Victoria Park Christian School/Victoria Park

Transport Impact Assessment

Prepared for: Adventist Education

Ref: 300305052 | Date: 6 October 2023

Revision

Revision	Date	Comment	Prepared By	Approved By
A	22 September 2023	Final	RC/EH	RJC
B	3 October 2023	Final	RC/EH	RJC
C	6 October 2023	Final	RC/EH	RJC

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For and on behalf of

Stantec Australia Pty Ltd

226 Adelaide Terrace, Perth WA 6000

Acknowledgment of Country

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

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1. Introduction

1.1 Background and Proposal

Stantec have been commissioned by Australasian Conference Association Ltd to prepare a Transport Impact Assessment (TIA) for the proposed expansion of Victoria Park Christian School, located in the Town of Victoria Park.

This report aims to focus on traffic access, circulation, and safety of the proposed school. Discussion regarding pedestrian, cycle and public transport considerations has also been included.

This report is prepared to be consistent with the Western Australian Planning Commission (WAPC) *Transport Assessment Guidelines for Developments: Volume 4 Individual Developments (2016)*.

2. Existing Situation

2.1 Existing Site Context

The Site is located between Colombo Street and Oswald Street. The Site is bounded by Hordern Street to the north, Oswald Street to the west, residential dwelling to the south and Columbo Street to the east.

The location of the Site is illustrated in **Figure 2.1**.

Figure 2.1 - Site Location

Source: Metrmaps (Base Map)

2.2 Existing Site Development

The existing site is home to Victoria Park Christian School. An aerial view of the Site location is presented in **Figure 2.2**.

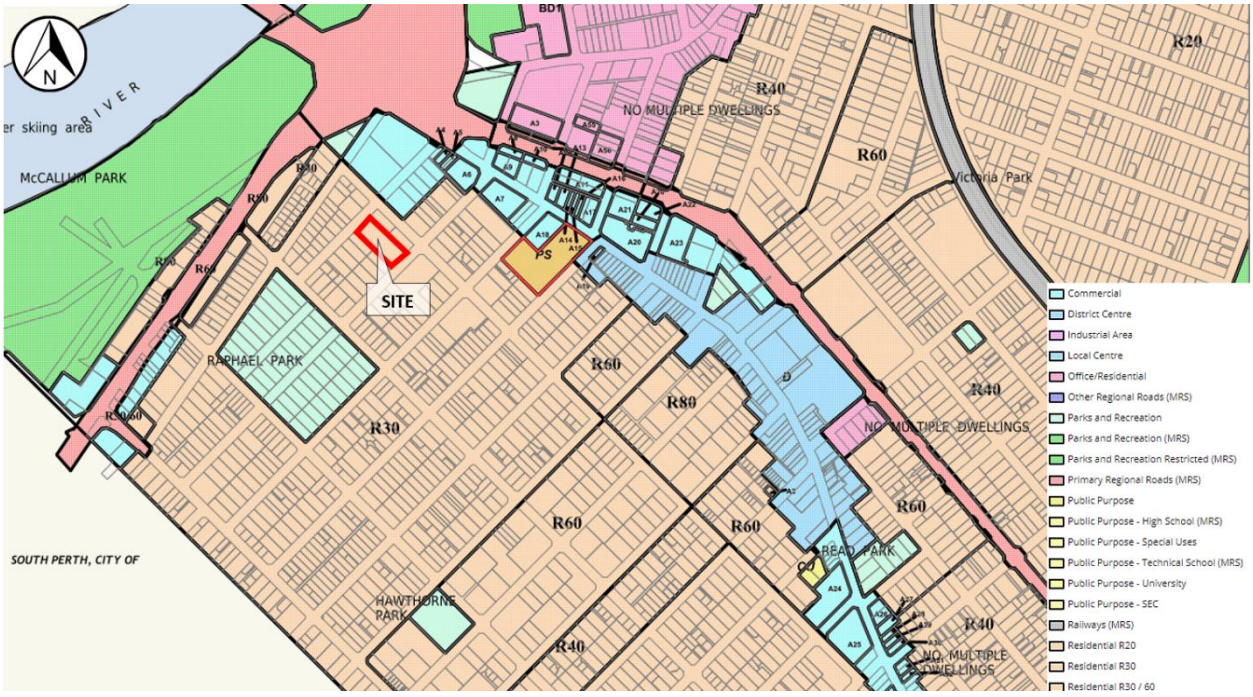
Figure 2.2 - Aerial view of the Site

Source: Metrmaps (Base Map)

2.3 Surrounding Land Use

According to the *Town of Victoria Park Local Planning Scheme No.1*, the Site is zoned as "Residential R30" and the nearby surrounding area is zoned as "Residential". A detailed zoning map around the Site is presented in **Figure 2.3**.

Figure 2.3 - Zoning Map



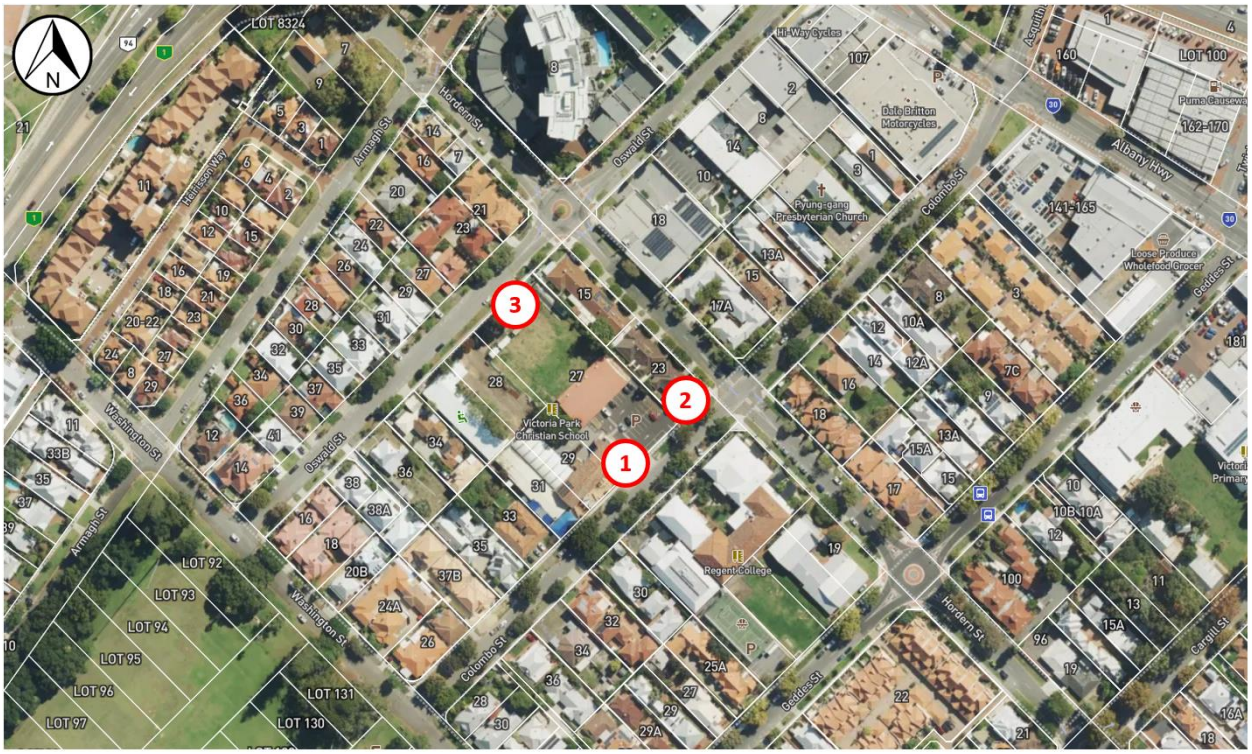
Source: Town of Victoria Park Local Planning Scheme No. 1

2.4 Existing Site Access

The existing vehicle accesses to the Site are shown in **Figure 2.4** and the access arrangement is summarised as follows:

- Access 1 – Car park Entry (Staff parking and pick-up/drop-off)
- Access 2 – Car park Exit (Staff parking and pick-up/drop-off)
- Access 3 – Service Entry and Exit (Maintenance)

Figure 2.4 - Existing Site Access Arrangement



Source: Metromaps (Base Map)

2.5 Existing Site Traffic Generation and Land Uses

The current student count is 149 students and the current staff count is 10 teaching and 7 non-teaching staff (equivalent to 13.4 for full-time equivalent (FTE) staff).

