Public Housing Redevelopment Project (PHRP)

Oakover & Stokes / Penola Sites
Integrated Transport and Traffic Management Report

Prepared by: GTA Consultants (VIC) Pty Ltd for MAB Corporation Pty Ltd

on 22/01/2020

Reference: V143133

Issue #: E

GTAconsultants

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Quality Record

Issue	Date	Description	Prepared By	Checked By	Approved By	Signed
A	11/09/19	Final	Goran Mihic	David Graham	David Graham	David Graham
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E	22/01/2020	Response to Council RFI	Goran Mihic	David Graham	David Graham	

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EXECUTIVE SUMMARY

In 2018, the Victorian Government announced details around delivering 1,700 social housing properties as part of its "Homes for Victorians" package of initiatives. Three of the sites within the Public Housing Renewal Program (PHRP) will see the Department of Health and Human Services (DHHS) partner with MAB Corporation to rebuild sites in North Melbourne, Northcote and Preston.

- Village Bell is a collection of multiple lots of land in Preston that will deliver two new residential villages. The Preston PHRP will include a mixture of private and social housing, a community space component and a commercial space component. The current design proposes to deliver in the order of 450 to 650 dwellings, with approximately 55% of the dwellings on the Stokes Penola site and approximately 45% of the dwellings on the Oakover site.
- The population of residents within the proposed development is estimated to be in the order of 1,100 people.
- Reference should be made to the Development Plan covering report for staging considerations.
- The provision of car parking will have regard to the accessibility to nearby public transport facilities and will be sufficient for the site and estimated population numbers.
- Vehicle access to on-site car parking for the Stokes Penola site is proposed to occur via Stokes Street and Penola Street while vehicle access to on-site car parking for the Oakover site is proposed to occur via Oakover Road, Railway Place West and the laneway located at the northern end of the site (i.e. immediately south of Showers Street).
- The indicative development plan is anticipated to generate up to 174 vehicle movements in the weekday AM and PM peak hours on a typical weekday, and up to 1,740 daily vehicle movements.
- On the basis of the analysis and investigation undertaken as part of this assessment it is considered that the traffic from the proposed indicative development plan can be accommodated on the road network with minor reallocation of phase times during the AM without compromising its function or safety and no mitigating works on the nearby road network are required as part of the proposed development.
- Measures that could be adopted to reduce private car usage by residents to the precinct could be contained in a Green Travel Plan (GTP), which could be required as a Condition on any permit issued for the proposed development. A GTP is a way to manage the transport needs of residents and visitors associated with new developments. The purpose of the GTP is to reduce the environmental impacts of travel to/from the site by encouraging more efficient use of motor vehicles as well as sustainable alternatives to their use.
- It is understood that car parking for each of the buildings will either be situated within basement levels or suitably concealed by appropriate building features such as active podium frontages or within buildings that display a high level of architectural resolution.
- Bicycle parking for residents will be located in a secure location (i.e. lockable) while bicycle parking for visitors will be located in easily accessible locations (i.e. on the ground level near building entrances). Further details will be provided as part of future Planning Permit applications.
- Appropriate provision will be made for loading and unloading activity (i.e. waste collection) through a combination of on-site loading areas and suitable on-street facilities. Further details will be provided as part of future Planning Permit applications.

- The proposed Development Plan indicates that the Oakover site will include a single east-west shared pedestrian/cycle/vehicle connection between Railway Place West and the adjacent building to the west. In addition, two north-south pedestrian/cycle connections are proposed to be provided between this link to the north and Oakover Road to the south. These provisions (which are also shown diagrammatically in Figure 4.2) generally satisfy the intent of the DPO, noting that it is not possible to provide a full connection through to Showers Street at this time due to the current land ownership.
- The proposed Development Plan indicates that the Stokes Penola site will include an east-west pedestrian/cycle laneway between Stokes Street and Penola Street. These provisions (which is also shown diagrammatically in Figure 4.3) generally satisfy the intent of the DPO.

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1. INTRODUCTION

1.1. Background & Proposal

In 2018, the Victorian Government announced details around delivering 1,700 social housing properties as part of its "Homes for Victorians" package of initiatives. Three of the sites within the $185 million public housing renewal program (PHRP) will see the Department of Health and Human Services (DHHS) partner with MAB Corporation to rebuild sites in North Melbourne, Northcote and Preston.

Village Bell is a collection of multiple lots of land in Preston that will deliver two new residential villages. The Preston PHRP will include a mixture of private and social housing, a community space component and a commercial space component. The current design proposes to deliver in the order of 450 to 650 dwellings, with approximately 55% of the dwellings on the Stokes Penola site and approximately 45% of the dwellings on the Oakover site. Reference should be made to the Development Plan covering report for staging considerations.

It is understood that car parking for each of the buildings will either be situated within basement levels or suitably concealed by appropriate building features such as active podium frontages or within buildings that display a high level of architectural resolution.

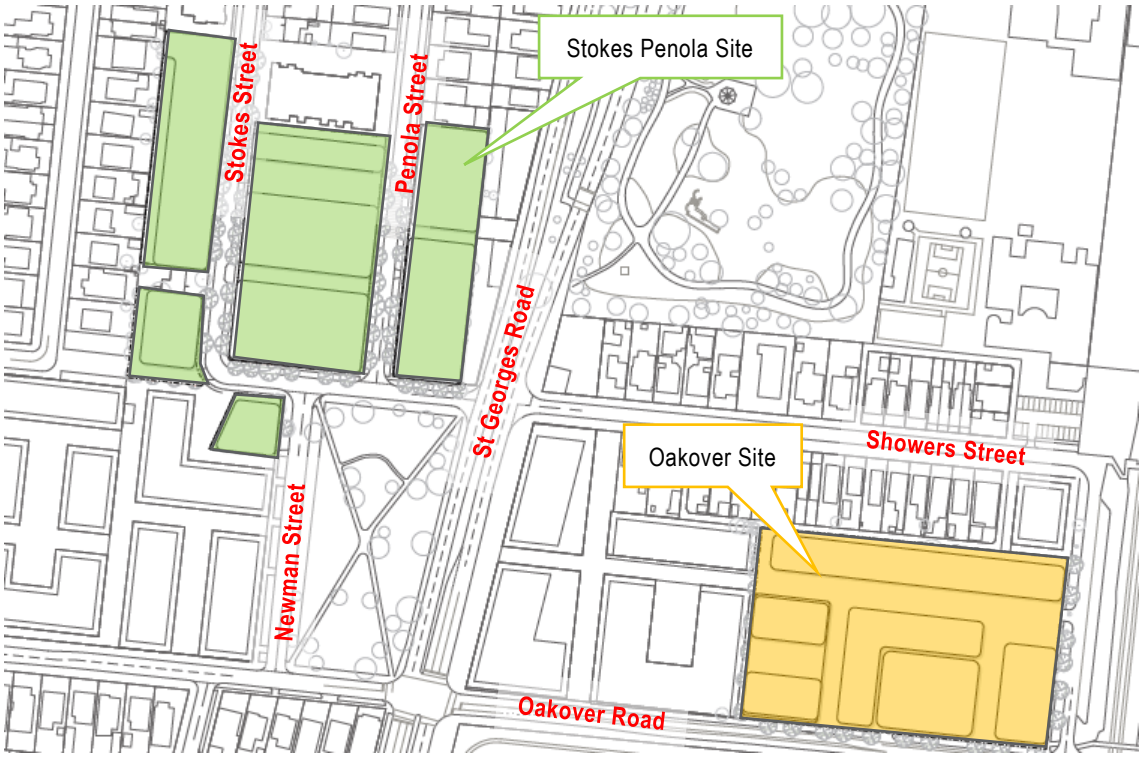
The provision of car parking will have regard to the accessibility to nearby public transport facilities and will be sufficient for the site and estimated population numbers.

Vehicle access to on-site car parking for the Stokes Penola site is proposed to occur via Stokes Street and Penola Street while vehicle access to on-site car parking for the Oakover site is proposed to occur via Oakover Road, Railway Place West and the laneway located at the northern end of the site (i.e. immediately south of Showers Street).

The population of residents within the proposed development is estimated to be in the order of 1,100 people.

The locations of the Stokes Penola site and Oakover site are shown in Figure 1.1.

Figure 1.1: Indicative Development Plan (Context Plan)



GTA was engaged by MAB Corporation in May 2019 to prepare an Integrated Transport and Traffic Management report, to satisfy the requirements of Schedule 11 to the Development Plan Overlay, which applies to the sites.

1.2. Purpose & Structure of this Report

The report sets out an assessment of the anticipated traffic implications of the proposed development and the suitability of the proposed vehicle access arrangements for the proposed development.

1.3. References

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

- Darebin Planning Scheme, including Schedule 11 to the Development Plan Overlay (DP011)
- Indicative development plan for the proposed development prepared by Hayball, dated August 2019
- Traffic surveys undertaken by GTA Consultants as referenced in the context of this report
- Intersection Diagnostic Monitor data obtained from the Department of Transport (DoT)
- An inspection of the sites and their surrounds
- Other documents as nominated.

2. EXISTING CONDITIONS

2.1. Location

The Stokes Penola site is located on the western side of St Georges Road at the southern end of Stokes and Penola Streets (near Showers Street). The Oakover site is located on the eastern side of St Georges Road at the northwest corner of the Oakover Road/Railway Place West intersection.

The sites are located within the Residential Growth Zone 1 (RGZ1) and Mixed Use Zone 1 (MUZ1). The Stokes Penola site is currently vacant, however the Oakover site is currently occupied by 26 single-storey residential dwellings. The following overlays are also applicable to whole or part of the subject site:

- Development Plan Overlay – Schedule 11 (DPO11)
- Development Contributions Plan Overlay – Schedule 1 (DCP01)
- Special Building Overlay (SBO)
- Environmental Audit Overlay (EAO).

The surrounding properties include a mixture of residential and commercial land uses. The notable exception is the New Preston Tram Depot located on the southern side of Oakover Road, opposite the Oakover site. The location of the sites and their surrounding environs is shown in Figure 2.1, with the land use zoning shown in Figure 2.2.

