07	0.03	31.6
Approach		812	4.9	0.274	0.5	NA	0.3	2.3	0.04	0.02	67.3
West: Eastern Site Access (West)											
10	L2	40	0.0	0.231	3.3	LOS A	0.8	5.7	0.73	0.77	27.5
12	R2	32	0.0	0.231	22.4	LOS C	0.8	5.7	0.73	0.77	27.5
Approach		72	0.0	0.231	11.7	LOS B	0.8	5.7	0.73	0.77	27.5
All Vehicles		1399	4.6	0.274	0.9	NA	0.8	5.7	0.06	0.06	63.4

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.

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

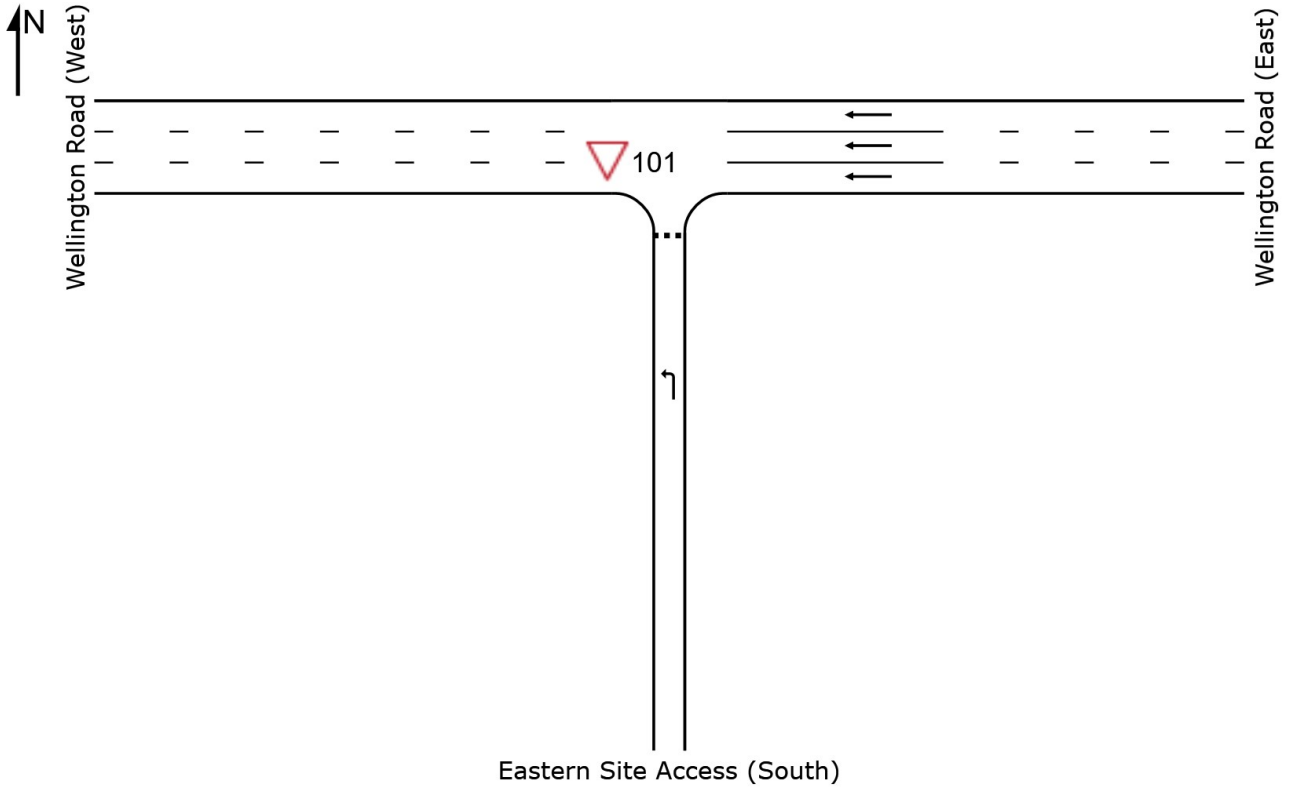
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

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

SITE LAYOUT

▽ Site: 101 [Wellington Road / Wise Wellness Site Access - Exg - AM]

Wellington Road / Eastern Site Access
Giveway / Yield (Two-Way)



MOVEMENT SUMMARY

Site: 101 [Wellington Road / Wise Wellness Site Access - Exg - AM]

Wellington Road / Eastern Site Access
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Eastern Site Access (South)											
1	L2	25	0.0	0.037	9.9	LOS A	0.1	1.0	0.61	0.74	50.4
Approach		25	0.0	0.037	9.9	LOS A	0.1	1.0	0.61	0.74	50.4
East: Wellington Road (East)											
5	T1	2489	5.0	0.439	0.1	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		2489	5.0	0.439	0.1	NA	0.0	0.0	0.00	0.00	59.9
All Vehicles		2515	4.9	0.439	0.2	NA	0.1	1.0	0.01	0.01	59.8

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.

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

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

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

MOVEMENT SUMMARY

Site: 101 [Wellington Road / Wise Wellness Site Access - Exg - PM]

Wellington Road / Eastern Site Access
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Eastern Site Access (South)											
1	L2	17	0.0	0.015	7.1	LOS A	0.1	0.5	0.44	0.59	52.2
Approach		17	0.0	0.015	7.1	LOS A	0.1	0.5	0.44	0.59	52.2
East: Wellington Road (East)											
5	T1	1327	5.0	0.234	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		1327	5.0	0.234	0.0	NA	0.0	0.0	0.00	0.00	59.9
All Vehicles		1344	4.9	0.234	0.1	NA	0.1	0.5	0.01	0.01	59.8

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.