3. Road Network

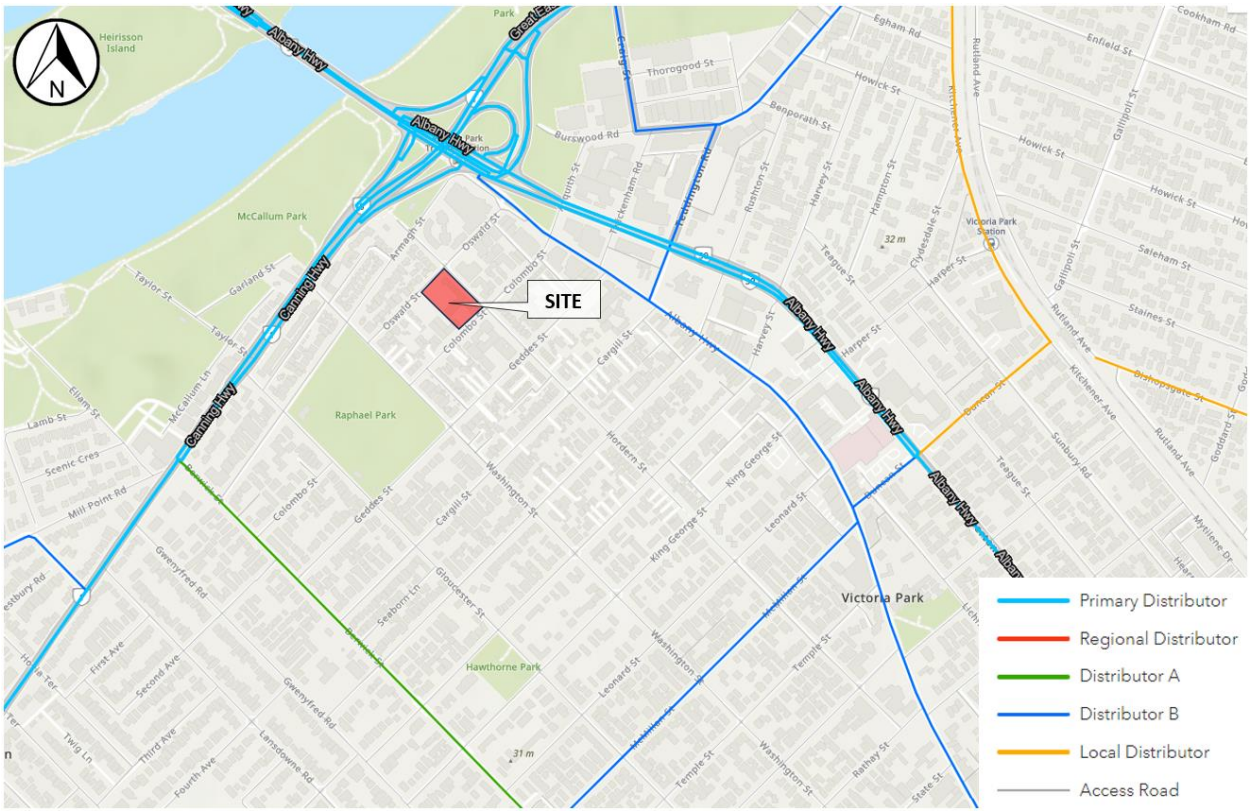
3.1 Existing Road Network

Road classifications are defined in the Main Roads Functional Hierarchy as follows:

- **Primary Distributors (light blue):** Form the regional and inter-regional grid of the Main Roads WA traffic routes and carry large volumes of fast-moving traffic. Some are strategic freight routes and all are National or State roads. They are managed by Main Roads WA.
- **Regional Distributors (red):** Roads that are not Primary Distributors, but which link significant destinations and are designed for efficient movement of people and goods within and beyond regional areas. They are managed by Local Government.
- **District Distributor A (green):** These carry traffic between industrial, commercial and residential areas and connect to Primary Distributors. These are likely to be truck routes and provide only limited access to adjoining property. They are managed by Local Government.
- **District Distributor B (dark blue):** Perform a similar function to District Distributor A but with reduced capacity due to flow restrictions from access to and roadside parking alongside adjoining property. These are often older roads with traffic demand in excess of that originally intended. District Distributor A and B roads run between land-use cells and not through them, forming a grid that would ideally be around 1.5 kilometres apart. They are managed by Local Government.
- **Local Distributors (orange):** Carry traffic within a cell and link District Distributors at the boundary to access roads. The route of the Local Distributor discourages through traffic so that the cell formed by the grid of District Distributors only carries traffic belonging to or serving the area. These roads should accommodate buses but discourage trucks. They are managed by Local Government.
- **Access Roads (grey):** Provide access to abutting properties with amenity, safety and aesthetic aspects having priority over the vehicle movement function. These roads are bicycle and pedestrian friendly. They are managed by Local government.

The layout and classification of the roads surrounding the Site are presented in **Figure 3.1** and summarised in **Table 3.1**.

Figure 3.1 - Existing Road Hierarchy



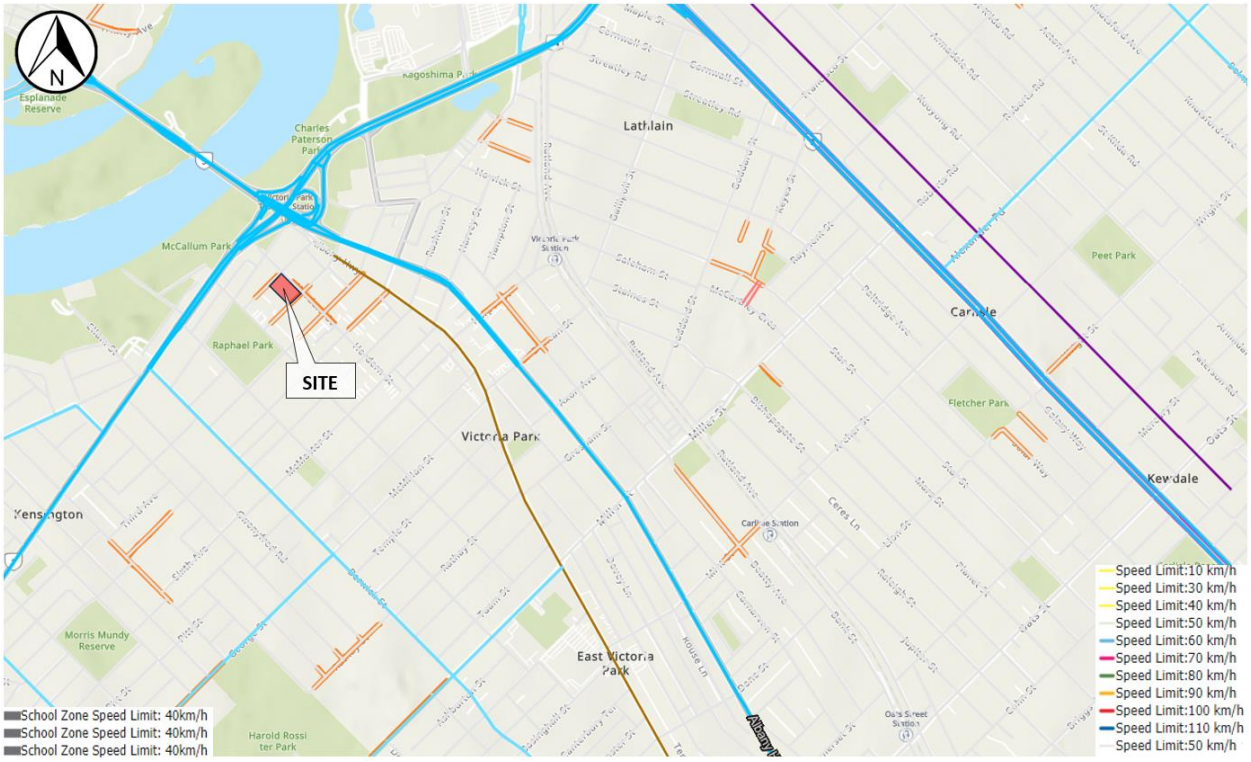
Source: Main Roads Mapping Information Centre (2023)

Table 3.1 - Summary of Existing Road Network

Road Name	Road Hierarchy	Jurisdiction	No. of Lanes	No. of Footpaths	Width (m)	Posted Speed (km/h)
Berwick Street	Distributor A	Local Government	3	2	19.60	60
Canning Highway	Primary Distributor	Local Government	5	2	20.40	60
Albany Highway	Primary Distributor	Local Government	2	2	16.70	50
Hordem Street	Access Road	Local Government	2	2	10.20	50/40
Oswald Street	Access Road	Local Government	2	1	10	50/40
Colombo Street	Access Road	Local Government	2	2	7.30	50/40

Figure 3.2 shows the posted speed limit for the surrounding road network including the 40km/h school zones. The periods when the school zone posted speed is in effect is between 7:30am – 9:00am and 2:30pm – 4:00pm.

Figure 3.2 - Posted Speed Limit and School Zones



Source: Main Roads Mapping Information Centre (2023)

3.2 Traffic Volumes

Traffic volumes for the surrounding roads near the School were obtained from Main Roads Traffic Map and the Town of Victoria Park and are summarised in **Table 3.2** Traffic Volume locations are illustrated in **Figure 3.3**.

Figure 3.3 - Traffic Volume Data Locations

Source: Main Roads Mapping Information Centre (2023)

Table 3.2 - Existing Traffic in the Vicinity of the Site

Road Name	Figure Ref	Date	Average Two-way Daily Traffic Volume (Weekday)	Average Two-way AM Peak Traffic Volume	Average Two-way PM Peak Traffic Volume
Berwick Street (East of Canning Highway)	1	2018/19	16,584	1,317	1,384
Albany Highway (East of Geddes Street)	2	2020/21	7,522	829	505
Cargill Street (West of Albany Highway)	3	2020/21	1,191	271	128
Canning Highway (At Albany Hwy Bridge)	4	2020/21	34,593	2,676	3,355
Asquith Street (East of Shepperton Road)	5	2020/21	1,550	166	141
Albany Highway (West of Asquith St)	6	2020/21	4,004 (westbound only)	367 (westbound only)	302 (westbound only)

Source: Main Roads WA

3.3 Existing Intersections

Key intersections within the surrounding area of the school include the following:

- Oswald Street/Hordern Street Intersection
- Hordern Street/Colombo Street Intersection

3.3.1 Oswald Street/Hordern Street Intersection

Oswald Street/Hordern Street Intersection is located to the north of the site. It is a 4-way roundabout and the intersection layout is shown in **Figure 3.4**.

Figure 3.4 - Oswald Street/Hordern Street Intersection

Source: Metromaps (2023)

3.3.2 Hordern Street/Colombo Street Intersection

Hordern Street/Colombo Street Intersection is located east of the site. It is 4-way stop controlled intersection with priority to Hordern Street. The intersection layout is shown in **Figure 3.5**.