Figure 2.1: The Subject Sites and its Environs

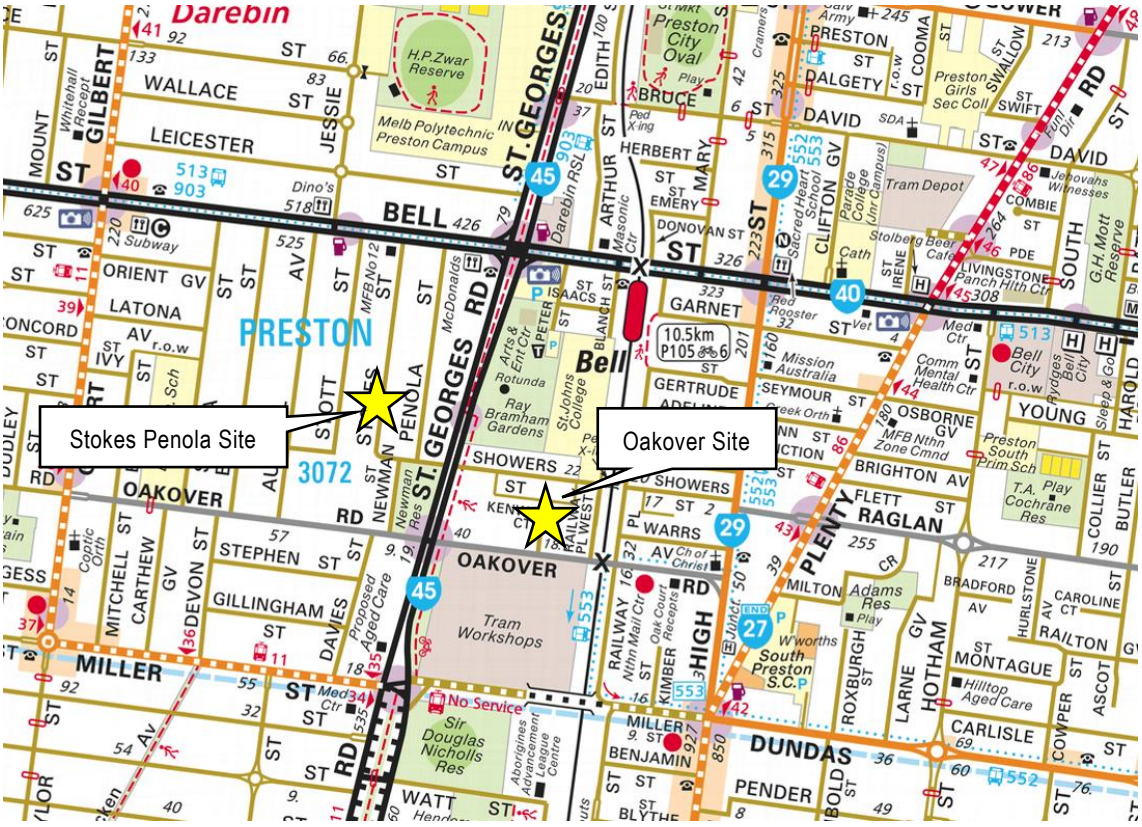


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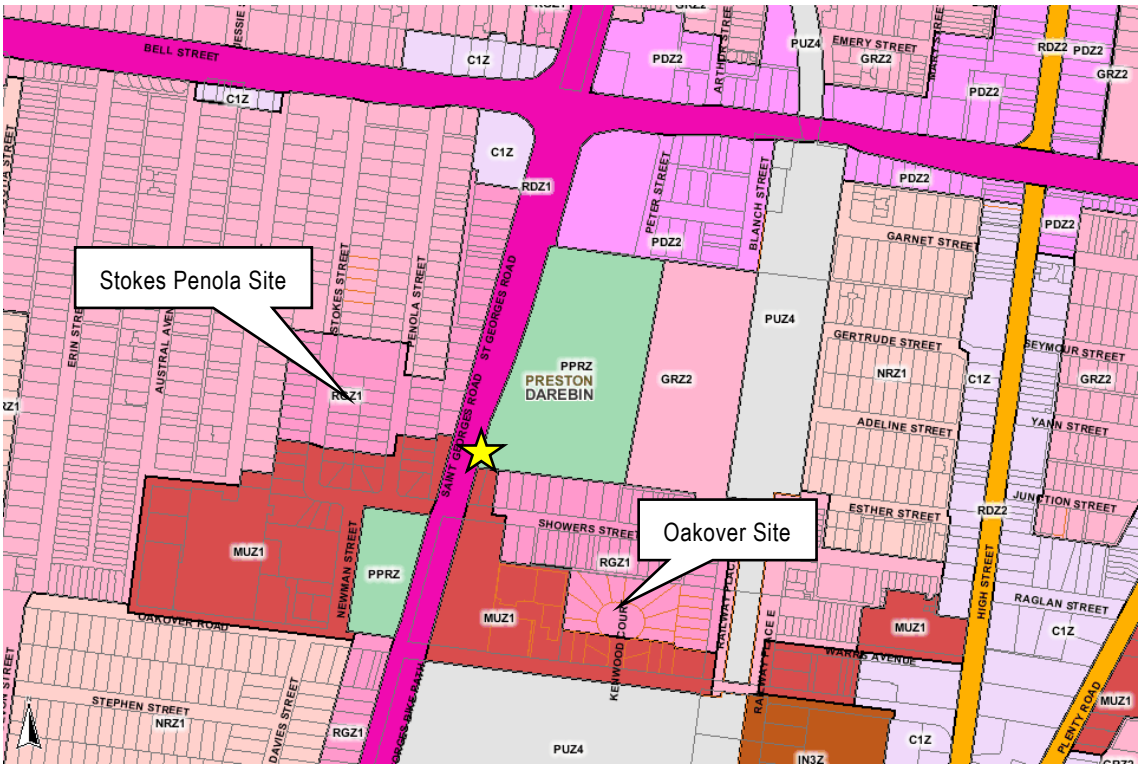
Figure 2.2: Land Use Zoning



(Reproduced from Land Channel web site)

2.2. Transport Network

2.2.1. Road Network

St Georges Road

St Georges Road functions as an arterial road. It is a two-way road aligned in a north-south direction and configured with two through lanes in each direction, turn lanes at intersections, and tram tracks within a median, set within a 40 metre wide road reserve (approximately).

St Georges Road carries a weekday average of 31,350 vehicles per day[1].

Oakover Road

Oakover Road functions as a collector road. It is a two-way road aligned in an east-west direction and configured with a 7.5 metre wide carriageway with one through lane in each direction, set within a 15 metre wide road reserve (approximately). Kerbside parking is permitted on the southern side of the road and indented parking is provided on the northern side of the road.

Oakover Road carries a weekday average of 7,135 vehicles per day[1].

[1] Based on traffic movement counts commissioned by GTA on Tuesday 18 June 2019 and adopting a peak to daily ratio of 8% for arterial roads and 10% for local roads.

Stokes Street

Stokes Street functions as a local road. It is a two-way road aligned in a north-south direction and configured with a 7 metre wide carriageway with one through lane in each direction, set within a 15 metre wide road reserve (approximately). Kerbside parking is permitted on both sides of the road.

Stokes Street carries a weekday average of 360 vehicles per day[1].

Penola Street

Penola Street functions as a local road. It is a two-way road aligned in a north-south direction and configured with a 6.8 metre wide carriageway with one through lane in each direction, set within a 15 metre wide road reserve (approximately). Kerbside parking is permitted on both sides of the road.

Penola Street carries a weekday average of 220 vehicles per day[1].

2.2.2. Surrounding Intersections

The intersections in the vicinity of the sites include:

- St Georges Road/Oakover Road (signalised X-intersection)
- St Georges Road/Showers Street (unsignalised T-intersection)
- Oakover Road/Railway Place West (unsignalised T-intersection)
- Showers Street/Railway Place West (unsignalised T-intersection)
- Oakover Road/Newman Street (unsignalised T-intersection)
- Newman Street/Stokes Street (unsignalised T-intersection)
- Penola Street/Showers Street (unsignalised T-intersection)
- Bell Street/Stokes Street (unsignalised T-intersection)
- Bell Street/Penola Street (unsignalised T-intersection).

2.2.3. Existing Traffic Volumes

GTA commissioned traffic movement surveys on Tuesday 18 June 2019 during the weekday AM (7:00am-9:00am) and PM (4:00pm-6:00pm) periods at the following locations in the vicinity of the sites:

- St Georges Road/Oakover Road (signalised X-intersection)
- St Georges Road/Showers Street (unsignalised T-intersection)
- Oakover Road/Railway Place West (unsignalised T-intersection)
- Oakover Road/Newman Street (unsignalised T-intersection)
- Bell Street/Stokes Street (unsignalised T-intersection)
- Bell Street/Penola Street (unsignalised T-intersection).

The weekday AM and PM peak hour traffic volumes are shown in Figure 2.3 and Figure 2.4.

Figure 2.3: Existing Weekday AM Peak Hour Traffic Volumes

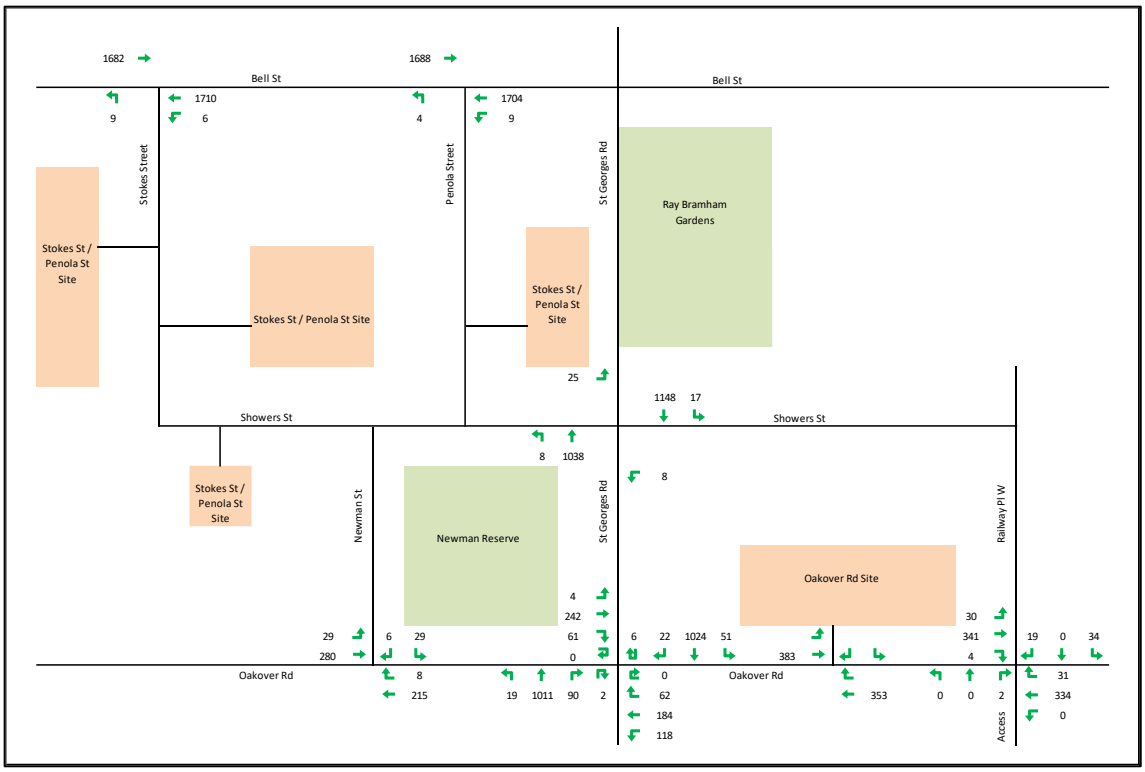
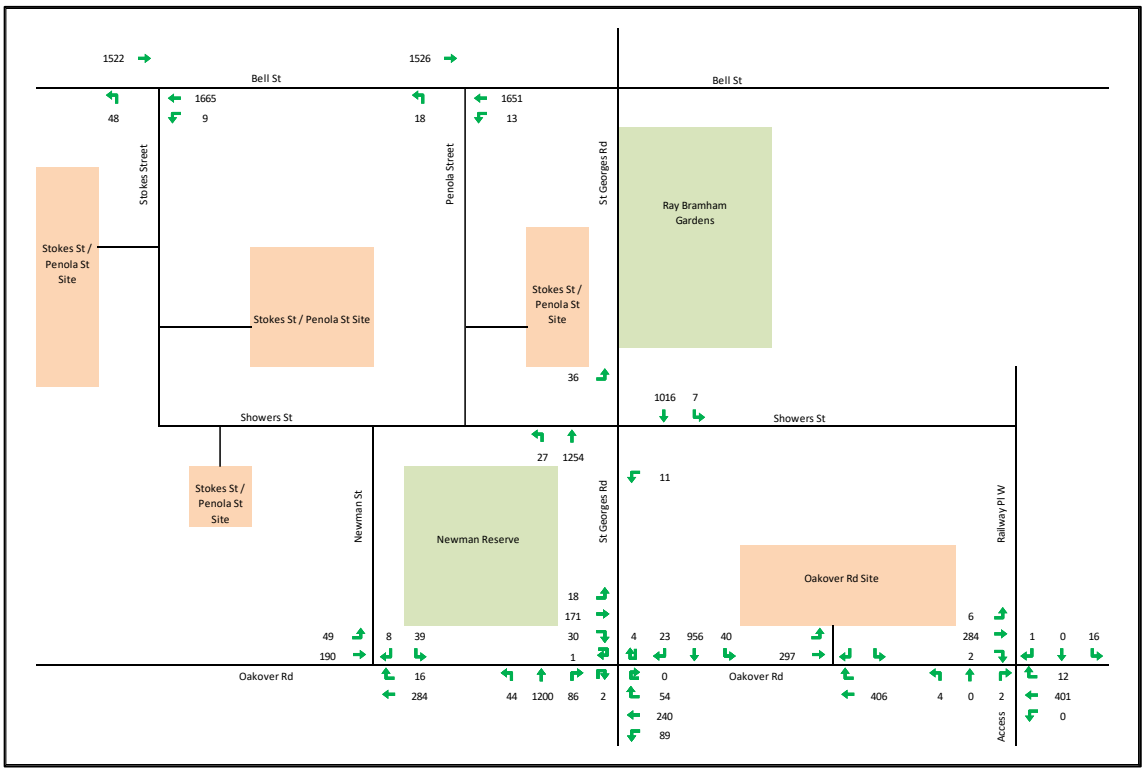