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

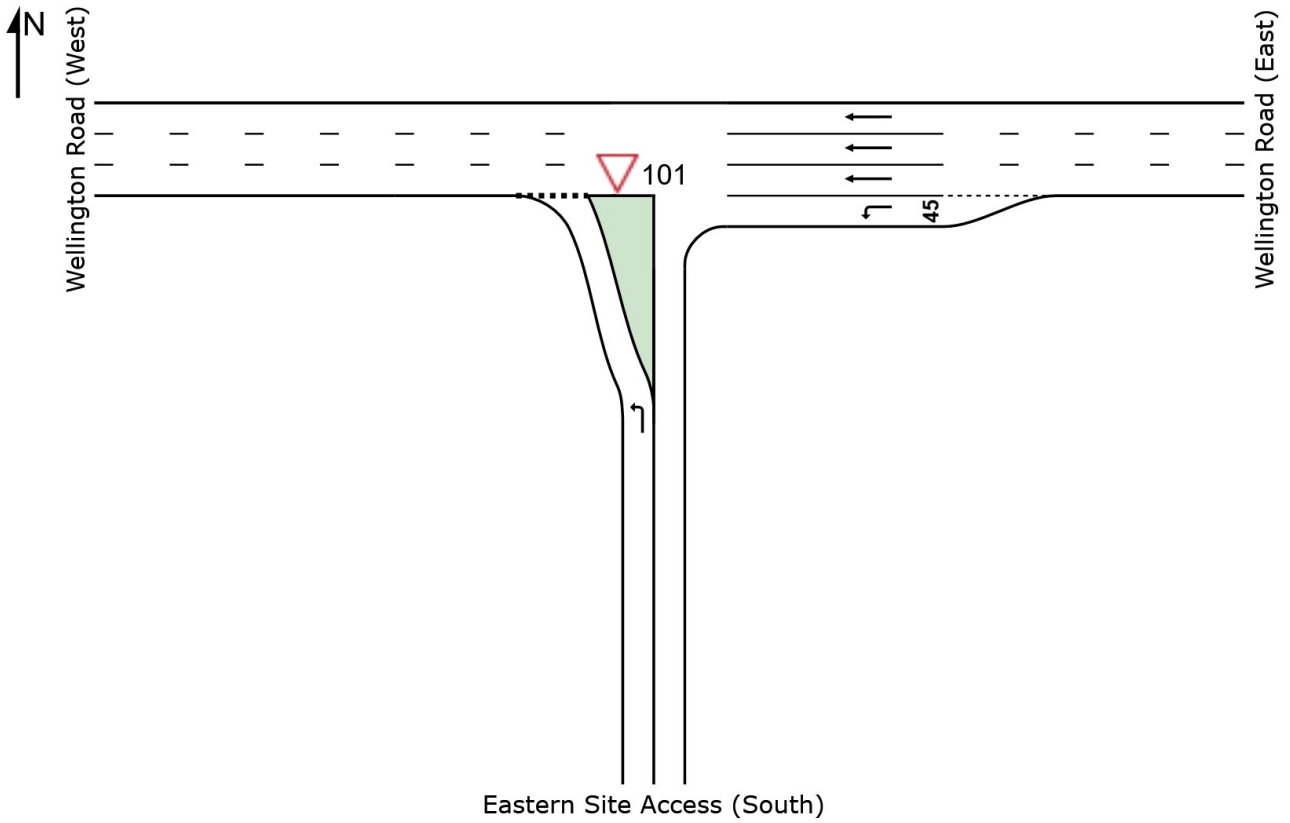
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

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

SITE LAYOUT

▽ Site: 101 [Wellington Road / Office Max Site Access - Exg - AM]

Wellington Road / Eastern Site Access
Giveway / Yield (Two-Way)



MOVEMENT SUMMARY

Site: 101 [Wellington Road / Office Max Site Access - Exg - AM]

Wellington Road / Eastern Site Access
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Eastern Site Access (South)											
1	L2	11	0.0	0.020	11.0	LOS B	0.1	0.5	0.61	0.73	50.3
Approach		11	0.0	0.020	11.0	LOS B	0.1	0.5	0.61	0.73	50.3
East: Wellington Road (East)											
4	L2	42	0.0	0.023	5.5	LOS A	0.0	0.0	0.00	0.58	53.6
5	T1	2473	5.0	0.436	0.1	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		2515	4.9	0.436	0.2	NA	0.0	0.0	0.00	0.01	59.8
All Vehicles		2525	4.9	0.436	0.2	NA	0.1	0.5	0.00	0.01	59.7

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.

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

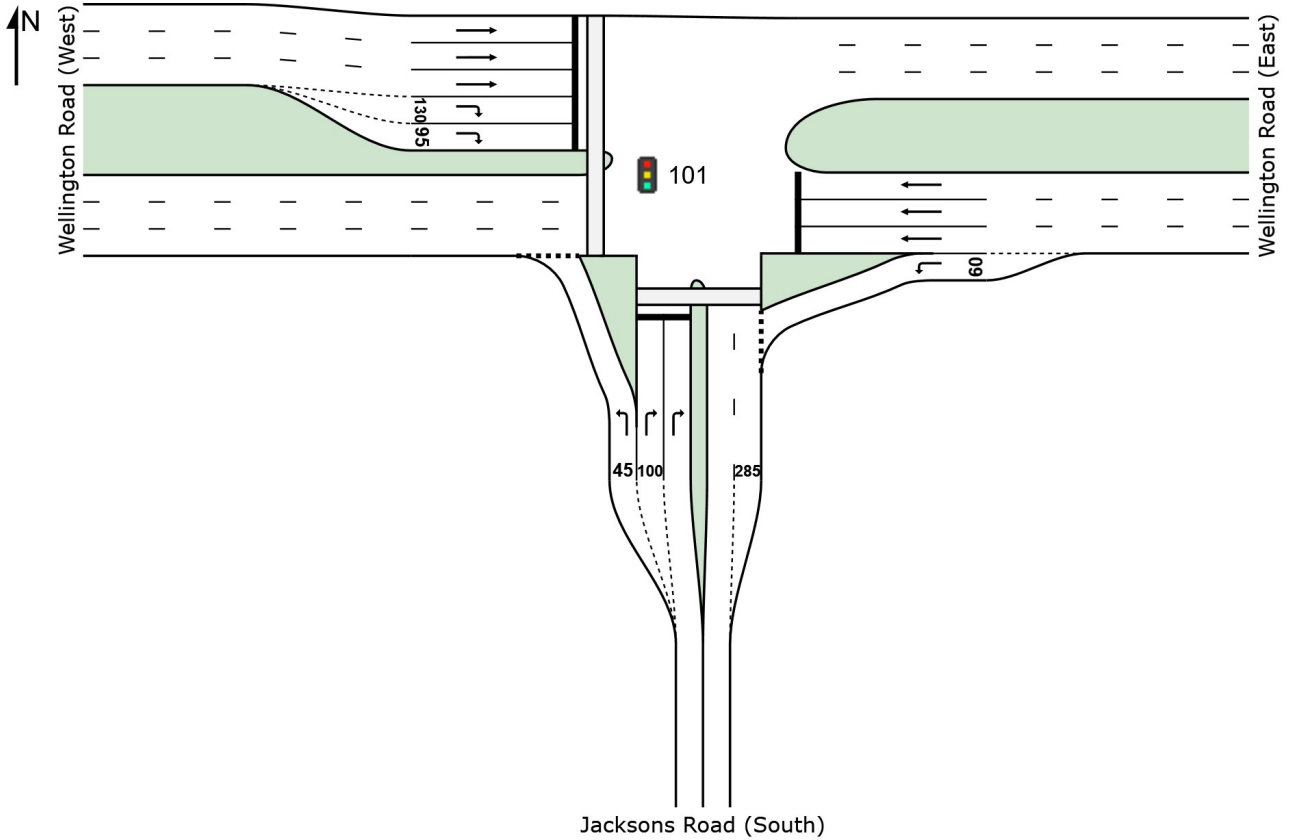
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

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

SITE LAYOUT

 Site: 101 [Wellington Road / Jacksons Road - Existing - AM]

Wellington Road / Jacksons Road
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

 **Site: 101 [Wellington Road / Jacksons Road - Existing - AM]**

Wellington Road / Jacksons Road
 Signals - Fixed Time Isolated Cycle Time = 100 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Jacksons Road (South)											
1	L2	202	5.0	0.255	23.7	LOS C	6.1	44.5	0.67	0.78	47.7
3	R2	359	5.0	0.455	43.6	LOS D	7.7	56.4	0.92	0.80	37.8
Approach		561	5.0	0.455	36.5	LOS D	7.7	56.4	0.83	0.79	40.9
East: Wellington Road (East)											
4	L2	417	5.0	0.286	9.1	LOS A	3.9	28.3	0.26	0.67	59.7
5	T1	2287	5.0	0.911	40.4	LOS D	47.3	345.0	0.95	1.02	42.5
Approach		2704	5.0	0.911	35.6	LOS D	47.3	345.0	0.84	0.96	44.5
West: Wellington Road (West)											
11	T1	1075	5.0	0.287	7.5	LOS A	7.2	52.6	0.45	0.39	68.7
12	R2	328	5.0	0.832	61.9	LOS E	8.9	64.7	1.00	0.92	32.1
Approach		1403	5.0	0.832	20.3	LOS C	8.9	64.7	0.58	0.52	54.2
All Vehicles		4668	5.0	0.911	31.1	LOS C	47.3	345.0	0.76	0.81	46.5