Figure 3.5 - Hordern Street/Colombo Street Intersection

Source: Metromaps (2023)

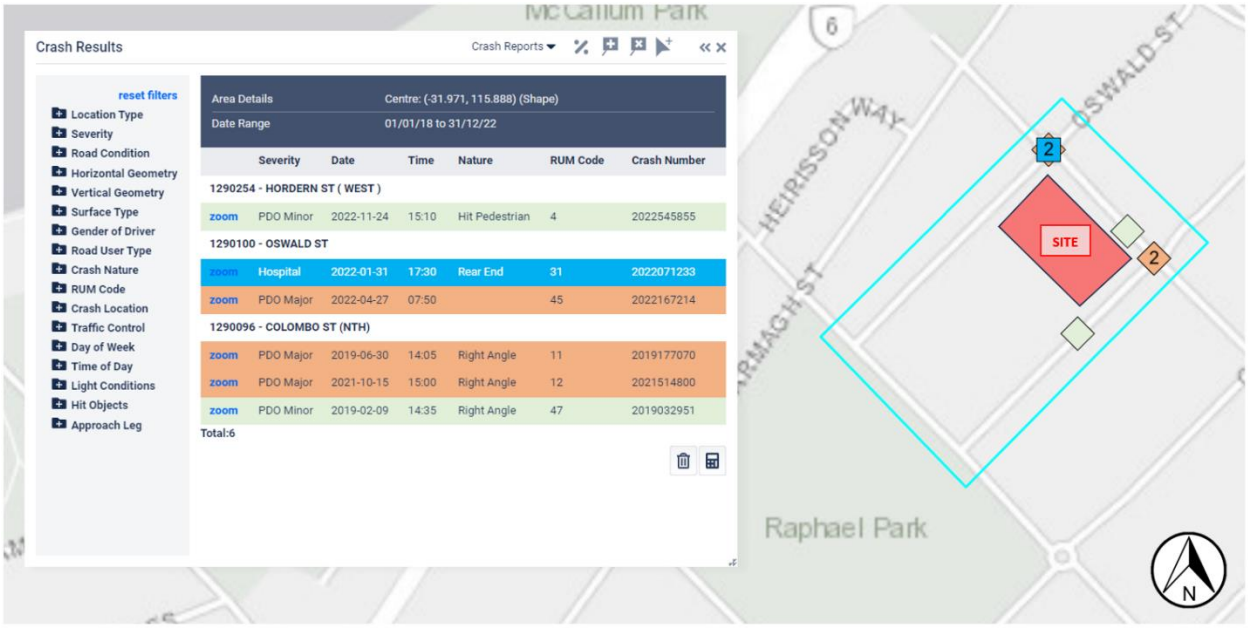
3.4 Future Road Network

Based on the information provided by the Town of Victoria Park there does not appear to be any significant changes proposed to the surrounding road network.

3.5 Crash Assessment

A search of the Main Road WA crash data for the five-year period between January 2018 and December 2022 has been undertaken for all the intersections and midblock sections along the frontage of the Site. 4 intersection crashes were recorded on Oswald Street/Hordern Street and Hordern Street/Colombo Street, 1 crash was recorder along Hordern Street (West of Colombo Street), and 1 crash along Colombo Street (South of Hordern Street). The crash data is illustrated in **Figure 3.6** and summarised in **Table 3.3, Table 3.4**, and **Table 3.5**.

Figure 3.6 - Crash Map



Source: Metromaps (2023)

Table 3.3 - Hordern Street (West)/Colombo Street (North) Intersection

Type of Crash (RUM Code)	Fatal	Hospital	Medical	Major Property Damage	Minor Property Damage	Not Stated	Total Crashes
Rear End	-	1	-	-	-	-	**1**
Right Angle	-	-	-	2	1	-	**3**
Hit on Pedestrian	-	-	-	-	1	-	**1**
Unspecified	-	-	-	1	-	-	**1**
Total	**0**	**1**	**0**	**3**	**2**	**0**	**6**

Source: Main Roads WA

Table 3.4 - Intersection Crashes

Type of Crash (RUM Code)	Fatal	Hospital	Medical	Major Property Damage	Minor Property Damage	Not Stated	Total Crashes
Oswald St – Hordern St	-	1	-	1	-	-	**2**
Hordern St – Colombo St	-	-	-	2	-	-	**2**
Total	**0**	**1**	**0**	**3**	**0**	**0**	**4**

Source: Main Roads WA

Table 3.5 - Midblock Crashes

Type of Crash (RUM Code)	Fatal	Hospital	Medical	Major Property Damage	Minor Property Damage	Not Stated	Total Crashes
Hordern Street	-	-	-	-	1	-	**1**
Colombo Street	-	-	-	-	1	-	**1**
Total	**0**	**0**	**0**	**0**	**2**	**0**	**2**

Source: Main Roads WA

A summary of the crash data is as follows;

- 3 crashes resulted in major property damage, 2 crashes resulted in minor property damage, and 1 crash had a hospital severity.
- No fatal crashes were recorded.
- 2 crashes within the surrounding area occurred during the school morning and afternoon peak periods. Though given the low severity of these crashes, no additional crash details are provided to determine whether it is related to school traffic.

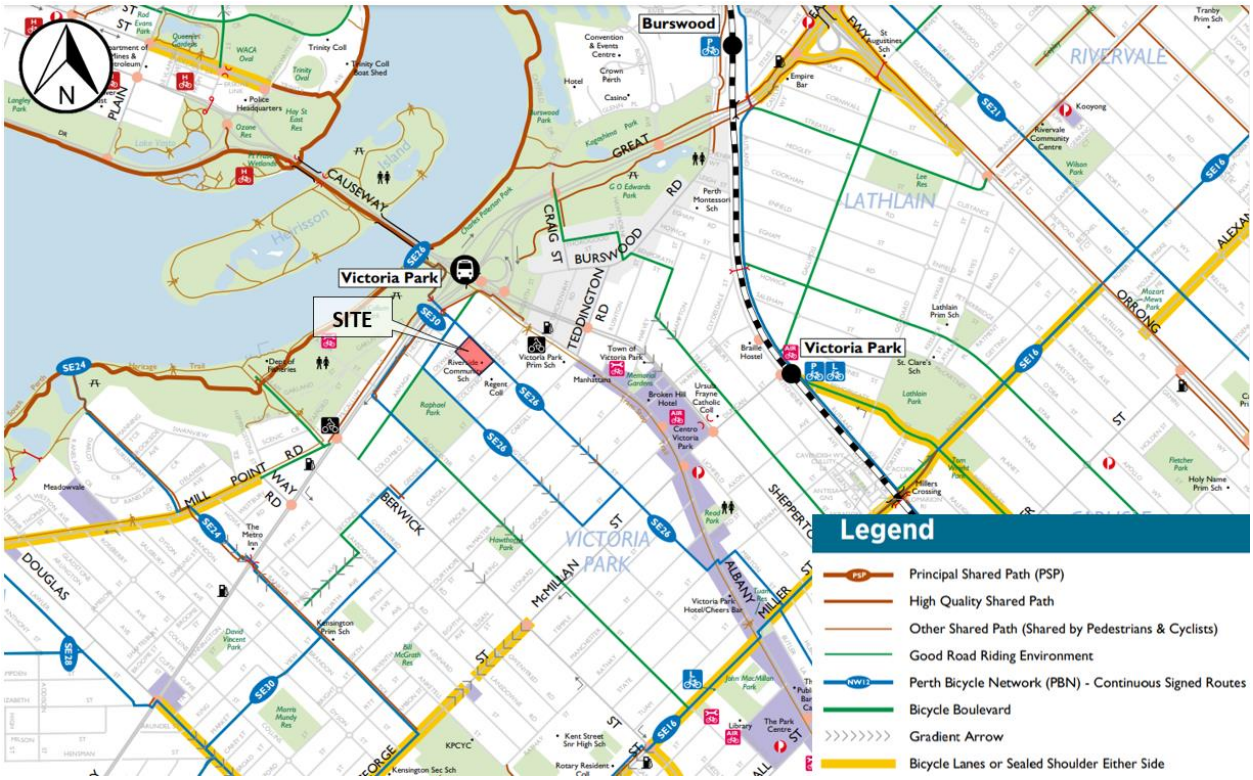
Overall, the number of crashes occurring near the Site is low.

4. Pedestrian/Cycle Network

4.1 Existing Pedestrian/Cycling Network

According to the *Department of Transports Perth, Fremantle and Stirling Comprehensive Bike Map* the Perth Bicycle Network (PBN) provides a route along the school frontage roads (Hordern Street and Washington Street). In addition, there are good road riding environments and convenient access to high quality shared paths. Overall, the walking and cycling network is considered to be good with convenient access to high quality facilities. **Figure 4.1** shows the bicycle network within the surrounding area of the site.