Figure 2.4: Existing Weekday PM Peak Hour Traffic Volumes



2.3. Existing Intersection Operation

The key intersection in the vicinity of the sites is the intersection of St Georges and Oakover Road. The existing operation of the St Georges Road/Oakover Road signalised intersection has been assessed using *SIDRA INTERSECTION 8*[2], 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. For signalised intersections, a DOS of around 0.95 has been typically considered the 'ideal' limit, beyond which queues and delays increase disproportionately[3].

Table 2.1 presents a summary of the existing performance of the St Georges Road/Oakover Road intersection. The intersection has been calibrated according to historical signal timing data.

Table 2.1: St Georges Road/Oakover Road Intersection – Existing Intersection Performance

Peak Hour	Approach	DOS	Average Delay (sec)	95th Percentile Queue (m)
AM	St Georges Road (south)	0.79	20 sec	143 m
	Oakover Road (east)	0.87	61 sec	144 m
	St Georges Road (north)	0.53	19 sec	147 m
	Oakover Road (west)	0.97	88 sec	181 m
	Intersection	**# 0.97**	**32 sec**	**181 m**
PM	St Georges Road (south)	0.76	20 sec	182 m
	Oakover Road (east)	0.97	82 sec	191 m
	St Georges Road (north)	0.49	17 sec	129 m
	Oakover Road (west)	0.66	51 sec	91 m
	Intersection	**# 0.97**	**29 sec**	**191 m**

DOS – Degree of Saturation, # - Intersection DOS

Table 3.3 indicates that the St Georges Road/Oakover Road signalised intersection currently at its theoretical capacity during the weekday AM and PM peak hours, noting the following key performance outputs:

- An intersection DOS of 0.97 in the weekday AM and PM peak hour
- An intersection average delay of 32 seconds in the weekday AM peak hour and an intersection average delay of 29 seconds in the weekday PM peak hour.

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

3 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

- A maximum 95th percentile queue of 181m in the weekday AM peak hour (on the St Georges Road south approach) and a maximum 95th percentile queue of 191m in the PM peak hour (on the St Georges Road south approach).

The SIDRA intersection has been calibrated to match historical phase timing data and the results are consistent with on-site observations.

A review of the traffic survey data collected at the below intersections indicates that these intersections carry lower levels of traffic (in traffic engineering terms), and perform satisfactorily under existing conditions:

- St Georges Road/Showers Street (unsignalised T-intersection)
- Oakover Road/Railway Place West (unsignalised T-intersection)
- Oakover Road/Newman Street (unsignalised T-intersection)
- Bell Street/Stokes Street (unsignalised T-intersection)
- Bell Street/Penola Street (unsignalised T-intersection).

2.4. Public Transport Network

Figure 2.5 shows the site in relation to existing public transport routes within its vicinity whilst Table 2.2 summarises the road-based routes and major destination that can be reached using these services

Figure 2.5: Public Transport in the Vicinity of the Site

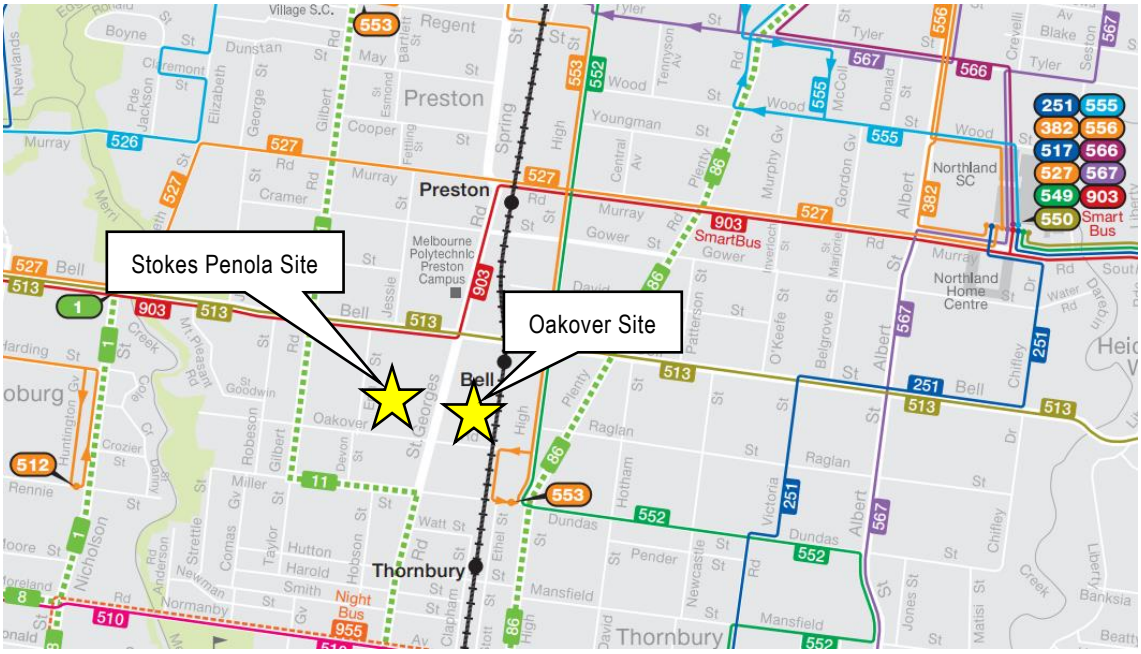


Table 2.2: Road Based Public Transport Provision

Service	Route No.	Route Description
Bus	513	Eltham - Glenroy via Greensborough or Lower Plenty
	527	Gowrie - Northland via Murray Road
	903	Altona - Mordialloc (SMARTBUS Service)
Tram	11	West Preston - Victoria Harbour Docklands

In addition to road based public transport, Bell station on the Mernda line is located within 800m to the north of the Oakover site.

Oakover Road, Preston – Level Crossing Removal

GTA understands that six level crossings in Darebin will be removed as part of the State Government's Level Crossing Removal Project. Most notably, the level crossing Oakover Road in Preston will be removed, with the rail line to be raised over the road on the Mernda line, delivering new open space and better local connections for the community. Construction is expected to commence in 2020.

2.5. Active Travel Network

Pedestrian Infrastructure

Pedestrian footpaths are generally located on both sides of the roads in the vicinity of the sites. Signalised pedestrian crossings are provided on all approaches at the St Georges Road/Oakover Road signalised intersection.

Bicycle Infrastructure

On-road bicycle lanes exist on both sides of Oakover Road in the immediate vicinity of the subject site.

3. TRAFFIC IMPACT

3.1. Traffic Generation

A single house on a standard lot in an outer metropolitan area will typically generate up to 1 trip in the peak hour and 8 to 10 trips per day. Medium density dwellings generally exhibit a lower traffic generation rate. In the outer metropolitan areas, where public transport accessibility is relatively low, the rate for medium density units is typically in the order of 6 to 8 trips per day. Closer to the Melbourne CBD the rate reduces to in the order of 3 to 6 trips per day depending on dwelling size, parking provisions and accessibility to public transport and local amenities, among other things. Within the Melbourne CBD and nearby areas these rates are even lower. Peak hour rates are typically 10–12% of daily rates.

Given the sites' good access to public transport, and the types of dwellings proposed, the development is likely to generate in the order of 0.3 vehicle movements per dwelling in a peak hour, along with a daily traffic generation rate of in the order of three vehicle movements per dwelling.

For the purposes of this assessment it is assumed that the dwelling yield will be in the order of 580 dwellings, which is close to the upper end of the potential range, noting that if the eventual yield is greater than 580 dwellings there will be a higher percentage of smaller dwellings, and hence the overall traffic generation of the development is not likely to increase. Application of the expected traffic generation rates to a yield of 580 dwellings results in 174 peak hour vehicle movements and 1,740 daily vehicle movements.

The directional split of development traffic entering and exiting the sites is expected to be as follows:

- Weekday AM Peak Hour: 20% inbound/80% outbound
- Weekday PM Peak Hour: 70% inbound/30% outbound.

Based on the above, Table 3.1 presents the estimated peak hour and daily traffic generation of the proposed development.