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.
 SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Queue Distance m	Prop. Queued	Effective Stop Rate per ped	
P1	South Full Crossing	53	19.9	LOS B	0.1	0.1	0.63	0.63	
P4	West Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94	
All Pedestrians		105	32.1	LOS D			0.79	0.79	

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

PHASING SUMMARY

 **Site: 101 [Wellington Road / Jacksons Road - Existing - AM]**

Wellington Road / Jacksons Road
 Signals - Fixed Time Isolated Cycle Time = 100 seconds (Practical Cycle Time)

Phase Times determined by the program

Phase Sequence: Two-Phase

Reference Phase: Phase A

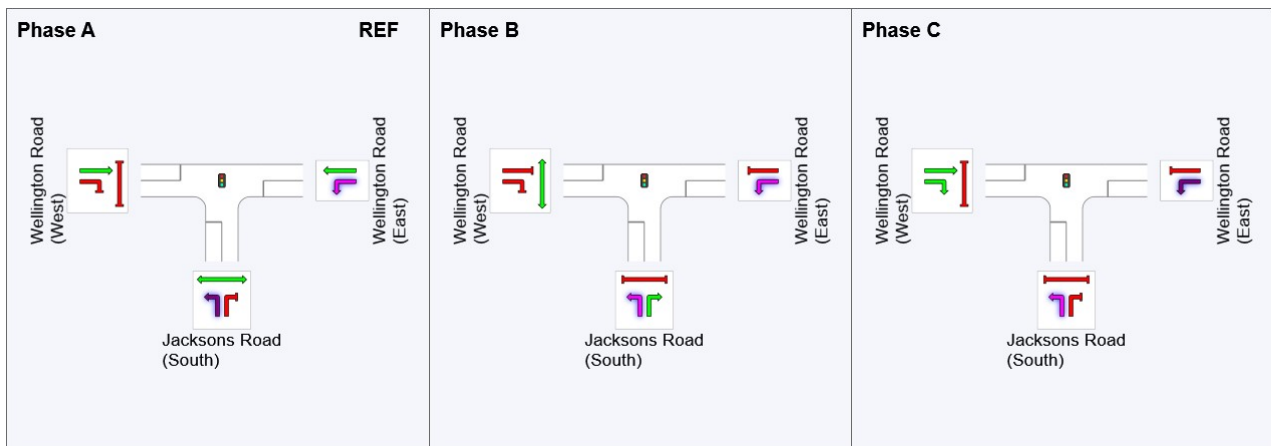
Input Phase Sequence: A, B, C

Output Phase Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Phase Change Time (sec)	0	55	83
Green Time (sec)	49	22	11
Phase Time (sec)	55	28	17
Phase Split	55%	28%	17%

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



REF: Reference Phase

VAR: Variable Phase



MOVEMENT SUMMARY

 **Site: 101 [Wellington Road / Jacksons Road - Existing - PM]**

Wellington Road / Jacksons Road
 Signals - Fixed Time Isolated Cycle Time = 50 seconds (Practical Cycle Time)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed	
		Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m		per veh	km/h	
South: Jacksons Road (South)												
1	L2	219	5.0	0.198	10.0	LOS A	1.9	14.1	0.48	0.69	57.9	
3	R2	322	5.0	0.374	24.5	LOS C	3.4	25.1	0.88	0.78	47.1	
Approach		541	5.0	0.374	18.6	LOS B	3.4	25.1	0.72	0.74	51.0	
East: Wellington Road (East)												
4	L2	332	5.0	0.271	9.8	LOS A	2.4	17.6	0.43	0.70	58.9	
5	T1	1108	5.0	0.815	24.6	LOS C	10.1	73.9	1.00	0.97	52.1	
Approach		1440	5.0	0.815	21.2	LOS C	10.1	73.9	0.87	0.91	53.5	
West: Wellington Road (West)												
11	T1	2522	5.0	0.856	19.0	LOS B	23.0	168.0	0.93	0.98	56.6	
12	R2	480	5.0	0.836	35.7	LOS D	6.9	50.4	1.00	0.97	41.6	
Approach		3002	5.0	0.856	21.7	LOS C	23.0	168.0	0.94	0.98	53.5	
All Vehicles		4983	5.0	0.856	21.2	LOS C	23.0	168.0	0.90	0.93	53.2	

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.
 SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue	Pedestrian Distance	Prop. Queued	Effective Stop Rate	
		ped/h	sec		Pedestrian	m		per ped	
P1	South Full Crossing	53	19.4	LOS B	0.1	0.1	0.88	0.88	
P4	West Full Crossing	53	19.4	LOS B	0.1	0.1	0.88	0.88	
All Pedestrians		105	19.4	LOS B			0.88	0.88	

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.

PHASING SUMMARY

 **Site: 101 [Wellington Road / Jacksons Road - Existing - PM]**

Wellington Road / Jacksons Road
 Signals - Fixed Time Isolated Cycle Time = 50 seconds (Practical Cycle Time)

Phase Times determined by the program

Phase Sequence: Two-Phase

Reference Phase: Phase A

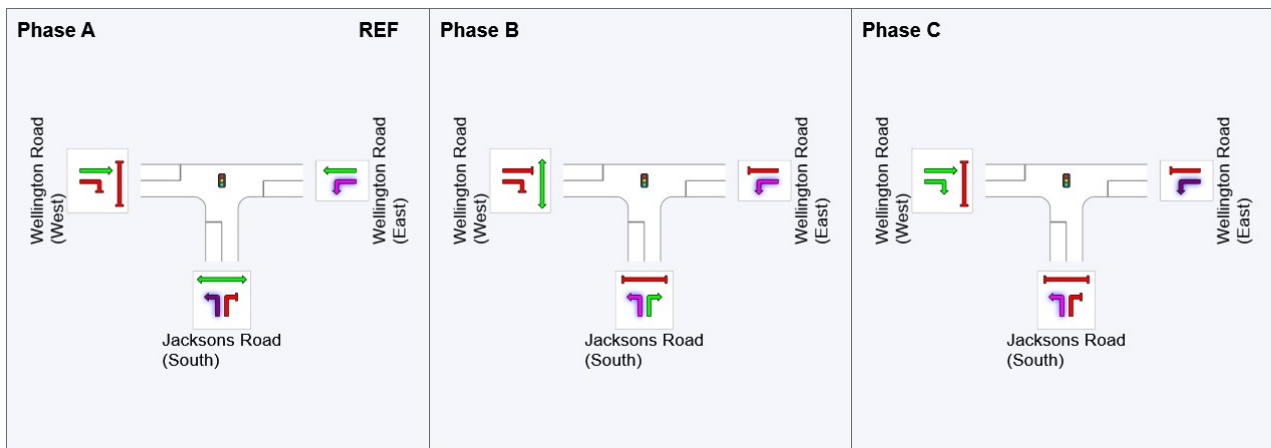
Input Phase Sequence: A, B, C

Output Phase Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Phase Change Time (sec)	0	18	36
Green Time (sec)	12	12	8
Phase Time (sec)	18	18	14
Phase Split	36%	36%	28%