Figure 4.1 - Existing Pedestrian/Cycle Network



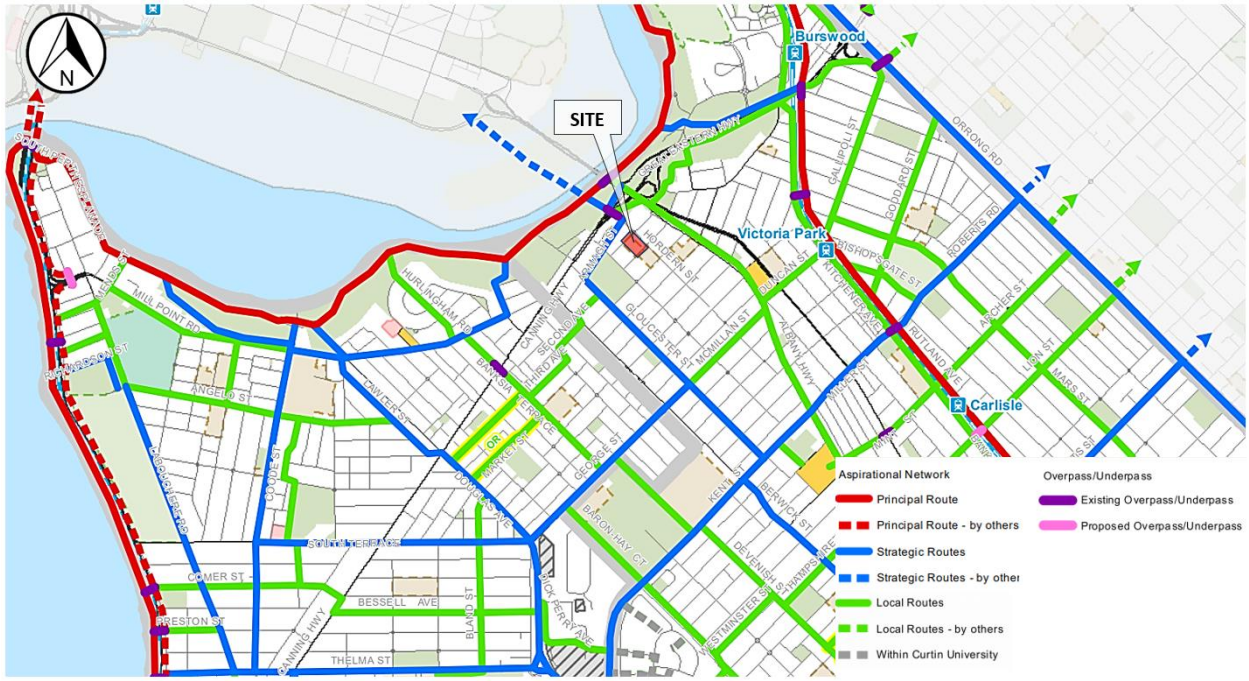
Source: Department of Transport

4.2 Future Pedestrian/Cycling Network

4.2.1 Joint Bike Plan

The Town of Victoria Park and the City of South Perth have taken initiatives to create the state's first joint bike plan, this aims to set out the long-term vision for a strategic cycling network covering both local government areas. This is in line with the State Government's *Perth and Peel @3.5million Transport Plan.* The bike plan outlines a five-year action plan for specific improvements to the cycle network and environment with 13 key infrastructure projects are proposed for delivery. The implementations aim for new cycling and pedestrian friendly networks which would be beneficial for the walkability and accessibility of the site.

Figure 4.2 - Proposed Networks for Cycle Routes

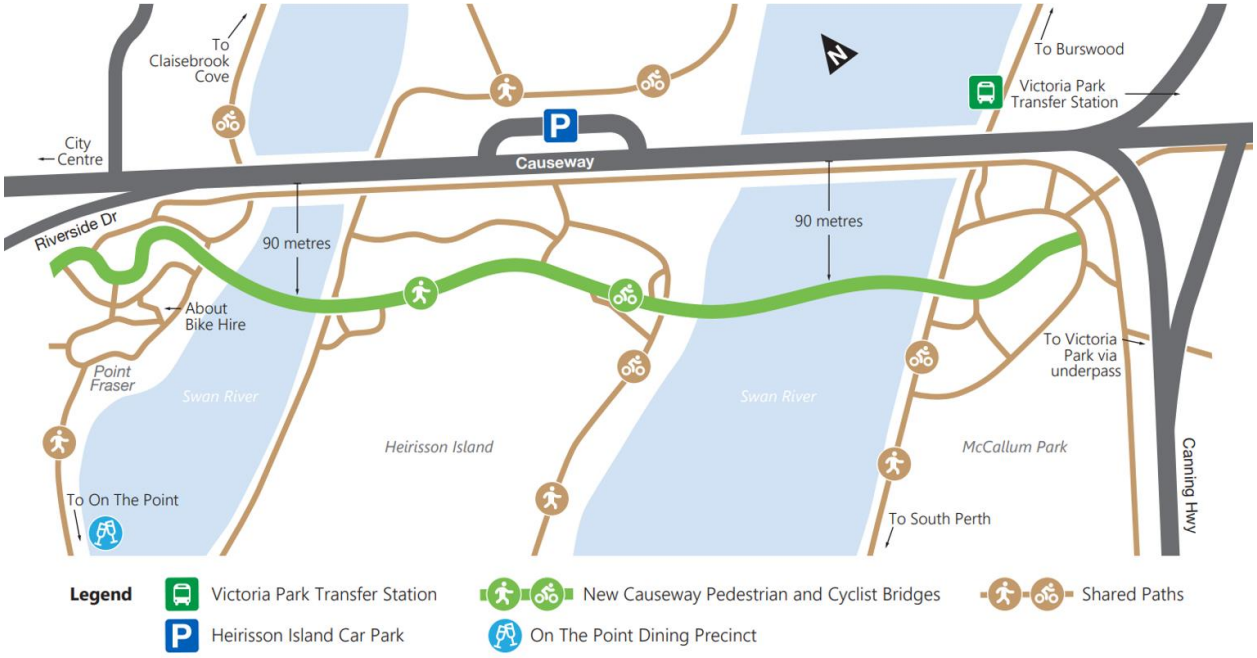


Source: Town of Victoria Park

4.2.2 Causeway Pedestrian and Cyclist Bridge

Main Roads is also in the process in creating a causeway pedestrian and cyclist bridge, which would link Victoria Park to Perth CBD. The new bridge is anticipated to be six metres wide, with dedicated pedestrian and cyclist lanes, **Figure 4.3** shows the Final Alignment and Path Network. It will be connected from Victoria Park foreshore with Heirisson Island and Perth's CBD. Planning and Development started last 2020 up until the end of 2022. Construction started early in 2023 and is expected to be completed towards the end of 2024.

Figure 4.3 – Causeway Pedestrian and Cyclist Bridge



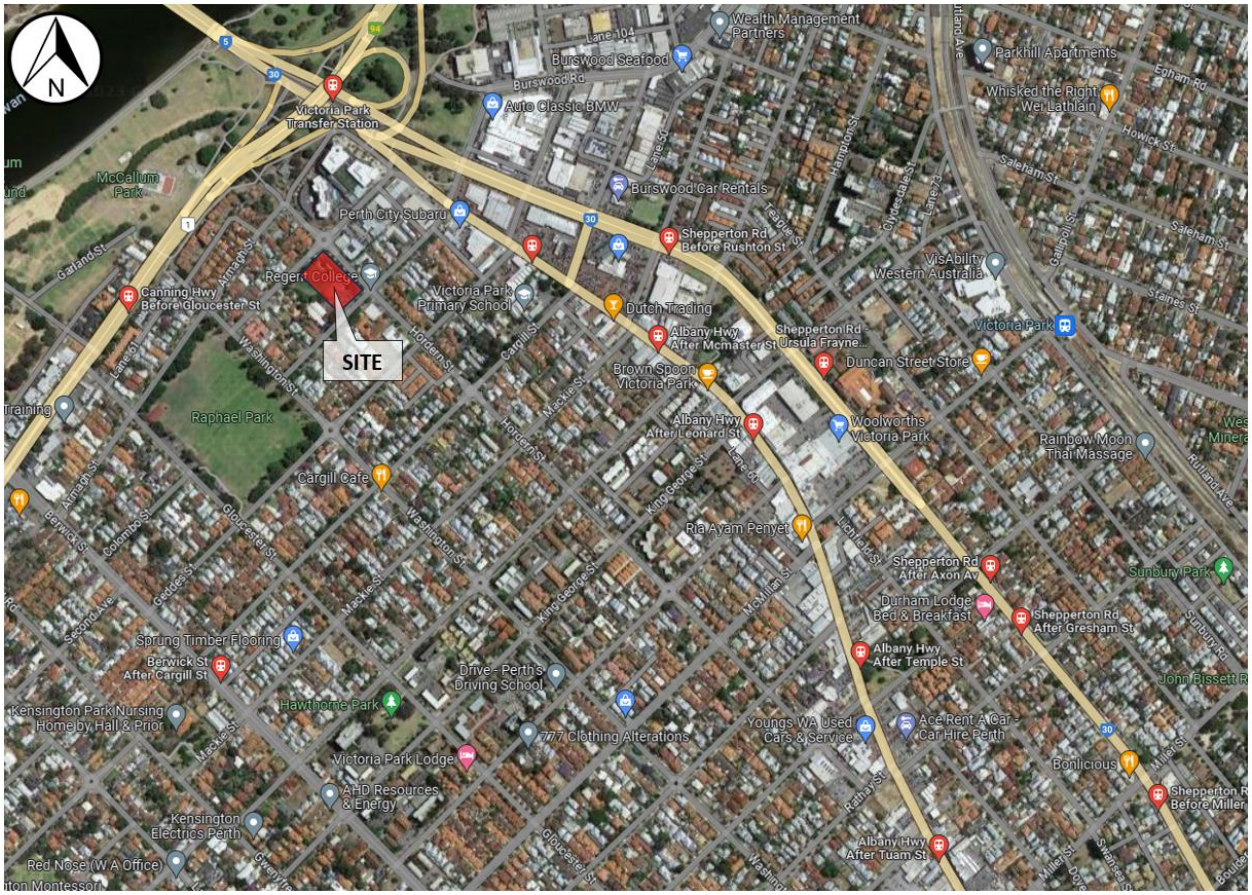
Source: Main Roads WA

5. Public Transport Facilities

5.1 Existing Public Transport Facilities

The closest Transperth bus services to the School are numbers 72,75 which travel from Elizabeth Quay Train Station to Canning Vale Bus Depot as shown in **Figure 5.1**. This bus route services specifically Canning College but bypasses Victoria Park Christian School. The closest bus stop is located along Geddes St Before Hordern St on the North entrance of campus (Stop ID: 11735).