Table 3.1: Traffic Generation Summary

Site	Indicative No. Of Dwellings	AM Peak Hour		PM Peak Hour		Daily
		In	Out	In	Out	
Stokes Penola	305 dwellings	18vph	73vph	64vph	27vph	915vpd
Oakover	275 dwellings	17vph	66vph	58vph	25vph	825vpd
Total	**580 dwellings**	**35vph**	**139vph**	**122vph**	**52vph**	**1,740pd**

vph denotes vehicles per hour.
vpd denotes vehicles per day.

Table 3.1 indicates that the indicative development plan is anticipated to generate up to 174 vehicle movements in the weekday AM and PM peak hours on a typical weekday, and up to 1,740 daily vehicle movements.

3.2. 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:

- configuration of the arterial road network in the immediate vicinity of the sites
- existing operation of intersections providing access between the local and arterial road network
- surrounding employment centres, retail centres and schools in relation to the sites

- configuration of access points to the sites.

Having consideration to the above, and for the purposes of this assessment, the following directional distributions have been assumed for the Stokes Penola and Oakover sites:

- To/From the North (10%)
- To/From the East (25%)
- To/From the South (50%)
- To/From the West (15%).

Based on the above, Figure 3.1 to Figure 3.4 present the estimated future development-generated vehicle movements in the immediate vicinity of the site.

Figure 3.1: Weekday AM Peak Hour Development Generated Traffic Volumes (Stokes Penola)

Figure 3.2: Weekday PM Peak Hour Development Generated Traffic Volumes (Stokes Penola)

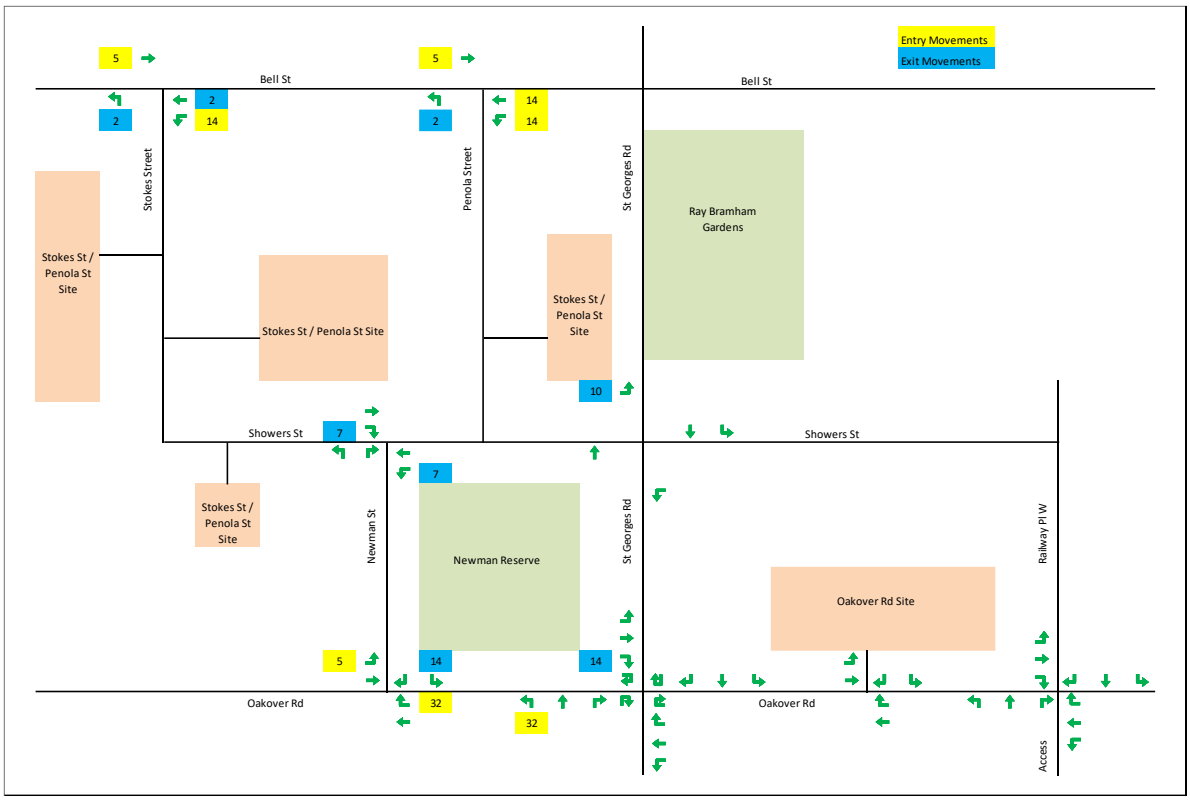
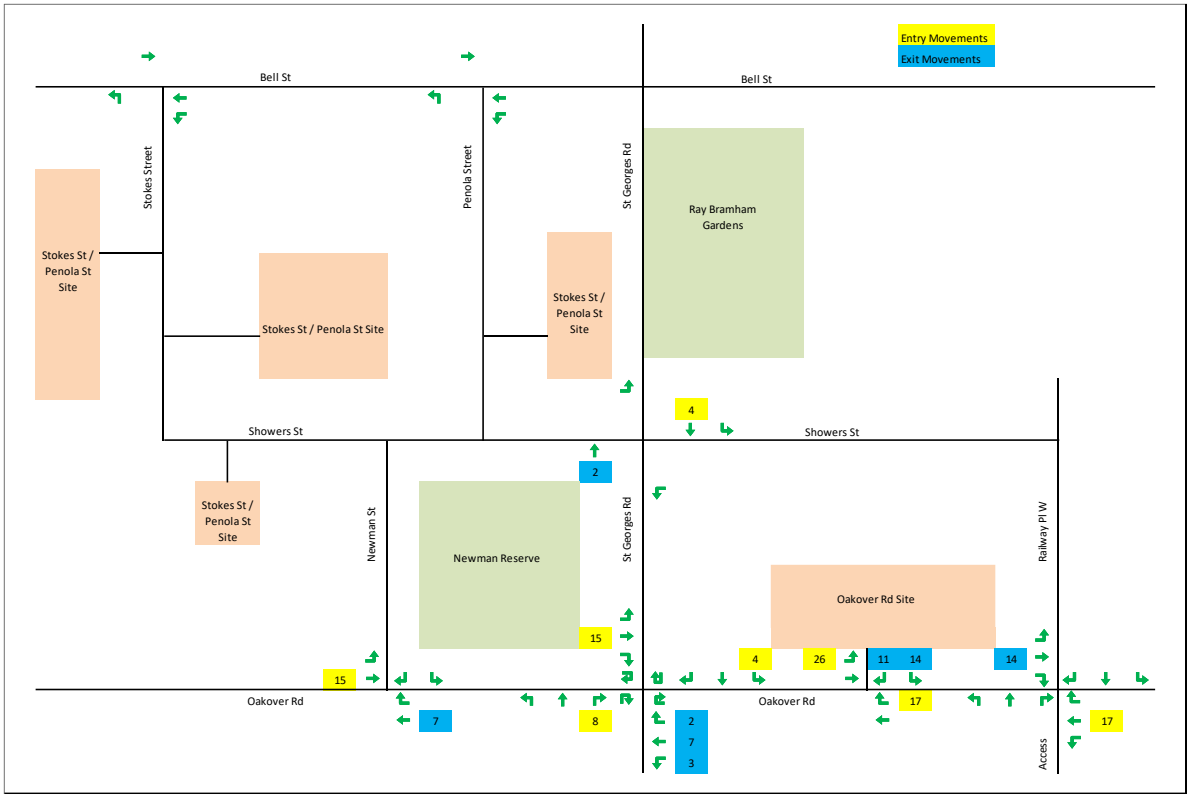


Figure 3.3: Weekday AM Peak Hour Development Generated Traffic Volumes (Oakover)

Figure 3.4: Weekday PM Peak Hour Development Generated Traffic Volumes (Oakover)



3.3. Post Development Traffic Volumes

Post development traffic volumes have been obtained by adding the development-generated traffic volumes to the existing traffic volumes.

The post development traffic volumes for the weekday AM and PM peak hours are presented in Figure 3.5 and Figure 3.6.

Figure 3.5: Weekday AM Peak Hour Post Development Traffic Volumes

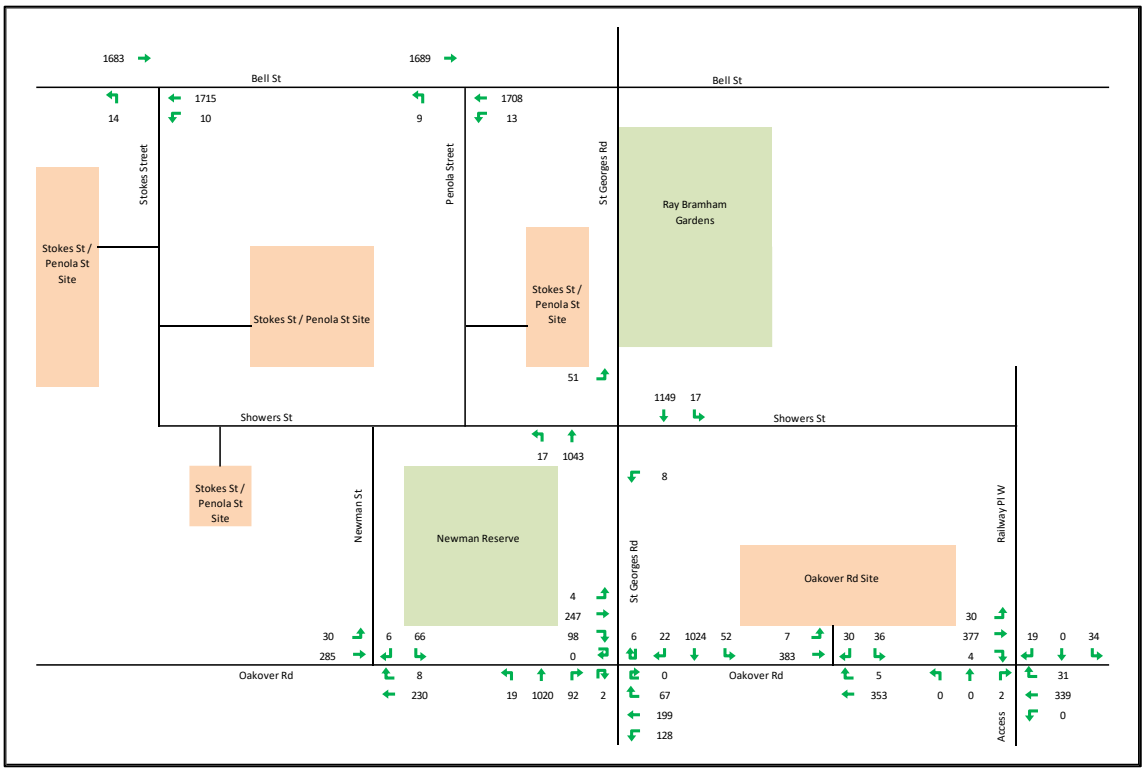
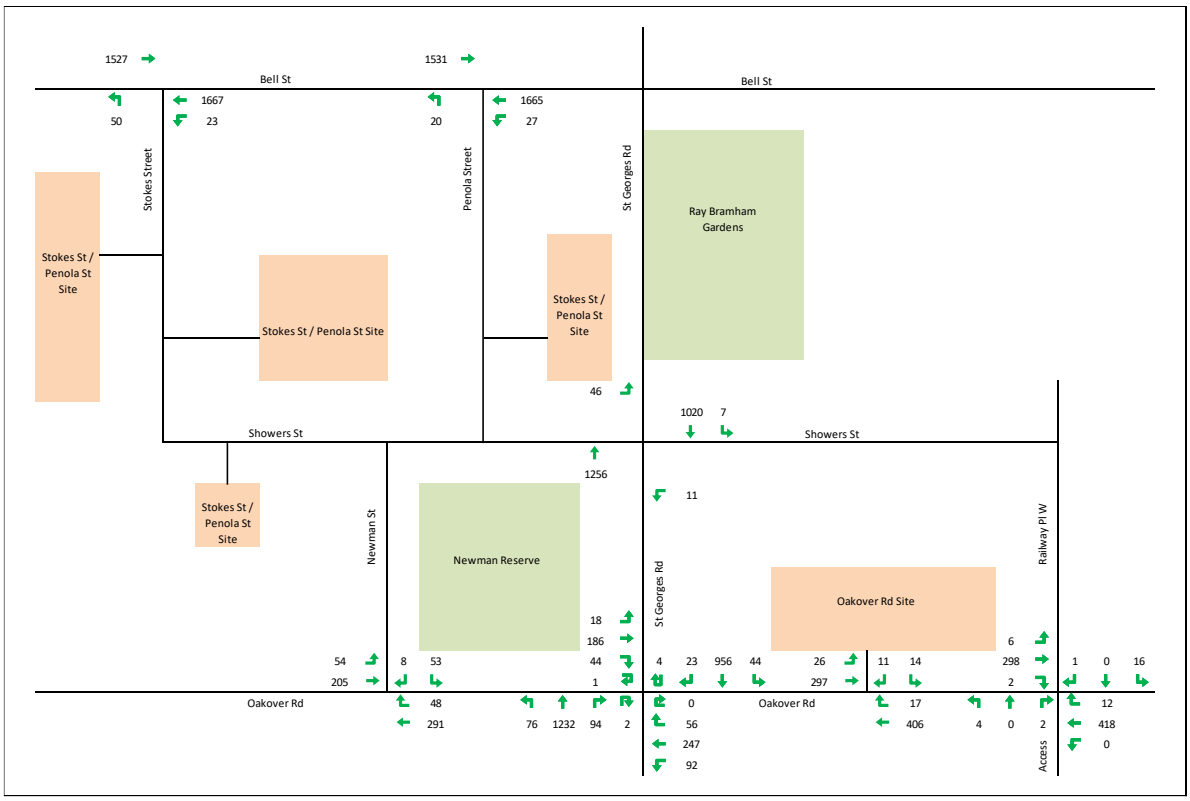