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



REF: Reference Phase

VAR: Variable Phase

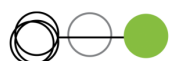


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A.2 Post Development



MOVEMENT SUMMARY

▽ Site: 101 [Jacksons Road / Site Access - Post Dev - AM]

Jacksons Road / Eastern Site Access
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Jacksons Road (South)											
1	L2	137	0.0	0.074	6.4	LOS A	0.0	0.0	0.00	0.61	59.7
2	T1	555	5.0	0.294	0.0	LOS A	0.0	0.0	0.00	0.00	69.9
Approach		692	4.0	0.294	1.3	NA	0.0	0.0	0.00	0.12	67.6
North: Jacksons Road (North)											
8	T1	695	5.0	0.424	1.6	LOS A	2.8	20.3	0.19	0.14	66.6
9	R2	205	0.0	0.424	12.6	LOS B	2.8	20.3	0.69	0.50	29.4
Approach		900	3.9	0.424	4.1	NA	2.8	20.3	0.31	0.22	51.7
West: Eastern Site Access (West)											
10	L2	113	0.0	0.918	50.0	LOS E	9.1	63.4	0.92	2.75	19.6
12	R2	94	0.0	0.918	83.4	LOS F	9.1	63.4	0.92	2.75	19.6
Approach		206	0.0	0.918	65.2	LOS F	9.1	63.4	0.92	2.75	19.6
All Vehicles		1798	3.5	0.918	10.0	NA	9.1	63.4	0.26	0.47	47.1

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.

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.

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

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

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

MOVEMENT SUMMARY

▽ Site: 101 [Jacksons Road / Site Access - Post Dev - PM]

Jacksons Road / Eastern Site Access
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Jacksons Road (South)											
1	L2	137	0.0	0.074	6.4	LOS A	0.0	0.0	0.00	0.61	59.7
2	T1	501	5.0	0.265	0.0	LOS A	0.0	0.0	0.00	0.00	69.9
Approach		638	3.9	0.265	1.4	NA	0.0	0.0	0.00	0.13	67.4
North: Jacksons Road (North)											
8	T1	791	5.0	0.441	1.7	LOS A	3.2	22.7	0.22	0.14	66.4
9	R2	205	0.0	0.441	12.1	LOS B	3.2	22.7	0.64	0.41	29.7
Approach		996	4.0	0.441	3.8	NA	3.2	22.7	0.30	0.20	52.9
West: Eastern Site Access (West)											
10	L2	195	0.0	1.531	497.4	LOS F	84.8	593.4	1.00	12.21	5.7
12	R2	156	0.0	1.531	522.6	LOS F	84.8	593.4	1.00	12.21	5.7
Approach		351	0.0	1.531	508.6	LOS F	84.8	593.4	1.00	12.21	5.7
All Vehicles		1984	3.3	1.531	92.2	NA	84.8	593.4	0.33	2.30	22.2

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.

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

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

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

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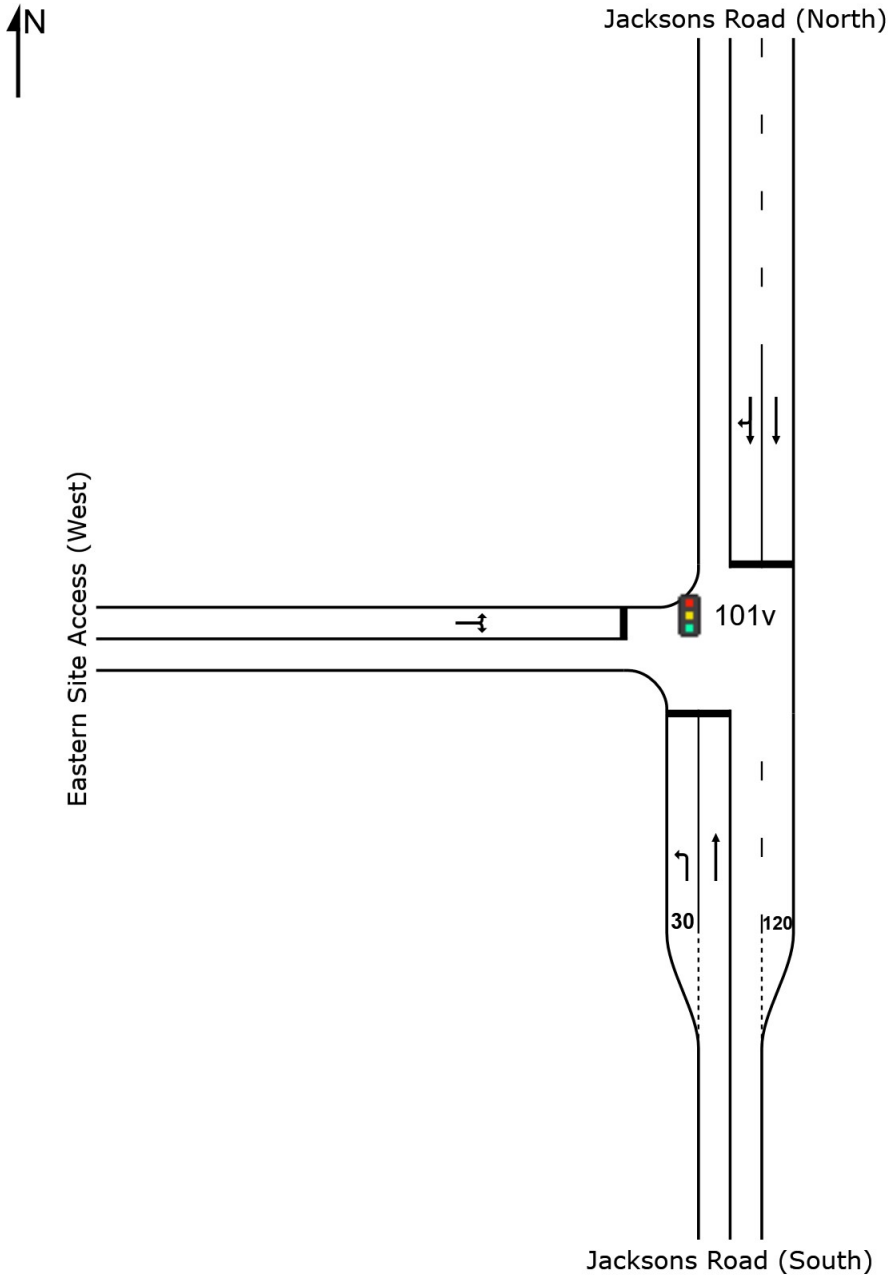
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SITE LAYOUT

 Site: 101v [Jacksons Road / Site Access - Post Dev - AM - Upgraded Intersection]

Jacksons Road / Eastern Site Access
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 101v [Jacksons Road / Site Access - Post Dev - AM - Upgraded Intersection]

Jacksons Road / Eastern Site Access

Signals - Fixed Time Isolated Cycle Time = 60 seconds (User-Given Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
		Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m		per veh	km/h
South: Jacksons Road (South)											
1	L2	137	0.0	0.092	7.1	LOS A	0.5	3.2	0.23	0.66	29.5
2	T1	555	5.0	0.482	6.2	LOS A	8.5	61.7	0.56	0.49	62.6
Approach		692	4.0	0.482	6.3	LOS A	8.5	61.7	0.49	0.53	51.2
North: Jacksons Road (North)											
8	T1	695	5.0	0.690	8.0	LOS A	9.3	66.4	0.61	0.56	59.8
9	R2	205	0.0	0.690	19.7	LOS B	9.3	66.4	0.80	0.81	27.7
Approach		900	3.9	0.690	10.6	LOS B	9.3	66.4	0.65	0.62	47.3
West: Eastern Site Access (West)											
10	L2	113	0.0	0.667	27.6	LOS C	6.1	43.0	0.99	0.90	24.6
12	R2	94	0.0	0.667	27.8	LOS C	6.1	43.0	0.99	0.90	24.5
Approach		206	0.0	0.667	27.7	LOS C	6.1	43.0	0.99	0.90	24.6
All Vehicles		1798	3.5	0.690	10.9	LOS B	9.3	66.4	0.63	0.62	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.