Figure 5.1 - Existing Transperth Bus Stops

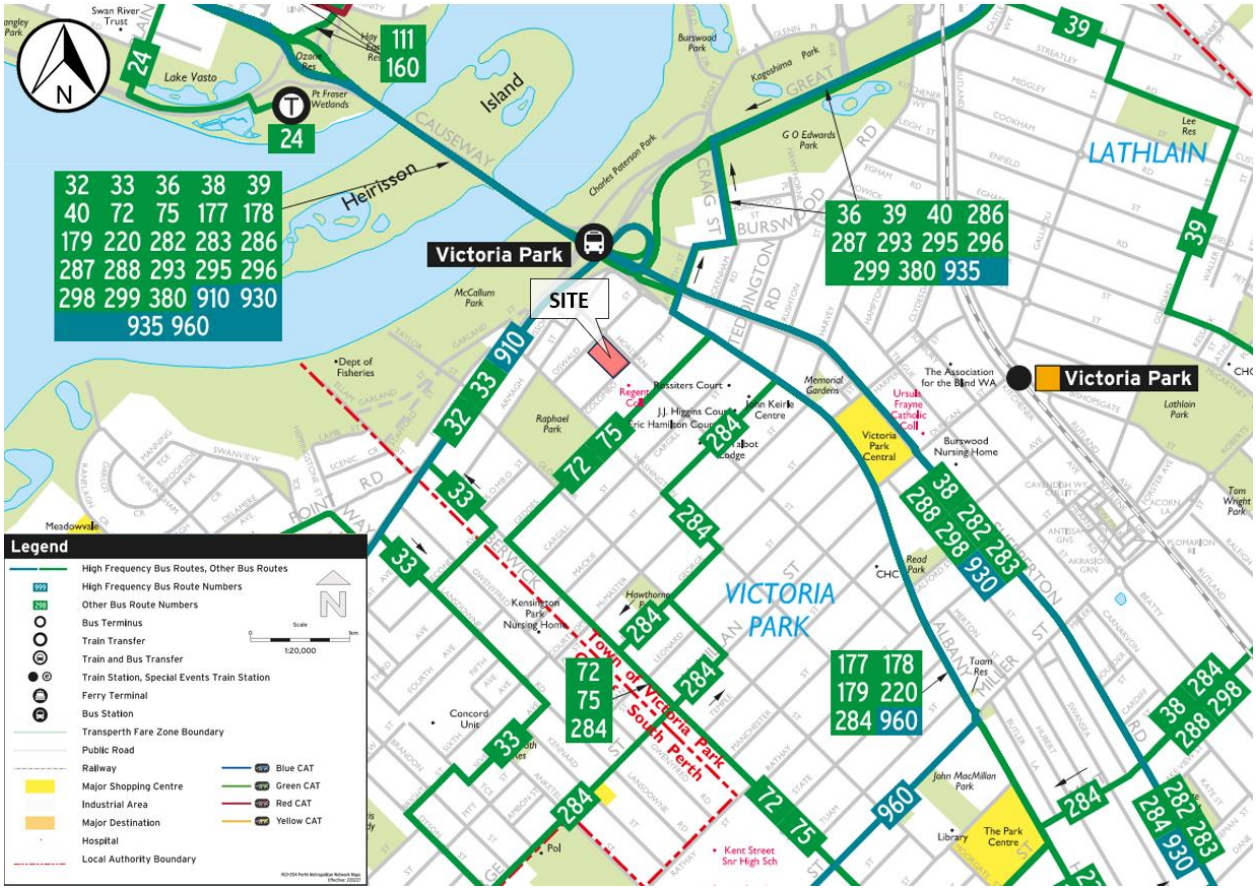


Source: Google Maps (2023)

Routes 177, 178, 179, 220 and 960 also operate nearby and travel to and from various bus ports across the Perth Metropolitan area including Elizabeth Quay Bus Station and Fremantle Station as shown in **Figure 5.2**. The closest bus stop is located along Albany Highway Before Geddes Street on the North entrance of campus (Stop ID: 11733).

Table 5.1 provides a summary of the bus services which operate near the Site and their respective frequencies.

Figure 5.2 - Existing Transperth Networks



Source: Department of Transport

Table 5.1 - Bus Services and Frequency

Bus Service	Weekday Peak	Weekday Off-Peak	Saturday	Sunday & Public Holiday
177 (Cannington Stn – via Albany Hwy & Chapman Rd)	10 – 15 mins	60 mins	60 mins	60 mins
178 (Bull Creek Stn – via Albany Hwy, Shelley & Rossmoyne)	15 – 20 mins	60 mins	60 mins	60 mins
179 (Bull Creek Stn – via Albany Hwy & Riverton Forum Shop Ctr)	25 – 60 mins	60 mins	N/A	N/A
72 (Cannington Stn – via Victoria Park & Curtin University)	10 – 20 mins	20 – 30 mins	60 mins	60 – 90 mins
75 (Canning Vale – via Victoria Park & Curtin University)	30 mins	30 – 60 mins	N/A	N/A
960 (Mirrabooka Bus Stn – Curtin University Bus Stn via Alexander Drive)	10 – 15 mins	10 – 15 mins	15 – 20 mins	15 – 20 mins
220 (Armadale Stn – Kelmscott Stn via Albany Hwy)	60 mins	60 mins	60 mins	60 – 90 mins

The Victoria Park Transfer Station also services a substantial amount of bus services that travel to various parts of Perth. The bus services that transfer through the station that weren't mentioned above include; 37, 286, 287, 293, 36, 40, 39. It is approximately 550 metres from the site, equivalent to a 7 minute walk.

5.2 Future Public Transport Facilities

The PTA have advised that there are no fundamental changes to the public transport services within the surrounding area of the subject Site. The PTA mentioned that the closure of the Armadale / Thornlie line will result in a number of additional supporting bus routes operating through the Victoria Park Transfer Station. The closure commences in November 2023 for a period of approximately 18 months.

There will also be minor expansion works at the Victoria Park Transfer Station with a 7th stand added for capacity.

6. Development Proposal

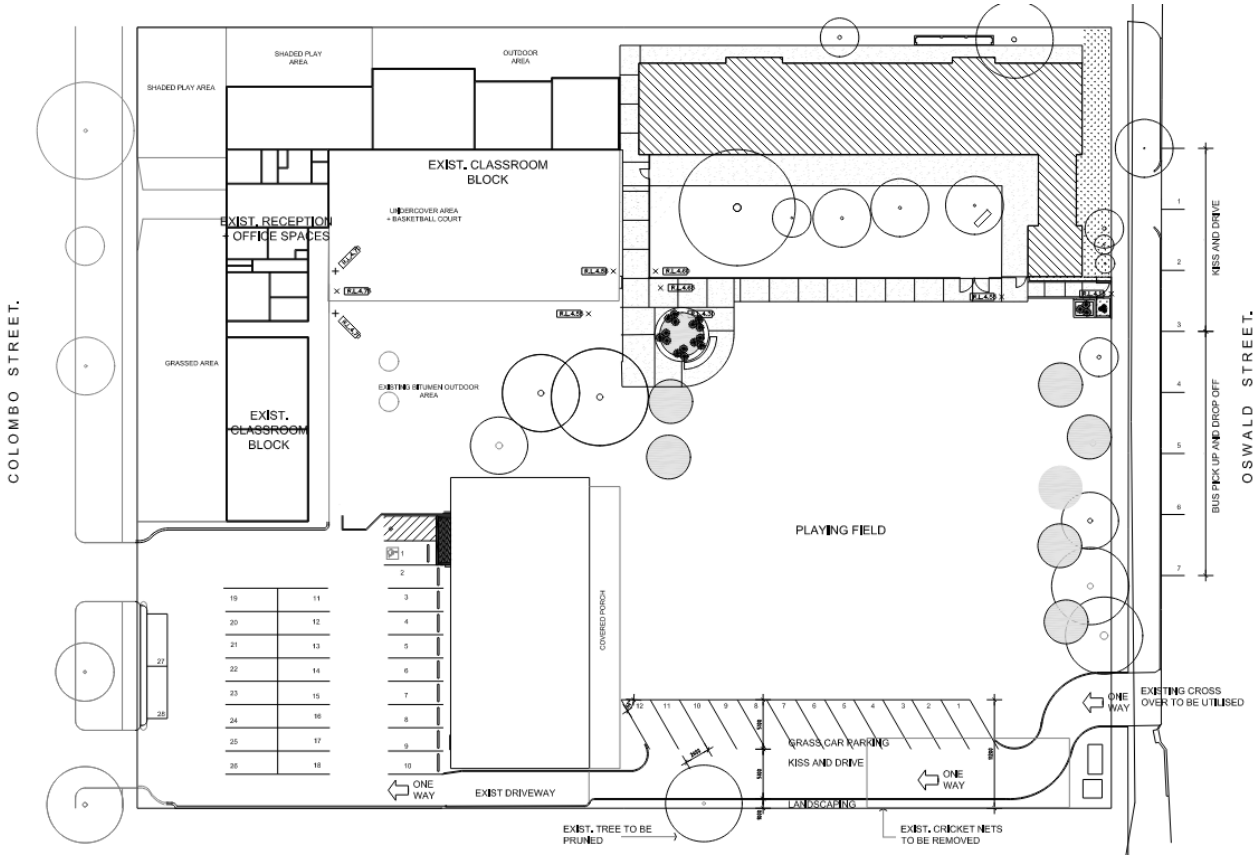
6.1 Proposed Development

The proposed development comprises of the following changes/upgrades:

- An increase in student numbers to 250 students (up from 150 students approved in the previous development application).
- A new drop-off/pick-up area comprising of twelve (12) 60 degree bays aligning the north eastern boundary of the school. A one-way movement arrangement is proposed with the Oswald Street maintenance access being repurposed as the entry to the drop-off/pick-up area and exit via the existing Colombo Street exit.