Figure 3.6: Weekday PM Peak Hour Post Development Traffic Volumes



3.4. Post Development Intersection Performance

3.4.1. Preamble

VicRoads guidelines state the following performance objective for existing road infrastructure:

"For existing road infrastructure – any potential adverse effects from land use development proposals on road safety and operational efficiency are identified and, where necessary, developers provide mitigating road improvement works as part of the development costs to minimise these effects and retain, within practical limitations, the level of safety and operational efficiency that would have existed without the development."

3.4.2. St Georges Road and Oakover Road

As previously mentioned, the key intersection in the vicinity of the sites is the intersection of St Georges and Oakover Road. The post-development performance of the St Georges Road/Oakover Road signalised intersection has been assessed using the SIDRA INTERSECTION 8[4] program, 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. As previously mentioned, for signalised intersections, a DOS of around 0.95 has been typically considered the 'ideal' limit, beyond which queues and delays increase disproportionately[5].

The introduction of 37 right hand turn movements from the west approach during AM peak, which was already the critical approach, results in the intersection performing inadequately while maintaining the historical phase timing. To ensure that the intersection performs adequately in post-development, reallocation of phase times is suggested. Initially, SIDRA's practical cycle time was applied to redistribute green time, however, this proposed major changes to the phase times for the north and south legs and hence were not adopted. Phase times were instead changed manually to determine the minimum change required from the current conditions to enable to the intersection to perform adequately, the proposed reallocation in post-development conditions is shown in Table 3.2.

Table 3.2: St Georges Rd/Oakover Rd Intersection – Reallocation of Green Time

Peak Period	Phase				Total
	A	D	E1	E2	
Existing AM	74 sec	32 sec	12 sec	2 sec	120 sec
Proposed AM	66 sec (-8)	40 sec (+8)	12 sec	2 sec	120 sec

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

[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

Table 3.3 presents a summary of the anticipated performance of the St Georges Road/Oakover Road intersection.

Table 3.3: St Georges Rd/Oakover Rd Intersection – Immediate Post-Development Intersection Performance

Peak Hour	Approach	DOS	Average Delay (sec)	95th Percentile Queue (m)
AM*	St Georges Road (south)	0.79	25 sec	168 m
	Oakover Road (east)	0.71	45 sec	122 m
	St Georges Road (north)	0.60	24 sec	170 m
	Oakover Road (west)	0.97	90 sec	212 m
	Intersection	**# 0.97**	**35 sec**	**212 m**
PM	St Georges Road (south)	0.83	21 sec	202 m
	Oakover Road (east)	0.96	78 sec	192 m
	St Georges Road (north)	0.50	18 sec	133 m
	Oakover Road (west)	0.80	57 sec	113 m
	Intersection	**# 0.96**	**31 sec**	**202 m**

DOS – Degree of Saturation, # - Intersection DOS, * - Results show intersection performance after phase time re-allocation

Table 3.3 indicates that the St Georges Road/Oakover Road signalised intersection is anticipated to operate at approximately its theoretical capacity during the weekday AM peak hour period under the new phase timing approach. During the weekday PM peak hour period, the intersection DOS is anticipated to operate at its theoretical capacity with no changes. Queues and delays will increase slightly.

A summary of the key performance outputs under immediate post development conditions is provided below:

- An intersection DOS of 0.97 in the weekday AM peak hour and an intersection DOS is 0.96 in the weekday PM peak hour.
- An intersection average delay of 35 seconds in the weekday AM peak hour and an intersection average delay of 31 seconds in the weekday PM peak hour.
- A maximum 95th percentile queue of 212m in the weekday AM peak hour (on the St Georges Road north approach) and a maximum 95th percentile queue of 202m in the PM peak hour (on the St Georges Road south approach).

3.4.3. Other Intersections

As previously mentioned, the intersections listed below currently carry low to moderate levels of traffic (in traffic engineering terms) and perform satisfactorily under existing conditions.

- St Georges Road/Showers Street (unsignalised T-intersection)
- Oakover Road/Railway Place West (unsignalised T-intersection)
- Oakover Road/Newman Street (unsignalised T-intersection)
- Bell Street/Stokes Street (unsignalised T-intersection)
- Bell Street/Penola Street (unsignalised T-intersection).

As shown in Figure 3.1 to Figure 3.4, the estimated future development-generated vehicle movements at the five intersections above are minimal (in traffic engineering terms). Accordingly, the above intersections are expected to continue to perform satisfactorily under post development conditions. Therefore, the post-development performance of these intersections has not been assessed using SIDRA INTERSECTION 8.

Traffic Impact Analysis Summary

As noted above, the development is expected to generate in the order of up to 174 vehicle movements in the weekday AM and PM peak hours. This equates to approximately three vehicle movements being generated on the road network every minute. This additional traffic will not be concentrated to one location, but rather will be spread across the multiple locations in the surrounding area.

The intersection analysis and road network performance observations suggest that the arterial road network is operating close to its theoretical capacity with limited opportunity for traffic growth on the road network. However, it is considered that future residents of the proposed development will be aware of the constraints on the road network and will plan their trip to the respective sites accordingly.

On the basis of the analysis and investigation undertaken as part of this assessment it is considered that the traffic from the proposed indicative development plan can be accommodated on the road network with minor reallocation of phase times during the AM without compromising its function or safety and no mitigating works on the nearby road network are required as part of the proposed development.

4. PERMEABILITY AND ACCESS

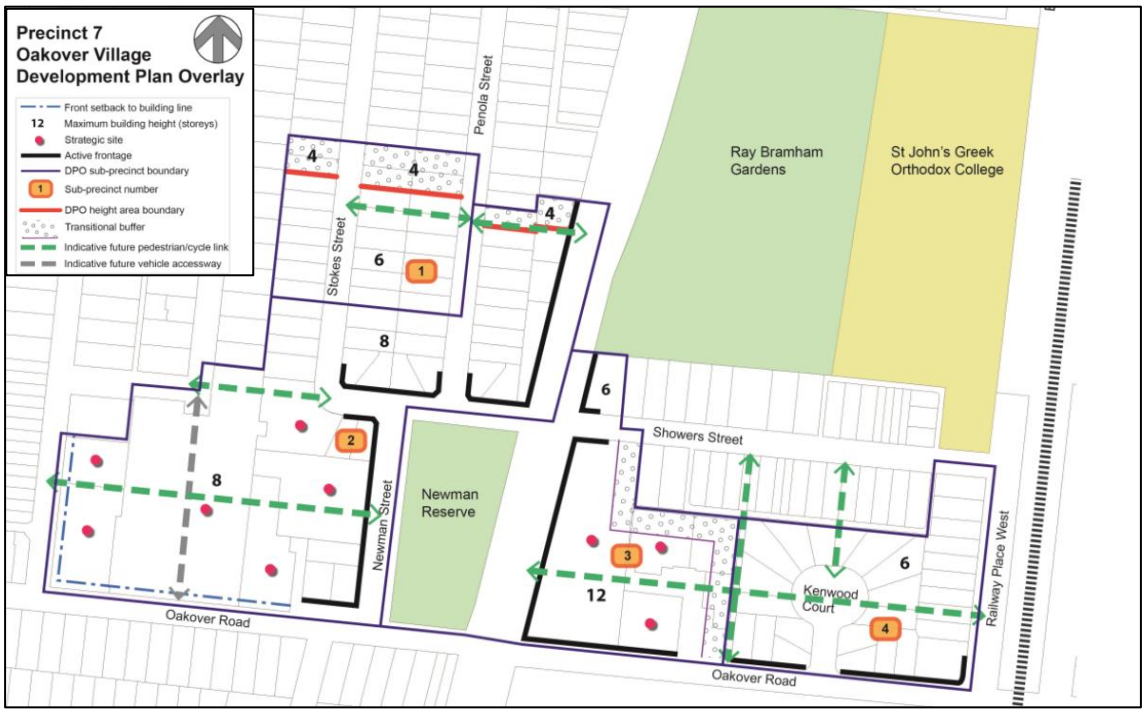
4.1. DPO Requirements

The Permeability and Access section in Schedule 11 to the Development Plan Overlay identifies specific provisions that must be included within the proposed development plan, as indicated below:

- *"A network of pedestrian and cycling connections through the precinct, between new building and the adjoining streets generally in accordance with the indicative accessways shown on the Concept Plan at Clause 5.0. including (but not limited to):*
  - *An east-west pedestrian/cycle connection or access street between Austral Avenue and Newman Street.*
  - *An east-west pedestrian/cycle connection access street between Stott Street and Stokes Street.*
  - *The extension of Stott Street to Oakover Road as an access street.*
  - *An east-west pedestrian/cycle connection or access street between Stokes Street and St Georges Road.*
  - *A north-south connection from Showers Street to Oakover Road to align with Kenwood Court being an access street between Oakover and Showers Street and a pedestrian link from Showers Street to Ray Bramham Gardens.*
  - *An east-west connection between St Georges Road and Railway Place including an access street to connect into a north-south access street between Oakover Road and Showers Street.*
  - *Pedestrian connections to the Bell Street station and associated wayfinding recommendations.*
  - *Strengthening the relationship between uses and adjacent pedestrian and bicycle networks through the use and design of buildings.*
  - *The location of these links can be varied from those shown on the Concept Plan, if the relevant Objectives of this Schedule are achieved, to the satisfaction of the Responsible Authority. New pedestrian and cycle links should connect to existing links, where possible."*

The above Permeability and Access provisions are shown diagrammatically in the Concept Plan at Clause 5.0 in the DPO. This concept plan has been reproduced below in Figure 4.1.