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

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

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

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

PHASING SUMMARY

 **Site: 101v [Jacksons Road / Site Access - Post Dev - AM - Upgraded Intersection]**

Jacksons Road / Eastern Site Access
 Signals - Fixed Time Isolated Cycle Time = 60 seconds (User-Given Cycle Time)

Phase Times determined by the program

Phase Sequence: Opposed Turns

Reference Phase: Phase A

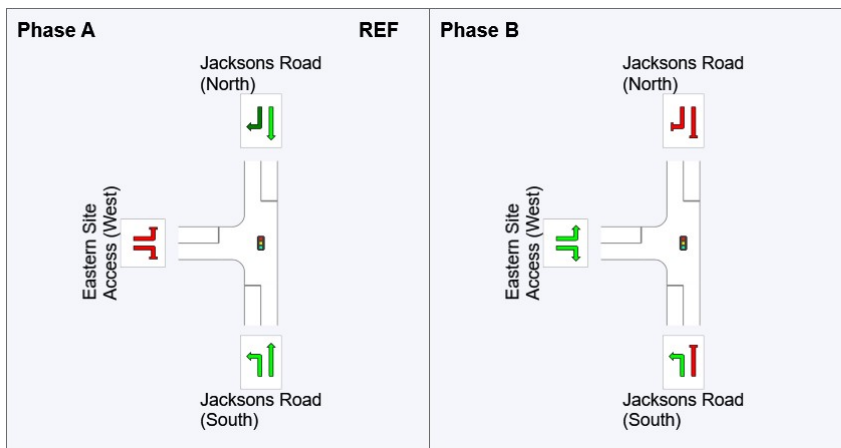
Input Phase Sequence: A, B

Output Phase Sequence: A, B

Phase Timing Results

Phase	A	B
Phase Change Time (sec)	0	44
Green Time (sec)	38	10
Phase Time (sec)	44	16
Phase Split	73%	27%

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



REF: Reference Phase

VAR: Variable Phase



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MOVEMENT SUMMARY

 **Site: 101v [Jacksions Road / Site Access - Post Dev - PM - Upgraded Intersection]**

Jacksions Road / Eastern Site Access

Signals - Fixed Time Isolated Cycle Time = 60 seconds (User-Given Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Jacksions Road (South)											
1	L2	137	0.0	0.092	7.1	LOS A	0.4	3.1	0.23	0.66	29.5
2	T1	501	5.0	0.492	8.3	LOS A	8.7	63.5	0.63	0.56	60.4
Approach		638	3.9	0.492	8.0	LOS A	8.7	63.5	0.55	0.58	49.3
North: Jacksions Road (North)											
8	T1	791	5.0	0.814	12.9	LOS B	14.3	102.4	0.74	0.70	55.3
9	R2	205	0.0	0.814	28.5	LOS C	14.3	102.4	0.92	0.97	26.0
Approach		996	4.0	0.814	16.1	LOS B	14.3	102.4	0.78	0.75	44.9
West: Eastern Site Access (West)											
10	L2	195	0.0	0.809	28.6	LOS C	11.2	78.7	1.00	1.09	24.4
12	R2	156	0.0	0.809	28.9	LOS C	11.2	78.7	1.00	1.09	24.4
Approach		351	0.0	0.809	28.8	LOS C	11.2	78.7	1.00	1.09	24.4
All Vehicles		1984	3.3	0.814	15.8	LOS B	14.3	102.4	0.74	0.76	40.1

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.

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

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

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

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PHASING SUMMARY

 **Site: 101v [Jacksons Road / Site Access - Post Dev - PM - Upgraded Intersection]**

Jacksons Road / Eastern Site Access

Signals - Fixed Time Isolated Cycle Time = 60 seconds (User-Given Cycle Time)

Phase Times determined by the program

Phase Sequence: Opposed Turns

Reference Phase: Phase A

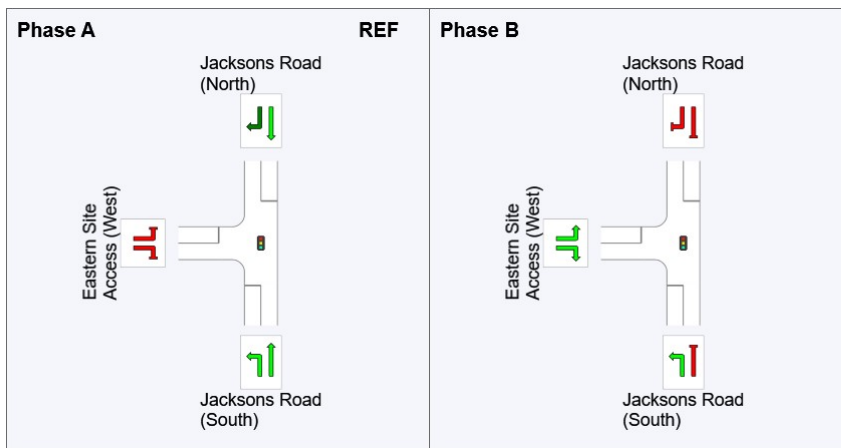
Input Phase Sequence: A, B

Output Phase Sequence: A, B

Phase Timing Results

Phase	A	B
Phase Change Time (sec)	0	40
Green Time (sec)	34	14
Phase Time (sec)	40	20
Phase Split	67%	33%

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



REF: Reference Phase

VAR: Variable Phase



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MOVEMENT SUMMARY

▽ Site: 101 [Jacksons Road / Site Access - Post Dev - AM - Trigger Point]

Jacksons Road / Eastern Site Access
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Jacksons Road (South)											
1	L2	89	0.0	0.048	6.4	LOS A	0.0	0.0	0.00	0.61	59.7
2	T1	555	5.0	0.294	0.0	LOS A	0.0	0.0	0.00	0.00	69.9
Approach		644	4.3	0.294	0.9	NA	0.0	0.0	0.00	0.08	68.3
North: Jacksons Road (North)											
8	T1	695	5.0	0.348	1.5	LOS A	2.1	15.1	0.21	0.12	66.7
9	R2	134	0.0	0.348	11.6	LOS B	2.1	15.1	0.52	0.28	30.2
Approach		828	4.2	0.348	3.1	NA	2.1	15.1	0.26	0.14	55.8
West: Eastern Site Access (West)											
10	L2	74	0.0	0.525	9.8	LOS A	2.4	16.9	0.83	1.17	25.7
12	R2	61	0.0	0.525	35.3	LOS E	2.4	16.9	0.83	1.17	25.6
Approach		135	0.0	0.525	21.4	LOS C	2.4	16.9	0.83	1.17	25.6
All Vehicles		1607	3.9	0.525	3.8	NA	2.4	16.9	0.21	0.21	54.4

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.