Figure 6.1 shows the site development layout plan. Higher resolution plans are provided in **Appendix A**.

Figure 6.1 - Site Plan



Source: Matthews & Scavalli Architects

6.2 Access Arrangements

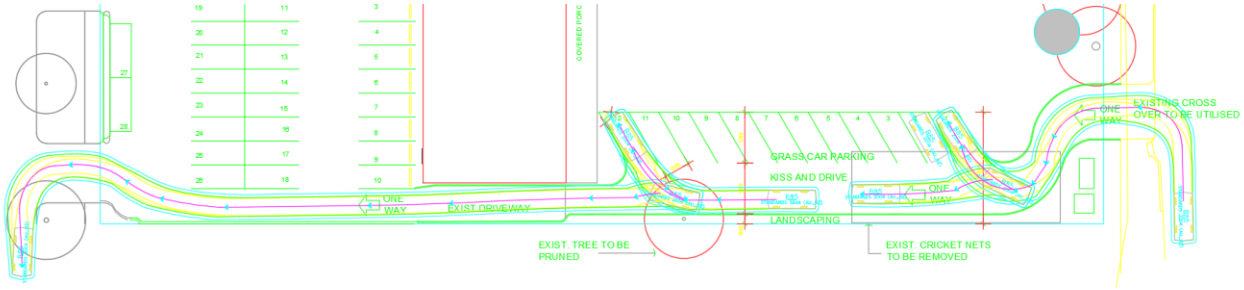
The Site is anticipated to utilise the existing access arrangements as described in **Section 2.4**.

With regards to the drop-off/pick-up area, the maintenance access (Access 3) is proposed to be modified to an entrance only with the exit through Access 2 on Colombo Street.

6.2.1 Swept Paths

A swept path assessment for a standard large car (B85) was conducted for the proposed drop-off/pick-up area as shown in **Figure 6.2** and **Appendix E**. The swept paths shows that the vehicle is able to manoeuvre in and out of the site without issues.

Figure 6.2 – B85 Swept Path



6.3 Car Parking Provision

Car parking requirements are set out in the Town of Victoria Park's *Parking Policy (LPP23)* The parking requirements are calculated in accordance with the following rates:

- Minimum of 14 bays per 100 students, plus staff car parking at a rate of 0.07 per student.

The projected enrolment is increase to 250 students in the long term.

Based on these requirements, the table below provides a summary of the additional parking requirements.

Table 6.1 - Parking Requirements and Provision

Number of Students	Number of bays for parents/visitors	Number of bays for staff	Total bays required
250	35	18	**53**

The proposed parking arrangement is summarised as follows and shown in **Figure 6.3**:

- 31 bays (including 1 ACROD bay) are currently provided on-site. With the inclusion of the drop-off/pick-up area, 3 bays will be removed resulting in a total provision of 28 bays
- The proposed drop-off/pick-up area will provide up to 12 bays additional bays to accommodate morning and afternoon school traffic.
- Informal verge parking available along the southern frontage of the school can accommodate up to 10 cars based on the verge space that is available.
- On-street parking is provided along Oswald Street on the northern school frontage shown in **Figure 6.5** (3 car bays with 4 bays to be converted for bus use). During the morning and afternoon school peaks, the parking duration for the car bays is restricted to 15 mins to encourage parking turnover.
- This accounts for a total provision of approximately 53 bays (40 on-site, 3 on-street and 10 verge).

Figure 6.3 - Parking Arrangement for the Site

Figure 6.4 - Verge Parking along the School Frontage (Colombo Street)

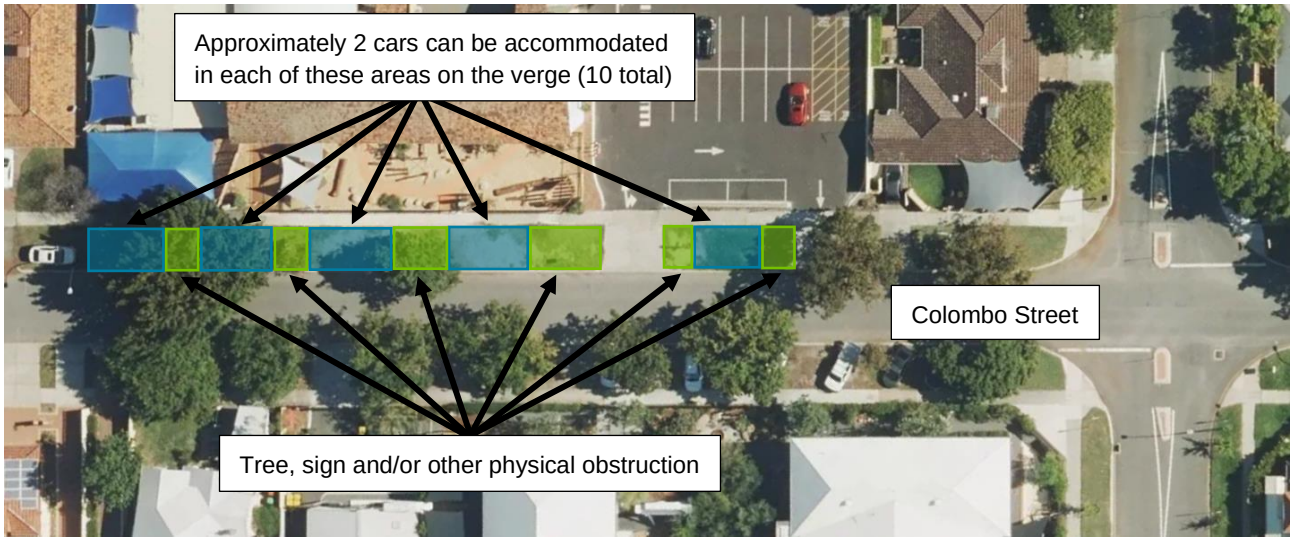
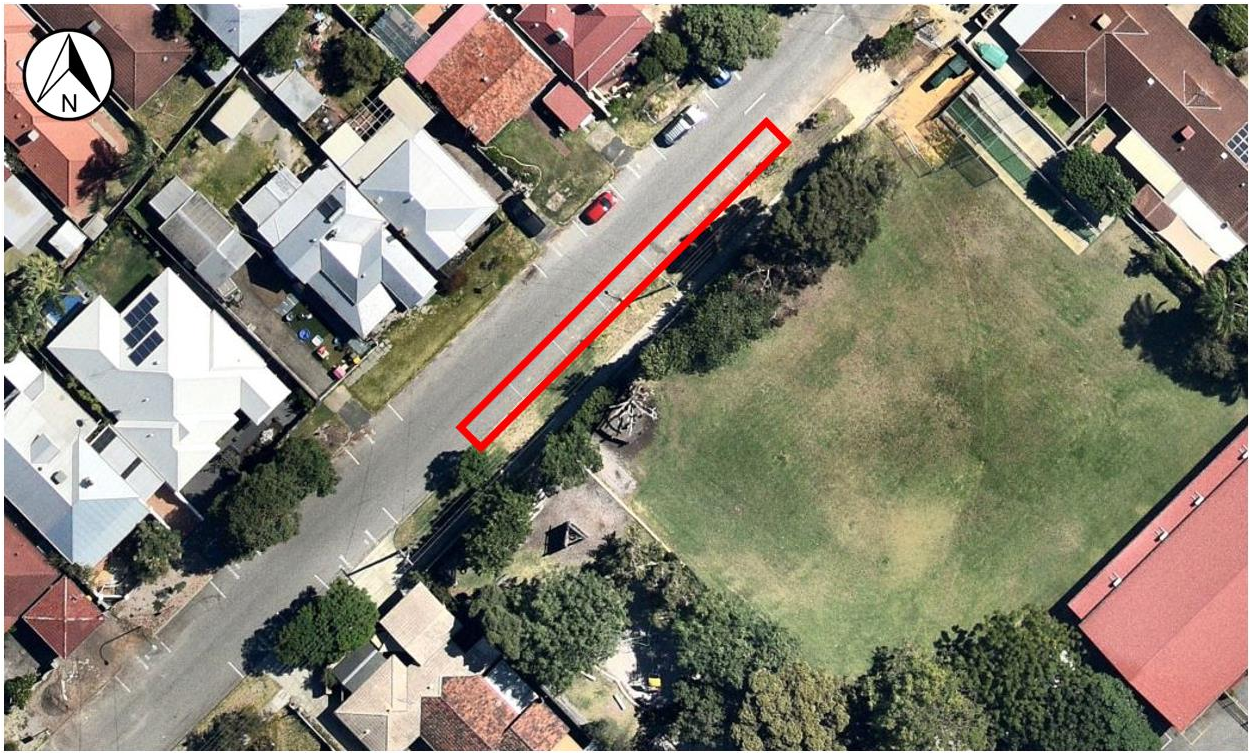