Figure 4.1: Schedule 11 to Development Plan Overlay – Concept Plan

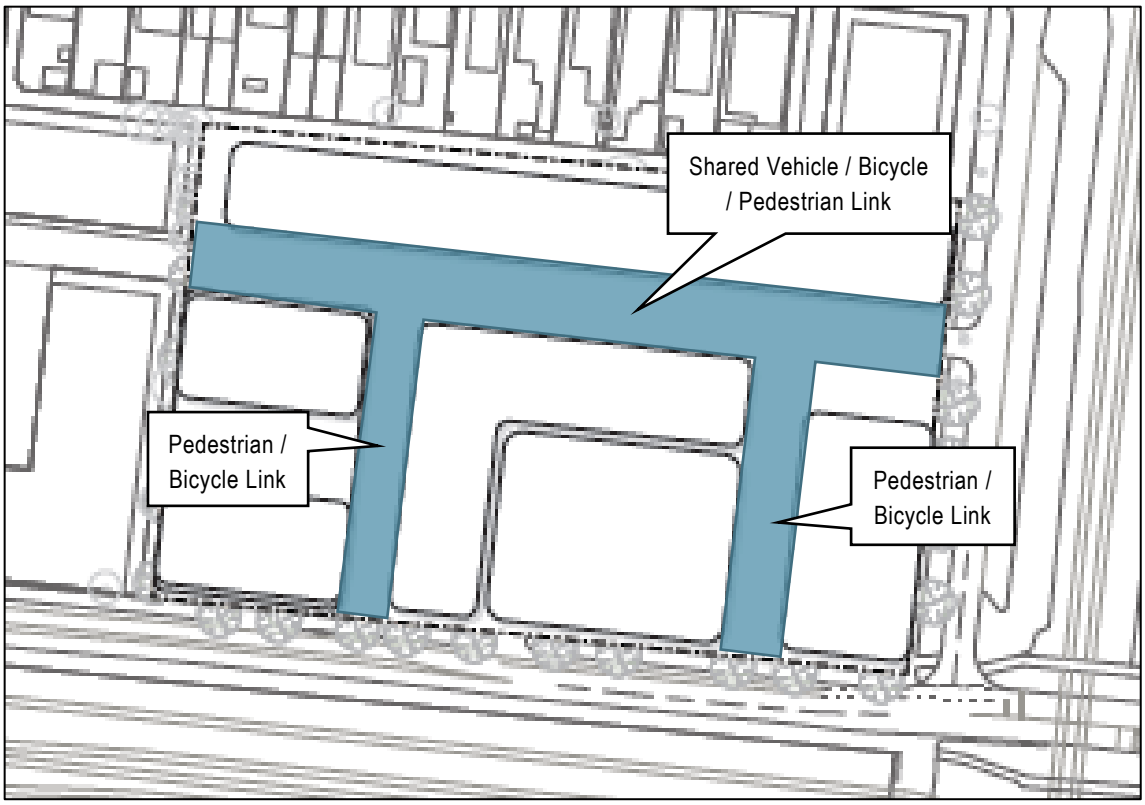


4.2. Proposed Layout / Consistency with DPO Requirements

4.2.1. Oakover Site

The proposed Development Plan indicates that the Oakover site will include a single east-west shared pedestrian/cycle/vehicle connection between Railway Place West and the adjacent building to the west. In addition, a north-south connection is proposed to be provided between this link to the north and Oakover Road to the south. These provisions (which are also shown diagrammatically in Figure 4.2) generally satisfy the intent of the DPO, noting that it is not possible to provide a full connection through to Showers Street at this time due to the current land ownership.

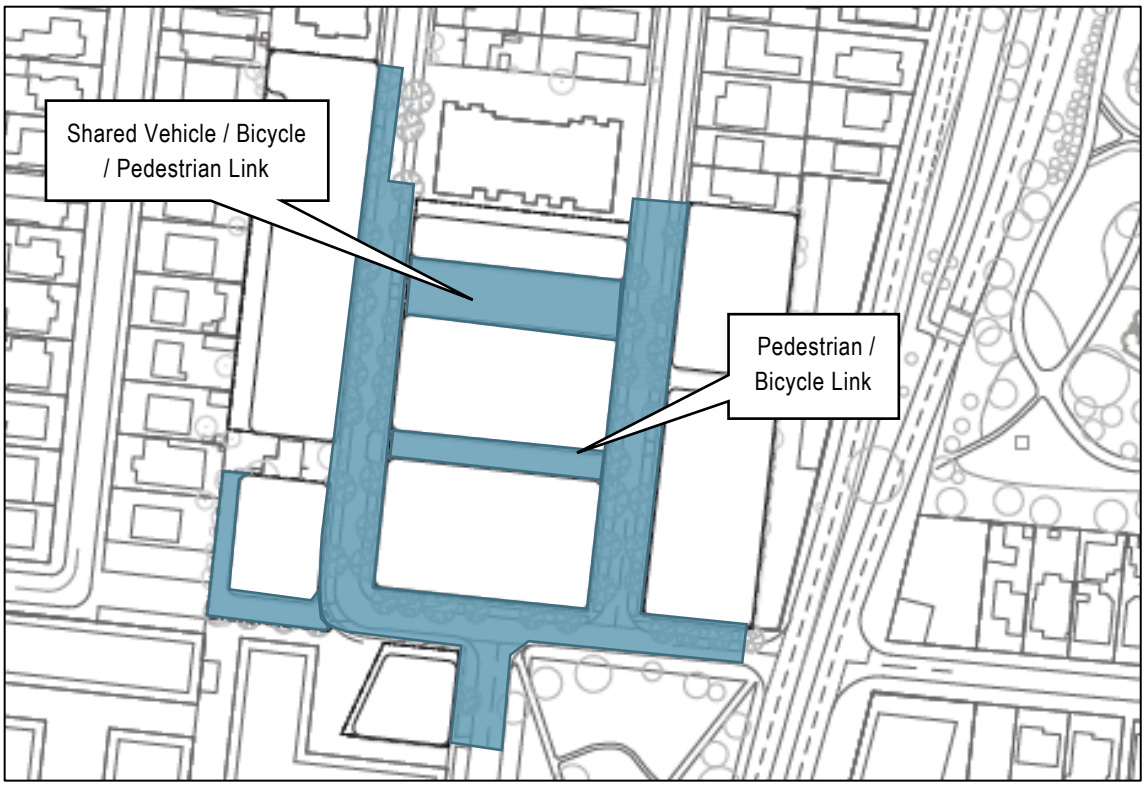
Figure 4.2: Proposed Development Plan – Permeability and Access (Oakover)



4.2.2. Stokes Penola Site

The proposed Development Plan indicates that the Stokes Penola site will include an east-west pedestrian/cycle laneway between Stokes Street and Penola Street. These provisions (which is also shown diagrammatically in Figure 4.3) generally satisfy the intent of the DPO.

Figure 4.3: Proposed Development Plan – Permeability and Access (Stokes Penola)



5. OTHER MATTERS

5.1. Car Parking

The provision of car parking will have regard to the accessibility to nearby public transport facilities and will be sufficient for the site and estimated population numbers. In this regard, it is our view that car parking for market dwellings will be provided as follows:

- 1-bedroom: between 0.5 and 1 space per dwelling
- 2-bedroom: in the order of 1 space per dwelling
- 3-bedroom: between 1 and 2 spaces per dwelling
- Visitor: 0 spaces (subject site is located within the Principle Public Transport Network).

It should be noted that individual buildings may deviate from the above suggested ranges for market dwellings, and will be further detailed as part of the Planning Permit applications. Buildings with Social Housing dwellings may be subject to different parking rates, subject to agreement between DHHS and MAB, the details of which will be provided in the relevant Planning Permit Applications.

5.2. Bicycle Parking

It is understood that, as a minimum, the proposed development on the sites will include on-site bicycle parking for both residents and visitors in accordance with the minimum requirements set out in Clause 52.34 of the Darebin Planning Scheme. Bicycle parking for residents will be located in a secure location (i.e. lockable) while bicycle parking for visitors will be located in easily accessible locations (i.e. on the ground level near building entrances). Further details will be provided as part of future Planning Permit applications.

The proposed provision of on-site bicycle parking for both residents and visitors will satisfy the relevant requirement set out in Schedule 11 to the Development Plan Overlay and relevant ESD requirements.

5.3. Sustainable Transport Initiatives

Transport is the second largest producer of greenhouse gas emissions in Victoria after stationary energy production, emitting the equivalent of over 19 million tonnes of carbon dioxide (CO_2) per annum.

Consequently, both State and local government authorities (including the City of Darebin) are implementing policies to reduce the impact of vehicle travel on the environment by encouraging walking, cycling and public modes of transport. Not only is traffic congestion detrimental to the environment but Australian employers are increasingly bearing the cost of this congestion and according to the Bureau of Transport Economics that cost is continually increasing.

Measures that could be adopted to reduce private car usage by residents to the precinct could be contained in a Green Travel Plan (GTP), which could be required as a Condition on any permit issued for the proposed development. A GTP is a way to manage the transport needs of residents and visitors associated with new developments. The purpose of the GTP is to reduce the environmental impacts of travel to/from the site by encouraging more efficient use of motor vehicles as well as sustainable alternatives to their use.

A GTP comprises of a list of strategies aimed at encouraging walking, cycling, public transport and car-pooling for travel to and from a site, and seeks to:

- Integrate the development with the existing transport facilities and network.

- Encourage the use of sustainable methods of transport.
- Assist in discouraging a reliance on private motor vehicles (i.e. single occupancy).
- Reduce the environmental impact of the development.
- Set-out future mode splits and an action plan.