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

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

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

MOVEMENT SUMMARY

▽ Site: 101 [Jacksons Road / Site Access - Post Dev - PM - Trigger Point]

Jacksons Road / Eastern Site Access
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Jacksons Road (South)											
1	L2	88	0.0	0.048	6.4	LOS A	0.0	0.0	0.00	0.61	59.7
2	T1	501	5.0	0.265	0.0	LOS A	0.0	0.0	0.00	0.00	69.9
Approach		589	4.3	0.265	1.0	NA	0.0	0.0	0.00	0.09	68.2
North: Jacksons Road (North)											
8	T1	791	5.0	0.370	1.3	LOS A	2.2	15.7	0.20	0.10	67.0
9	R2	134	0.0	0.370	11.1	LOS B	2.2	15.7	0.45	0.23	30.4
Approach		924	4.3	0.370	2.7	NA	2.2	15.7	0.24	0.12	57.1
West: Eastern Site Access (West)											
10	L2	126	0.0	0.875	35.1	LOS E	8.1	56.6	0.89	2.46	21.6
12	R2	101	0.0	0.875	64.7	LOS F	8.1	56.6	0.89	2.46	21.6
Approach		227	0.0	0.875	48.2	LOS E	8.1	56.6	0.89	2.46	21.6
All Vehicles		1741	3.7	0.875	8.1	NA	8.1	56.6	0.24	0.42	49.2

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.

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

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

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

MOVEMENT SUMMARY

Site: 101 [Wellington Road / Wise Wellness Site Access - Post Dev - AM]

Wellington Road / Eastern Site Access
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Eastern Site Access (South)											
1	L2	169	0.0	0.255	11.1	LOS B	1.2	8.2	0.67	0.88	49.6
Approach		169	0.0	0.255	11.1	LOS B	1.2	8.2	0.67	0.88	49.6
East: Wellington Road (East)											
5	T1	2558	5.0	0.451	0.1	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		2558	5.0	0.451	0.1	NA	0.0	0.0	0.00	0.00	59.9
All Vehicles		2727	4.7	0.451	0.8	NA	1.2	8.2	0.04	0.05	59.1

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.

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.

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

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

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

MOVEMENT SUMMARY

▽ Site: 101 [Wellington Road / Wise Wellness Site Access - Post Dev - PM]

Wellington Road / Eastern Site Access
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Eastern Site Access (South)											
1	L2	39	0.0	0.037	7.4	LOS A	0.2	1.1	0.48	0.63	52.1
Approach		39	0.0	0.037	7.4	LOS A	0.2	1.1	0.48	0.63	52.1
East: Wellington Road (East)											
5	T1	1475	5.0	0.260	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		1475	5.0	0.260	0.0	NA	0.0	0.0	0.00	0.00	59.9
All Vehicles		1514	4.9	0.260	0.2	NA	0.2	1.1	0.01	0.02	59.7

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.

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

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

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

MOVEMENT SUMMARY

▽ Site: 101 [Wellington Road / Office Max Site Access - Post Dev - AM]

Wellington Road / Eastern Site Access
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
		Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m		per veh	km/h
South: Eastern Site Access (South)											
1	L2	93	0.0	0.199	12.9	LOS B	0.8	5.3	0.70	0.87	49.0
Approach		93	0.0	0.199	12.9	LOS B	0.8	5.3	0.70	0.87	49.0
East: Wellington Road (East)											
4	L2	23	0.0	0.012	5.5	LOS A	0.0	0.0	0.00	0.58	53.6
5	T1	2686	5.0	0.474	0.1	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		2709	5.0	0.474	0.1	NA	0.0	0.0	0.00	0.00	59.8
All Vehicles		2802	4.8	0.474	0.5	NA	0.8	5.3	0.02	0.03	59.4

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.

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

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

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

MOVEMENT SUMMARY

▽ Site: 101 [Wellington Road / Office Max Site Access - Post Dev - PM]

Wellington Road / Eastern Site Access
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
		Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m		per veh	km/h
South: Eastern Site Access (South)											
1	L2	46	0.0	0.056	8.0	LOS A	0.2	1.5	0.48	0.65	52.4
Approach		46	0.0	0.056	8.0	LOS A	0.2	1.5	0.48	0.65	52.4
East: Wellington Road (East)											
4	L2	69	0.0	0.037	5.5	LOS A	0.0	0.0	0.00	0.58	53.6
5	T1	1461	5.0	0.258	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		1531	4.8	0.258	0.3	NA	0.0	0.0	0.00	0.03	59.6
All Vehicles		1577	4.6	0.258	0.5	NA	0.2	1.5	0.01	0.04	59.4

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.

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

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

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

MOVEMENT SUMMARY

 **Site: 101 [Wellington Road / Jacksons Road - Post Development - AM]**

Wellington Road / Jacksons Road
 Signals - Fixed Time Isolated Cycle Time = 120 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Jacksons Road (South)											
1	L2	247	5.0	0.323	30.5	LOS C	9.3	68.0	0.71	0.85	43.9
3	R2	426	5.0	0.594	54.2	LOS D	11.5	84.0	0.96	0.82	34.1
Approach		674	5.0	0.594	45.5	LOS D	11.5	84.0	0.87	0.83	37.1
East: Wellington Road (East)											
4	L2	540	5.0	0.374	10.4	LOS B	6.6	48.1	0.30	0.70	58.6
5	T1	2311	5.0	0.904	40.6	LOS D	54.7	399.6	0.92	0.96	42.5
Approach		2851	5.0	0.904	34.9	LOS C	54.7	399.6	0.81	0.91	44.8
West: Wellington Road (West)											
11	T1	1075	5.0	0.271	7.0	LOS A	7.6	55.4	0.40	0.35	69.4
12	R2	411	5.0	0.858	71.5	LOS E	13.3	96.9	1.00	0.93	29.6
Approach		1485	5.0	0.858	24.8	LOS C	13.3	96.9	0.56	0.51	50.6
All Vehicles		5009	5.0	0.904	33.3	LOS C	54.7	399.6	0.74	0.78	45.1

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.
 SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Queue Distance m	Prop. Queued	Effective Stop Rate per ped	
P1	South Full Crossing	53	20.5	LOS C	0.1	0.1	0.58	0.58	
P4	West Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95	
All Pedestrians		105	37.4	LOS D			0.77	0.77	

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.