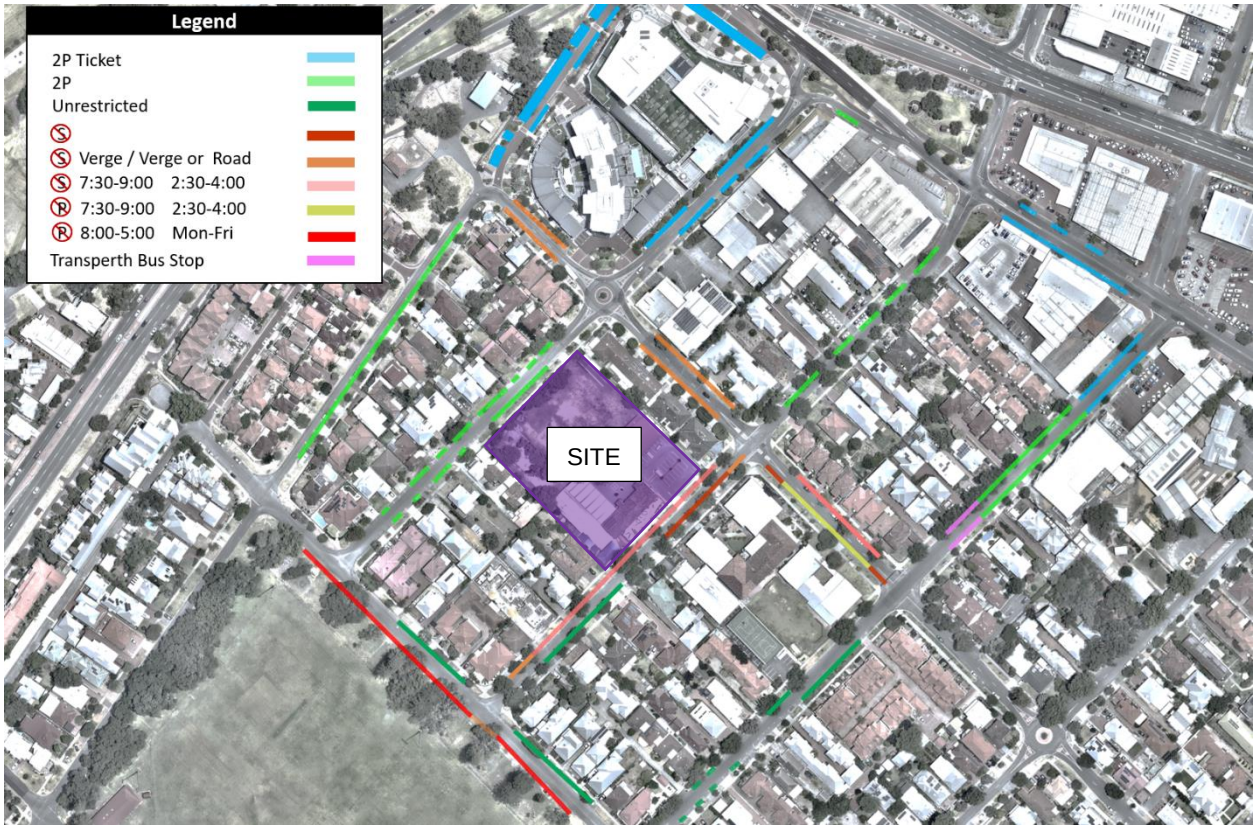
Figure 6.5 - On-street Parking along School Frontage (Oswald Street)



Based on the statutory requirements, there will be a shortfall of 12 parking bays on-site. However, the availability of on-street parking is also available on all nearby local road within the surrounding area with varying time limits and fees.

Figure 6.6 shows the available parking within a 200m radius of the School (and included in **Appendix D**).

Figure 6.6 - Parking within 200m of the School



Additionally, the parking demand from the school is likely to be lower due to the following:

- The school operates a private bus service to transport students to and from school. Approximately 32 students currently use this service (which is approximately 21% of the current student population). It is assumed that the same proportion of students will also use the private bus service in the future i.e. for a future student population of 250, approximately 54 students are estimated to use the private bus service. This can be accommodated with approximately 3 buses with a seating capacity of 24 people per bus.

  Families are required to pay an upfront fee for their child/children to use the private bus service ($2,300 per student per year) which incentivises families to use this service as much as possible.
- Bike parking for staff and students is provided by the school (approximately 10 bike bays) though the demand is anticipated to be low. Approximately 10 students walk/cycle/scooter to school which accounts for approximately 7% of the current student population.
- Families with multiple children attending the same school will generate less traffic as these students will likely be dropped-off/picked-up by a single vehicle. Based on the information provided by the School, 20 out of the 127 families (approx. 16%) have 2 or more children attending the school which represents a sizable volume of reduced vehicle trips.
- Short pick-up/drop-offs will be fairly common resulting in a higher turnover of parking.

Given the availability of existing and proposed parking on the school site and immediately adjacent to the School as well as initiatives aimed at reducing parking demand (e.g. the private bus service and cycling facilities), the current parking arrangement would be sufficient enough to accommodate the increase in student numbers. Note that the demand for parking for the school typically occurs within a 30-minute timeframe in the morning and afternoon pick-up/drop-off periods with zero demand from the school outside these periods.

6.4 Service/Delivery Vehicles

Service and delivery vehicles for the school is not likely to change.

6.5 Traffic Management

6.5.1 Pick-up/Drop-off Area

The new drop-off/pick-up facility provides a total of 12 additional bays and should consider the following management measures to improve overall operation:

- Implementing time limits to ensure parents are aware that this area is intended to be for pick-up/drop-off only and parking for long periods is prohibited.
- Assigning staff to monitor the kiss and drop area during mornings and afternoons to ensure that parents are not parking for long periods and for student safety.
- Informing parents on the operating procedures of drop-off/pick-up area (via fliers and/or posts on school website/newsletter)

6.5.2 Buses

The following section provides a summary on the private bus service operation:

- Prior to the start of school, the school bus travels to the designated locations to pick up students.
- After picking up the students, the bus travels to the school and drops them off at the designated bus bays located on Oswald Street.
- During afternoons, before the end of school, the buses park and wait at the designated bays located on Oswald Street. After school finishes, students begin entering the bus.
- When all students have been accounted for, the bus leaves to drop off students back home or at the designated drop off location.

7. Integration with Surrounding Area

7.1 Surrounding Major Attractors/Generators

The major attractors and generators surrounding the development are shown in **Figure 7.1**. Key attractors and generators include;

- Victoria Park Primary School and Regent College
- Various parks and reserves including McCallum Park, Raphael Park and Taylor Reserve
- The commercial and retail strip along Distributor B road (along Albany Highway)

Figure 7.1 - Major Attractors/Generators

Source: Matthews & Scavalli Architects

7.2 Proposed Changes to the Surrounding Land Uses

Based on current available information, there does not appear to be any significant changes to the land uses within the surrounding area of the Site.

8. Analysis of Transport Network

8.1 Assessment Years and Time Period

Peak times selected are 8:00am-9:00am and 4:00pm-5:00pm respectively for the morning and afternoon peak periods, which are the peak times identified from the supplied traffic counts.

School peak traffic generation is generally in the period of 8:30am-9:00am and 3:00pm-3:30pm, which corresponds to the class start and finish times.

For the purpose of this assessment, the school peak and background traffic peak is assumed to coincide which would represent the worst-case scenario.

The following model scenarios have been analysed as part of the assessment:

- Scenario 1 – Background 2023;
- Scenario 2 – Background 2025 (assumed opening year) + Development Traffic (104 additional students); and

- Scenario 3 – Background 2035 (10-year horizon) + Development Traffic (104 additional students).

For the purpose of this assessment, a 1% growth rate has been adopted for the background traffic growth which is consistent with the average traffic growth across all roads within metropolitan Perth.

8.2 Traffic Generation

Trip generation has been calculated for the proposed development utilising trip generation rates from the *Institute of Transportation Engineers (ITE) "Trip Generation" 10th Ed*. The following tables explain the directional distribution and total trip generation of the development.

Table 8.1 provides the trip generation rate during the AM and PM peak hours and **Table 8.2** states the total trip generation for the proposed development.

Table 8.1 - Trip Generation Rate - Peak Hour Generator

Land Use	ITE Code/Source	AM Peak	PM Peak
School	WAPC	IN: 0.5 trip per student OUT: 0.5 trip per student	IN:0.5 trip per student OUT: 0.5 trip per student

Table 8.2 - Total Trip Generation

Land Use	AM Peak		PM Peak	
	IN	OUT	IN	OUT
School (additional 104 students, total 250 students)	52	52	52	52

The proposed development represents a trip generation of approximately 104 vehicles during the AM and PM peak for 104 additional students. Note that the actual traffic generated is likely to be lower given that a proportion of students use the private bus service operated by the school or walk/cycle if they live nearby. In addition, some families will have multiple children enrolled in the school (based on the information provided from the school there are 127 families for a 149 student population) resulting in a lower number of vehicle trips as these students will travel together in a single vehicle.

8.3 Development Traffic Distribution and Assignment

Based on a traffic survey conducted at both Oswald Street/Hordern Street and Colombo Street/Hordern Street intersections, a majority of traffic to travelling to/from Albany Highway and Shepperton Road.

Figure 8.1 shows existing traffic volumes including the proportion of traffic travelling to/from the school.