5.4. Loading and Unloading

Appropriate provision will be made for loading and unloading activity (i.e. waste collection) through a combination of on-site loading areas and suitable on-street facilities. Further details will be provided as part of future Planning Permit applications. This provision will satisfy the relevant requirement set out in Schedule 11 to the Development Plan Overlay.

6. CONCLUSION

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

1. Village Bell is a collection of multiple lots of land in Preston that will deliver two new residential villages. The Preston PHRP will include a mixture of private and social housing, a community space component and a commercial space component. The current design proposes to deliver in the order of 450 to 650 dwellings, with approximately 55% of the dwellings on the Stokes Penola site and approximately 45% of the dwellings on the Oakover site.
2. The population of residents within the proposed development is estimated to be in the order of 1,100 people.
3. Reference should be made to the Development Plan covering report for staging considerations.
4. The provision of car parking will have regard to the accessibility to nearby public transport facilities and will be sufficient for the site and estimated population numbers.
5. Vehicle access to on-site car parking for the Stokes Penola site is proposed to occur via Stokes Street and Penola Street while vehicle access to on-site car parking for the Oakover site is proposed to occur via Oakover Road, Railway Place West and the laneway located at the northern end of the site (i.e. immediately south of Showers Street). The indicative development plan is anticipated to generate up to 174 vehicle movements in the weekday AM and PM peak hours on a typical weekday, and up to 1,740 daily vehicle movements.
6. On the basis of the analysis and investigation undertaken as part of this assessment it is considered that the traffic from the proposed indicative development plan can be accommodated on the road network with minor reallocation of phase times during the AM without compromising its function or safety and no mitigating works on the nearby road network are required as part of the proposed development.
7. Measures that could be adopted to reduce private car usage by residents to the precinct could be contained in a Green Travel Plan (GTP), which could be required as a Condition on any permit issued for the proposed development. A GTP is a way to manage the transport needs of residents and visitors associated with new developments. The purpose of the GTP is to reduce the environmental impacts of travel to/from the site by encouraging more efficient use of motor vehicles as well as sustainable alternatives to their use.
8. It is understood that car parking for each of the buildings will either be situated within basement levels or suitably concealed by appropriate building features such as active podium frontages or within buildings that display a high level of architectural resolution.
9. Bicycle parking for residents will be located in a secure location (i.e. lockable) while bicycle parking for visitors will be located in easily accessible locations (i.e. on the ground level near building entrances). Further details will be provided as part of future Planning Permit applications.
10. Appropriate provision will be made for loading and unloading activity (i.e. waste collection) through a combination of on-site loading areas and suitable on-street facilities. Further details will be provided as part of future Planning Permit applications.
11. The proposed Development Plan indicates that the Oakover site will include a single east-west shared pedestrian/cycle/vehicle connection between Railway Place West and the adjacent building to the west. In addition, two north-south pedestrian/cycle connections are proposed to be provided between this link to the north and Oakover Road to the south. These provisions generally satisfy the intent of the DPO, noting that it is not possible to provide a full connection through to Showers Street at this time due to the current land ownership.
12. The proposed Development Plan indicates that the Stokes Penola site will include an east-west pedestrian/cycle laneway between Stokes Street and Penola Street. These provisions generally satisfy the intent of the DPO.

A. SIDRA INTERSECTION RESULTS

A

USER REPORT FOR SITE

Project: 190826sid-V143133 St Georges Road & Oakover Road

Template: Movement Summary Output

Site: 4748 [Existing AM Peak]

Existing Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, D, E1, E2
Output Phase Sequence: A, D, E1, E2

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
South: St Georges Road												
1	L2	20	2.0	0.520	21.4	LOS C	20.0	142.7	0.65	0.59	0.65	46.4
2	T1	1064	2.0	0.520	15.4	LOS B	20.0	142.7	0.63	0.57	0.63	47.8
3	R2	97	2.0	0.793	72.0	LOS E	6.2	43.9	1.00	0.89	1.27	27.1
Approach		1181	2.0	0.793	20.1	LOS C	20.0	142.7	0.66	0.59	0.68	45.0
East: Oakover Road												
4	L2	124	2.0	0.874	64.4	LOS E	20.2	143.8	1.00	1.01	1.25	29.6
5	T1	194	2.0	0.874	58.8	LOS E	20.2	143.8	1.00	1.01	1.25	30.0
6	R2	65	2.0	0.426	63.7	LOS E	3.8	27.0	0.99	0.76	0.99	29.0
Approach		383	2.0	0.874	61.4	LOS E	20.2	143.8	1.00	0.97	1.21	29.7
North: St Georges Road												
7	L2	54	2.0	0.531	22.6	LOS C	20.6	146.7	0.67	0.62	0.67	45.5
8	T1	1078	2.0	0.531	16.9	LOS B	20.6	146.7	0.66	0.60	0.66	46.8
9	R2	29	2.0	0.322	68.9	LOS E	1.8	12.7	1.00	0.72	1.00	27.7
Approach		1161	2.0	0.531	18.5	LOS B	20.6	146.7	0.67	0.61	0.67	45.9
West: Oakover Road												
10	L2	4	2.0	0.973	92.3	LOS F	25.5	181.4	1.00	1.20	1.55	24.3
11	T1	255	2.0	0.973	86.7	LOS F	25.5	181.4	1.00	1.20	1.55	24.6
12	R2	64	2.0	0.973	92.3	LOS F	25.5	181.4	1.00	1.20	1.55	24.3
Approach		323	2.0	0.973	87.9	LOS F	25.5	181.4	1.00	1.20	1.55	24.6
All Vehicles		3048	2.0	0.973	31.9	LOS C	25.5	181.4	0.74	0.71	0.84	39.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
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.

Site: 4784 [Existing PM Peak]

Existing Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, D, E1, E2
Output Phase Sequence: A, D, E1, E2

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
South: St Georges Road												
1	L2	46	2.0	0.611	22.1	LOS C	25.5	181.7	0.69	0.64	0.69	45.9
2	T1	1263	2.0	0.611	16.1	LOS B	25.5	181.7	0.67	0.61	0.67	47.3
3	R2	93	2.0	0.759	70.9	LOS E	5.8	41.5	1.00	0.86	1.22	27.4
Approach		1402	2.0	0.759	19.9	LOS B	25.5	181.7	0.69	0.63	0.71	45.1
East: Oakover Road												
4	L2	94	2.0	0.971	89.8	LOS F	26.9	191.3	1.00	1.21	1.54	24.7
5	T1	253	2.0	0.971	84.3	LOS F	26.9	191.3	1.00	1.21	1.54	25.0
6	R2	57	2.0	0.324	60.0	LOS E	3.2	22.6	0.96	0.76	0.96	29.8
Approach		403	2.0	0.971	82.1	LOS F	26.9	191.3	0.99	1.14	1.45	25.5
North: St Georges Road												
7	L2	42	2.0	0.485	21.5	LOS C	18.2	129.3	0.64	0.59	0.64	46.2
8	T1	1006	2.0	0.485	15.8	LOS B	18.2	129.3	0.63	0.57	0.63	47.5
9	R2	28	2.0	0.310	68.8	LOS E	1.7	12.2	1.00	0.72	1.00	27.7
Approach		1077	2.0	0.485	17.4	LOS B	18.2	129.3	0.64	0.58	0.64	46.6
West: Oakover Road												
10	L2	19	2.0	0.664	54.9	LOS D	12.8	91.2	0.98	0.83	0.99	32.3
11	T1	180	2.0	0.664	49.3	LOS D	12.8	91.2	0.98	0.83	0.99	32.8
12	R2	33	2.0	0.664	54.9	LOS D	12.8	91.2	0.98	0.83	0.99	32.3
Approach		232	2.0	0.664	50.6	LOS D	12.8	91.2	0.98	0.83	0.99	32.7
All Vehicles		3114	2.0	0.971	29.4	LOS C	26.9	191.3	0.74	0.69	0.80	40.4

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.
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.

Site: 4748 [Post Development AM Peak]

Existing Site - Phase Time Adjusted
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, D, E1, E2
Output Phase Sequence: A, D, E1, E2

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
South: St Georges Road												
1	L2	20	2.0	0.590	27.0	LOS C	23.5	167.6	0.75	0.68	0.75	43.3
2	T1	1074	2.0	0.590	20.8	LOS C	23.5	167.6	0.73	0.65	0.73	44.6
3	R2	97	2.0	0.793	72.0	LOS E	6.2	43.9	1.00	0.89	1.27	27.1
Approach		1191	2.0	0.793	25.1	LOS C	23.5	167.6	0.75	0.67	0.77	42.4
East: Oakover Road												
4	L2	136	2.0	0.708	46.3	LOS D	17.2	122.3	0.93	0.82	0.94	34.6
5	T1	198	2.0	0.708	40.7	LOS D	17.2	122.3	0.93	0.82	0.94	35.2
6	R2	71	2.0	0.292	54.8	LOS D	3.7	26.6	0.92	0.76	0.92	31.2
Approach		404	2.0	0.708	45.1	LOS D	17.2	122.3	0.93	0.81	0.94	34.2
North: St Georges Road												
7	L2	55	2.0	0.602	28.4	LOS C	23.9	169.9	0.77	0.71	0.77	42.4
8	T1	1078	2.0	0.602	22.6	LOS C	23.9	169.9	0.76	0.69	0.76	43.6
9	R2	29	2.0	0.322	68.9	LOS E	1.8	12.7	1.00	0.72	1.00	27.7
Approach		1162	2.0	0.602	24.0	LOS C	23.9	169.9	0.77	0.69	0.77	42.9
West: Oakover Road												
10	L2	4	2.0	0.977	93.9	LOS F	29.8	212.3	1.00	1.23	1.55	24.0
11	T1	260	2.0	0.977	88.3	LOS F	29.8	212.3	1.00	1.23	1.55	24.3
12	R2	103	2.0	0.977	93.9	LOS F	29.8	212.3	1.00	1.23	1.55	24.0
Approach		367	2.0	0.977	89.9	LOS F	29.8	212.3	1.00	1.23	1.55	24.2
All Vehicles		3124	2.0	0.977	34.9	LOS C	29.8	212.3	0.81	0.76	0.88	38.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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: 4784 [Post Development PM Peak]

Existing Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, D, E1, E2
Output Phase Sequence: A, D, E1, E2

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
South: St Georges Road												
1	L2	46	2.0	0.637	23.1	LOS C	27.3	194.1	0.72	0.67	0.72	45.3
2	T1	1297	2.0	0.637	17.0	LOS B	27.3	194.1	0.69	0.64	0.69	46.8
3	R2	101	2.0	0.828	73.4	LOS E	6.5	46.5	1.00	0.91	1.33	26.9
Approach		1444	2.0	0.828	21.1	LOS C	27.3	194.1	0.72	0.66	0.74	44.4
East: Oakover Road												
4	L2	97	2.0	0.961	85.4	LOS F	27.0	192.4	1.00	1.18	1.49	25.4
5	T1	260	2.0	0.961	79.9	LOS E	27.0	192.4	1.00	1.18	1.49	25.7
6	R2	59	2.0	0.320	59.9	LOS E	3.3	23.4	0.96	0.76	0.96	29.9
Approach		416	2.0	0.961	78.3	LOS E	27.0	192.4	0.99	1.12	1.42	26.2
North: St Georges Road												
7	L2	46	2.0	0.495	22.1	LOS C	18.6	132.6	0.65	0.60	0.65	45.8
8	T1	1006	2.0	0.495	16.4	LOS B	18.6	132.6	0.64	0.58	0.64	47.1
9	R2	28	2.0	0.310	68.8	LOS E	1.7	12.2	1.00	0.72	1.00	27.7
Approach		1081	2.0	0.495	18.0	LOS B	18.6	132.6	0.65	0.59	0.65	46.2
West: Oakover Road												
10	L2	19	2.0	0.800	61.2	LOS E	15.9	112.9	1.00	0.93	1.14	30.6
11	T1	196	2.0	0.800	55.6	LOS E	15.9	112.9	1.00	0.93	1.14	31.0
12	R2	47	2.0	0.800	61.2	LOS E	15.9	112.9	1.00	0.93	1.14	30.6
Approach		262	2.0	0.800	57.0	LOS E	15.9	112.9	1.00	0.93	1.14	30.9
All Vehicles		3203	2.0	0.961	30.5	LOS C	27.3	194.1	0.75	0.72	0.83	39.9

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.