PHASING SUMMARY

 **Site: 101 [Wellington Road / Jacksons Road - Post Development - AM]**

Wellington Road / Jacksons Road
 Signals - Fixed Time Isolated Cycle Time = 120 seconds (Practical Cycle Time)

Phase Times determined by the program

Phase Sequence: Two-Phase

Reference Phase: Phase A

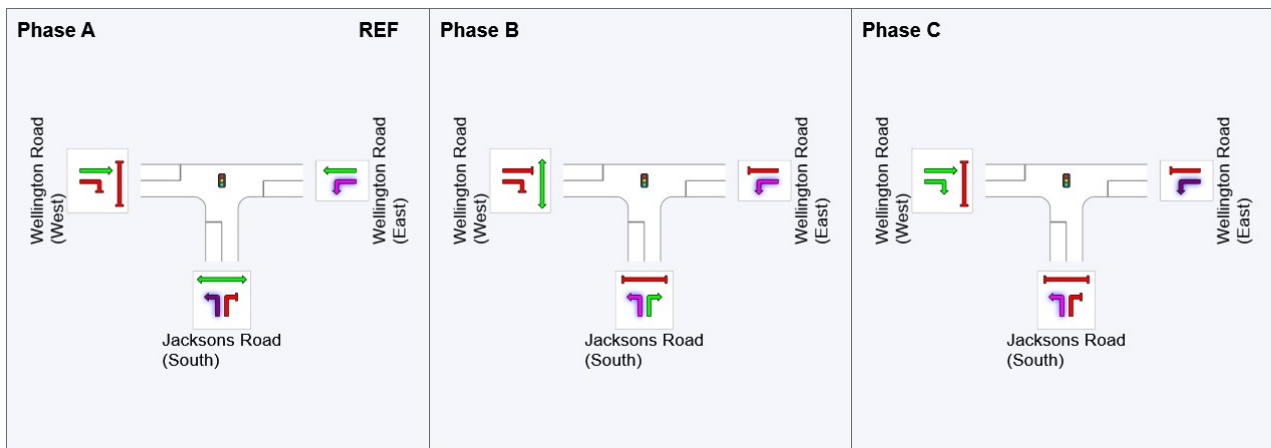
Input Phase Sequence: A, B, C

Output Phase Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Phase Change Time (sec)	0	68	98
Green Time (sec)	62	24	16
Phase Time (sec)	68	30	22
Phase Split	57%	25%	18%

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



REF: Reference Phase

VAR: Variable Phase



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Organisation: GTA CONSULTANTS | Processed: Thursday, 13 December 2018 10:17:15 AM

Project: P:\V11500-11599\115201 1 Jacksons Road, Mulgrave - Rev1Modelling\181210_V115201_Rezoning.sip7

MOVEMENT SUMMARY

 **Site: 101 [Wellington Road / Jacksons Road - Post Development - PM]**

Wellington Road / Jacksons Road

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

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Jacksons Road (South)											
1	L2	297	5.0	0.262	10.4	LOS B	3.2	23.3	0.47	0.70	57.5
3	R2	439	5.0	0.525	29.2	LOS C	5.9	42.7	0.92	0.81	44.5
Approach		736	5.0	0.525	21.6	LOS C	5.9	42.7	0.74	0.76	49.0
East: Wellington Road (East)											
4	L2	414	5.0	0.345	10.6	LOS B	4.1	30.3	0.46	0.72	58.2
5	T1	1178	5.0	0.832	29.2	LOS C	12.9	94.0	1.00	0.98	48.9
Approach		1592	5.0	0.832	24.4	LOS C	12.9	94.0	0.86	0.91	51.0
West: Wellington Road (West)											
11	T1	2522	5.0	0.786	13.5	LOS B	21.2	154.9	0.84	0.81	61.8
12	R2	603	5.0	0.776	35.3	LOS D	9.4	68.9	1.00	0.91	41.8
Approach		3125	5.0	0.786	17.7	LOS B	21.2	154.9	0.87	0.83	56.6
All Vehicles		5453	5.0	0.832	20.2	LOS C	21.2	154.9	0.85	0.84	53.7

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.

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

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

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

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Queue Distance m	Prop. Queued	Effective Stop Rate per ped	
P1	South Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90	
P4	West Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90	
All Pedestrians		105	24.4	LOS C			0.90	0.90	

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

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

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

PHASING SUMMARY

 **Site: 101 [Wellington Road / Jacksons Road - Post Development - PM]**

Wellington Road / Jacksons Road
 Signals - Fixed Time Isolated Cycle Time = 60 seconds (Practical Cycle Time)

Phase Times determined by the program

Phase Sequence: Two-Phase

Reference Phase: Phase A

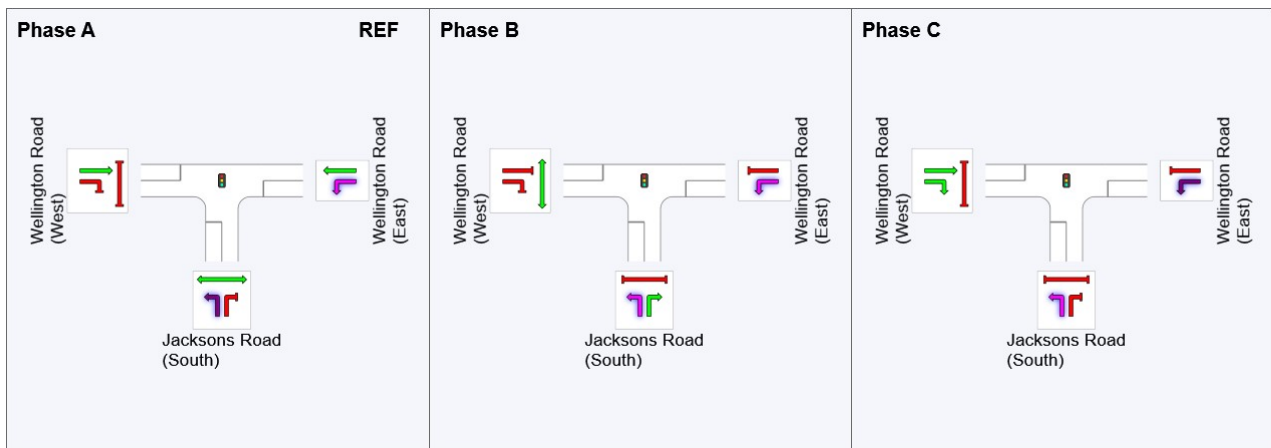
Input Phase Sequence: A, B, C

Output Phase Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Phase Change Time (sec)	0	21	41
Green Time (sec)	15	14	13
Phase Time (sec)	21	20	19
Phase Split	35%	33%	32%