Organisation: GTA CONSULTANTS | Created: Thursday, 5 September 2019 10:49:37 AM
Project: P:\V14300-14399\V143133 Public Housing Redevelopment Project (PHRP) Preston\Modelling\190826sid-V143133 St Georges Road & Oakover Road.sip8

USER REPORT FOR SITE

Project: 190918sid-V143133 St Georges Road & Oakover Road

Template: Default Site User Report

Site: 4748 [Existing AM Peak]

Existing Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, D, E1, E2
Output Phase Sequence: A, D, E1, E2

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
South: St Georges Road												
1	L2	20	2.0	0.520	21.4	LOS C	20.0	142.7	0.65	0.59	0.65	46.4
2	T1	1064	2.0	0.520	15.4	LOS B	20.0	142.7	0.63	0.57	0.63	47.8
3	R2	97	2.0	0.793	72.0	LOS E	6.2	43.9	1.00	0.89	1.27	27.1
Approach		1181	2.0	0.793	20.1	LOS C	20.0	142.7	0.66	0.59	0.68	45.0
East: Oakover Road												
4	L2	124	2.0	0.874	64.4	LOS E	20.2	143.8	1.00	1.01	1.25	29.6
5	T1	194	2.0	0.874	58.8	LOS E	20.2	143.8	1.00	1.01	1.25	30.0
6	R2	65	2.0	0.426	63.7	LOS E	3.8	27.0	0.99	0.76	0.99	29.0
Approach		383	2.0	0.874	61.4	LOS E	20.2	143.8	1.00	0.97	1.21	29.7
North: St Georges Road												
7	L2	54	2.0	0.531	22.6	LOS C	20.6	146.7	0.67	0.62	0.67	45.5
8	T1	1078	2.0	0.531	16.9	LOS B	20.6	146.7	0.66	0.60	0.66	46.8
9	R2	29	2.0	0.322	68.9	LOS E	1.8	12.7	1.00	0.72	1.00	27.7
Approach		1161	2.0	0.531	18.5	LOS B	20.6	146.7	0.67	0.61	0.67	45.9
West: Oakover Road												
10	L2	4	2.0	0.973	92.3	LOS F	25.5	181.4	1.00	1.20	1.55	24.3
11	T1	255	2.0	0.973	86.7	LOS F	25.5	181.4	1.00	1.20	1.55	24.6
12	R2	64	2.0	0.973	92.3	LOS F	25.5	181.4	1.00	1.20	1.55	24.3
Approach		323	2.0	0.973	87.9	LOS F	25.5	181.4	1.00	1.20	1.55	24.6
All Vehicles		3048	2.0	0.973	31.9	LOS C	25.5	181.4	0.74	0.71	0.84	39.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
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.

Site: 4784 [Existing PM Peak]

Existing Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, D, E1, E2
Output Phase Sequence: A, D, E1, E2

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
South: St Georges Road												
1	L2	46	2.0	0.611	22.1	LOS C	25.5	181.7	0.69	0.64	0.69	45.9
2	T1	1263	2.0	0.611	16.1	LOS B	25.5	181.7	0.67	0.61	0.67	47.3
3	R2	93	2.0	0.759	70.9	LOS E	5.8	41.5	1.00	0.86	1.22	27.4
Approach		1402	2.0	0.759	19.9	LOS B	25.5	181.7	0.69	0.63	0.71	45.1
East: Oakover Road												
4	L2	94	2.0	0.971	89.8	LOS F	26.9	191.3	1.00	1.21	1.54	24.7
5	T1	253	2.0	0.971	84.3	LOS F	26.9	191.3	1.00	1.21	1.54	25.0
6	R2	57	2.0	0.324	60.0	LOS E	3.2	22.6	0.96	0.76	0.96	29.8
Approach		403	2.0	0.971	82.1	LOS F	26.9	191.3	0.99	1.14	1.45	25.5
North: St Georges Road												
7	L2	42	2.0	0.485	21.5	LOS C	18.2	129.3	0.64	0.59	0.64	46.2
8	T1	1006	2.0	0.485	15.8	LOS B	18.2	129.3	0.63	0.57	0.63	47.5
9	R2	28	2.0	0.310	68.8	LOS E	1.7	12.2	1.00	0.72	1.00	27.7
Approach		1077	2.0	0.485	17.4	LOS B	18.2	129.3	0.64	0.58	0.64	46.6
West: Oakover Road												
10	L2	19	2.0	0.664	54.9	LOS D	12.8	91.2	0.98	0.83	0.99	32.3
11	T1	180	2.0	0.664	49.3	LOS D	12.8	91.2	0.98	0.83	0.99	32.8
12	R2	33	2.0	0.664	54.9	LOS D	12.8	91.2	0.98	0.83	0.99	32.3
Approach		232	2.0	0.664	50.6	LOS D	12.8	91.2	0.98	0.83	0.99	32.7
All Vehicles		3114	2.0	0.971	29.4	LOS C	26.9	191.3	0.74	0.69	0.80	40.4

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.
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.

Site: 4748 [Post Development AM Peak]

Existing Site - Phase Time Adjusted
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, D, E1, E2
Output Phase Sequence: A, D, E1, E2

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
South: St Georges Road												
1	L2	20	2.0	0.590	27.0	LOS C	23.5	167.6	0.75	0.68	0.75	43.3
2	T1	1074	2.0	0.590	20.8	LOS C	23.5	167.6	0.73	0.65	0.73	44.6
3	R2	97	2.0	0.793	72.0	LOS E	6.2	43.9	1.00	0.89	1.27	27.1
Approach		1191	2.0	0.793	25.1	LOS C	23.5	167.6	0.75	0.67	0.77	42.4
East: Oakover Road												
4	L2	136	2.0	0.708	46.3	LOS D	17.2	122.3	0.93	0.82	0.94	34.6
5	T1	198	2.0	0.708	40.7	LOS D	17.2	122.3	0.93	0.82	0.94	35.2
6	R2	71	2.0	0.292	54.8	LOS D	3.7	26.6	0.92	0.76	0.92	31.2
Approach		404	2.0	0.708	45.1	LOS D	17.2	122.3	0.93	0.81	0.94	34.2
North: St Georges Road												
7	L2	55	2.0	0.602	28.4	LOS C	23.9	169.9	0.77	0.71	0.77	42.4
8	T1	1078	2.0	0.602	22.6	LOS C	23.9	169.9	0.76	0.69	0.76	43.6
9	R2	29	2.0	0.322	68.9	LOS E	1.8	12.7	1.00	0.72	1.00	27.7
Approach		1162	2.0	0.602	24.0	LOS C	23.9	169.9	0.77	0.69	0.77	42.9
West: Oakover Road												
10	L2	4	2.0	0.977	93.9	LOS F	29.8	212.3	1.00	1.23	1.55	24.0
11	T1	260	2.0	0.977	88.3	LOS F	29.8	212.3	1.00	1.23	1.55	24.3
12	R2	103	2.0	0.977	93.9	LOS F	29.8	212.3	1.00	1.23	1.55	24.0
Approach		367	2.0	0.977	89.9	LOS F	29.8	212.3	1.00	1.23	1.55	24.2
All Vehicles		3124	2.0	0.977	34.9	LOS C	29.8	212.3	0.81	0.76	0.88	38.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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: 4784 [Post Development PM Peak]

Existing Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: Phasing
Reference Phase: Phase A
Input Phase Sequence: A, D, E1, E2
Output Phase Sequence: A, D, E1, E2

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
South: St Georges Road												
1	L2	80	2.0	0.653	23.4	LOS C	28.3	201.5	0.73	0.68	0.73	45.0
2	T1	1297	2.0	0.653	17.2	LOS B	28.3	201.5	0.70	0.65	0.70	46.6
3	R2	101	2.0	0.828	73.4	LOS E	6.5	46.5	1.00	0.91	1.33	26.9
Approach		1478	2.0	0.828	21.4	LOS C	28.3	201.5	0.73	0.67	0.75	44.3
East: Oakover Road												
4	L2	97	2.0	0.961	85.4	LOS F	27.0	192.4	1.00	1.18	1.49	25.4
5	T1	260	2.0	0.961	79.9	LOS E	27.0	192.4	1.00	1.18	1.49	25.7
6	R2	59	2.0	0.320	59.9	LOS E	3.3	23.4	0.96	0.76	0.96	29.9
Approach		416	2.0	0.961	78.3	LOS E	27.0	192.4	0.99	1.12	1.42	26.2
North: St Georges Road												
7	L2	46	2.0	0.495	22.1	LOS C	18.6	132.6	0.65	0.60	0.65	45.8
8	T1	1006	2.0	0.495	16.4	LOS B	18.6	132.6	0.64	0.58	0.64	47.1
9	R2	28	2.0	0.310	68.8	LOS E	1.7	12.2	1.00	0.72	1.00	27.7
Approach		1081	2.0	0.495	18.0	LOS B	18.6	132.6	0.65	0.59	0.65	46.2
West: Oakover Road												
10	L2	19	2.0	0.800	61.2	LOS E	15.9	112.9	1.00	0.93	1.14	30.6
11	T1	196	2.0	0.800	55.6	LOS E	15.9	112.9	1.00	0.93	1.14	31.0
12	R2	47	2.0	0.800	61.2	LOS E	15.9	112.9	1.00	0.93	1.14	30.6
Approach		262	2.0	0.800	57.0	LOS E	15.9	112.9	1.00	0.93	1.14	30.9
All Vehicles		3237	2.0	0.961	30.5	LOS C	28.3	201.5	0.76	0.72	0.83	39.9

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.

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