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



REF: Reference Phase

VAR: Variable Phase



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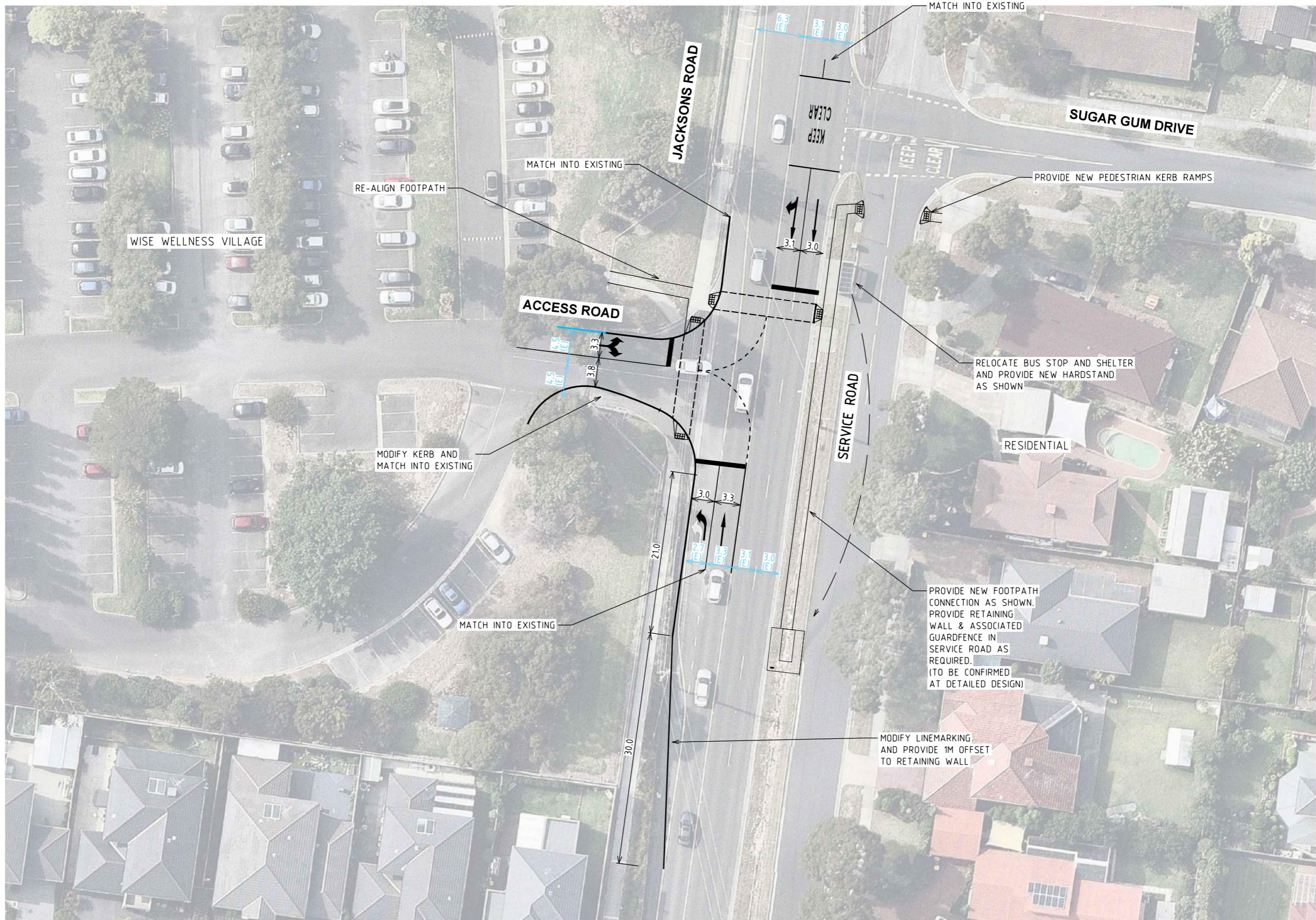
Organisation: GTA CONSULTANTS | Processed: Thursday, 13 December 2018 10:17:16 AM

Project: P:\V11500-11599\115201 1 Jacksons Road, Mulgrave - Rev1Modelling\181210_V115201_Rezoning.sip7

Appendix B

Concept Layout Plan (GTA Drawing Nos. V115200-01P1
and V115200-02P1)

Appendix B



N

WARNING
BEWARE OF UNDERGROUND SERVICES
THE LOCATIONS OF UNDERGROUND SERVICES ARE APPROXIMATE ONLY AND THEIR EXACT POSITION SHOULD BE PROVEN ON SITE. NO GUARANTEE IS GIVEN THAT ALL EXISTING SERVICES ARE SHOWN.

PRELIMINARY PLAN
FOR DISCUSSION PURPOSES
ONLY SUBJECT TO CHANGE
WITHOUT NOTIFICATION

ON 04/08/2017 AT 05:37:14 PM

PLOTTED BY : Aaron Whate

AMENDMENTS						
NO.	DATE	DESCRIPTION	BY	CHK.	APP.	STATUS
P1	26.07.17	INITIAL ISSUE	FLK	PD	CG	

GENERAL NOTES

- ALL DIMENSIONS AND RADII ARE IN METRES AND ARE TO THE FACE OF KERB AND CHANNEL.
- BASE INFORMATION OBTAINED FROM NEARMAP AERIAL PHOTOGRAPHY DATABASE. GTA CONSULTANTS DOES NOT TAKE ANY RESPONSIBILITY FOR THE ACCURACY OF THE EXISTING CONDITIONS BASE (AERIAL PHOTOGRAPHY) ON WHICH THE SETOUT DETAIL IS BASED. PRIOR TO COMMENCEMENT OF CONSTRUCTION, THE EXISTING CONDITIONS INCLUDING UNDERGROUND SERVICES SHOULD BE VERIFIED ON SITE.
- DECLARED MAIN ROAD - JACKSONS ROAD - SPEED ZONE 70KM/H
- DESIGN VEHICLE - B99 CHECKING VEHICLE - 8.8M MRV

DESIGNED F. KHUNG	DESIGN CHECK -
DRAWN F. KHUNG	DRAFTING CHECK -
APPROVED BY -	DATE APPROVED FOR INITIAL ISSUE 26 JULY 2017
SCALE A3	1:500 CAD FILE NO. V115200-01-P1.dgn

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CONCEPT SIGNALISED INTERSECTION DESIGN
ACCESS ROAD / JACKSONS ROAD
1 JACKSONS ROAD
MULGRAVE
CONCEPT LAYOUT

MAP REF. 80/K2 DRAWING NO. V115200-01 SHEET 1 OF 2 ISSUE P1



WARNING
BEWARE OF UNDERGROUND SERVICES
THE LOCATIONS OF UNDERGROUND SERVICES ARE
APPROXIMATE ONLY AND THEIR EXACT POSITION
SHOULD BE CHECKED ON SITE. NO GUARANTEE IS
GIVEN THAT ALL EXISTING SERVICES ARE SHOWN.

PRELIMINARY PLAN
FOR DISCUSSION PURPOSES
ONLY. SUBJECT TO CHANGE
WITHOUT NOTIFICATION.

PLOTTED BY: Fern-Ling Khung ON 1/08/2017 AT 12:09:28 PM

AMENDMENTS						
NO.	DATE	DESCRIPTION	BY	CHK.	APP.	STATUS
P1	26.07.17	INITIAL ISSUE	FLK	PD	CG	

- GENERAL NOTES**
- ALL DIMENSIONS AND RADII ARE IN METRES AND ARE TO THE FACE OF KERB AND CHANNEL.
 - BASE INFORMATION OBTAINED FROM NEARMAP AERIAL PHOTOGRAPHY DATABASE. GTA CONSULTANTS DOES NOT TAKE ANY RESPONSIBILITY FOR THE ACCURACY OF THE EXISTING CONDITIONS BASE (AERIAL PHOTOGRAPHY) ON WHICH THE SETOUT DETAIL IS BASED. PRIOR TO COMMENCEMENT OF CONSTRUCTION, THE EXISTING CONDITIONS INCLUDING UNDERGROUND SERVICES SHOULD BE VERIFIED ON SITE.
 - DECLARED MAIN ROAD - JACKSONS ROAD - SPEED ZONE 70KM/H
 - DESIGN VEHICLE - B99 CHECKING VEHICLE - 8.8M MRV

DESIGNED F. KHUNG	DESIGN CHECK -
DRAWN F. KHUNG	DRAFTING CHECK -
APPROVED BY -	DATE APPROVED FOR INITIAL ISSUE 26 JULY 2017
SCALE A3	CAD FILE NO. V115200-01-P1.dgn

Horizontal scale: 0, 5, 10 meters


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 CONCEPT SIGNALISED INTERSECTION DESIGN
 ACCESS ROAD / JACKSONS ROAD
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 MULGRAVE
 SWEEP PATH ASSESSMENT
 MAP REF. 80/K2 DRAWING NO. V115200-02 SHEET 2 OF 2 ISSUE P1

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