Figure 8.1 - Existing Traffic Volumes and Distribution in the School

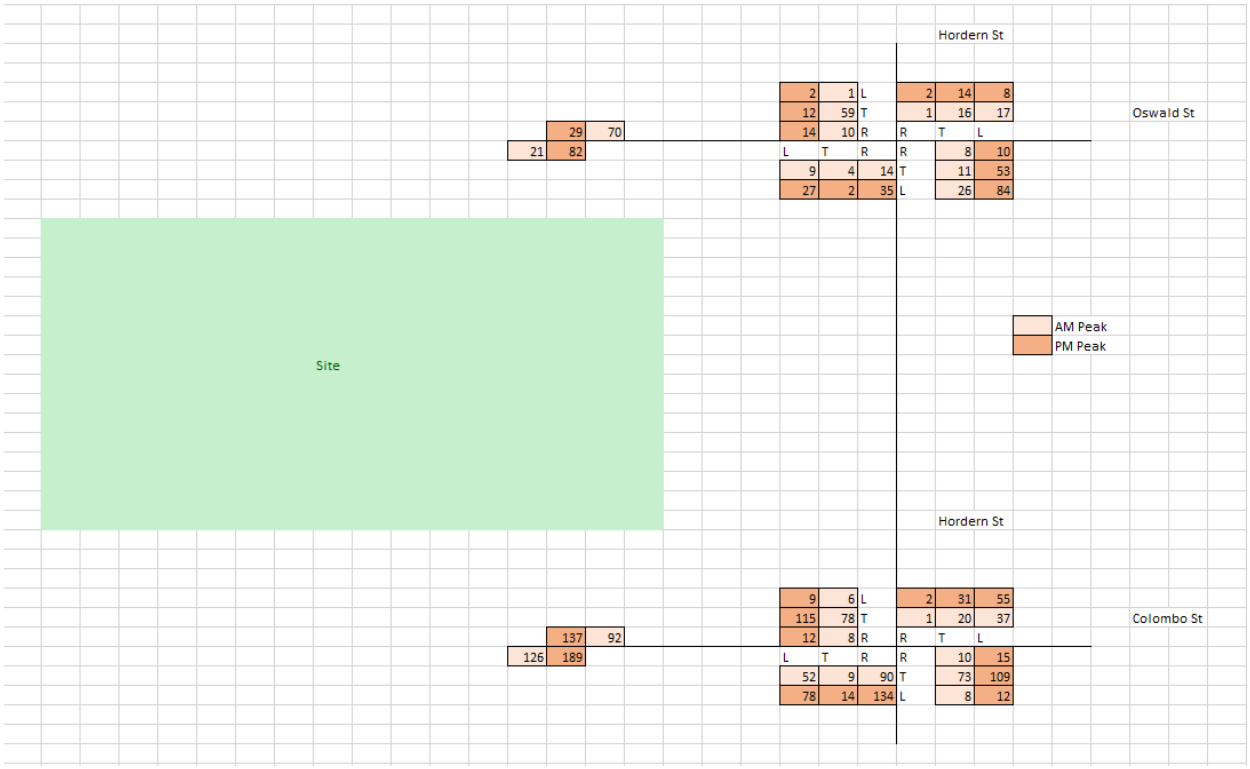


Figure 8.2 and **Figure 8.3** shows the traffic distribution within the network with the addition of development traffic for Scenarios 2 and 3 respectively.

Figure 8.2 - Background 2025 (assumed opening year) + Development Traffic (104 additional students)

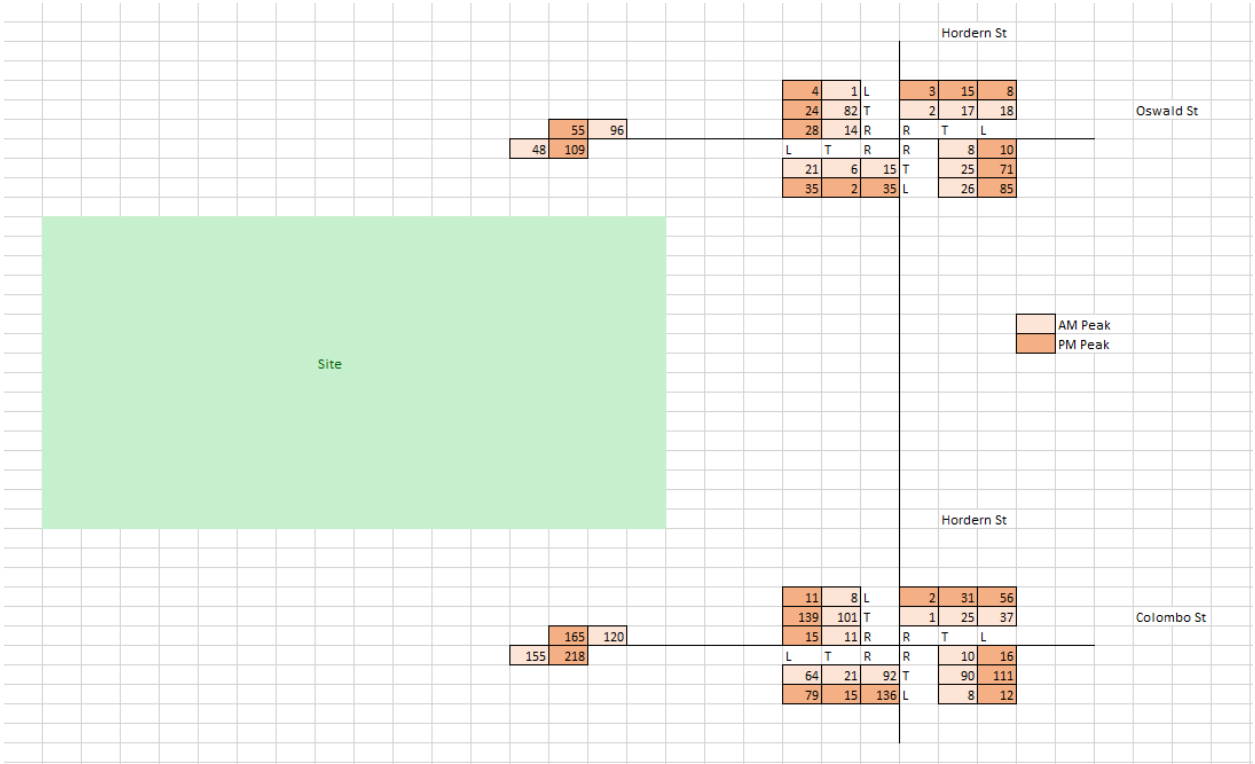
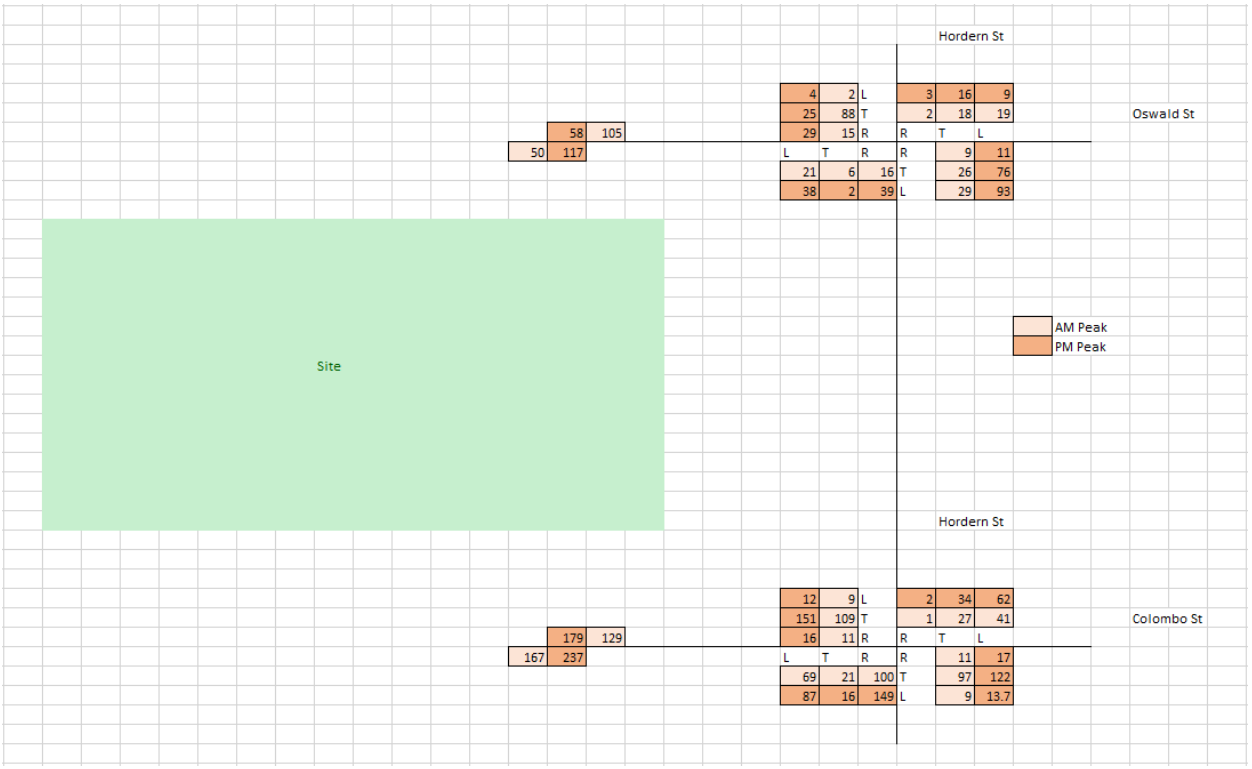


Figure 8.3 - Background 2035 (10-year horizon) + Development Traffic (104 additional students)



8.4 Transport Analysis Assumptions

A list of the assumptions is summarised below:

- Surveys were unable to be conducted for the Hordern Street/Colombo Street intersection for the PM peak period due to construction works which resulted in the closure of the north-eastern approach during the survey period (Refer to **Figure 8.4**). Therefore, the following proposed was used to determine the estimated PM peak volumes at this intersection:
  - The AM and PM peak period volumes were compared Oswald Street/Hordern Street intersection to determine the proportional difference between the two peak periods.
  - This factor is then used to scale the AM peak period volumes at the Hordern Street/Colombo Street intersection to provide an estimate of the PM period volumes.

Figure 8.4 - Hordern Street/Colombo Street Intersection North Eastern Approach Closure

- For the purpose of this assessment, it is assumed that the initial 104 student increase will occur when the proposed building upgrades are complete (Scenario 2) and is assumed to be constant for 10 years after the proposed building upgrades (Scenario 3). This aligns with the WAPC guidelines (which requires a post development assessment 10 years after full opening) as well as provides a robust assessment of the surrounding road network.
- Although the approaches to the stop line (of the Hordern Street/Colombo Street intersection) are only a single lane, the width at the edge allows for 2 vehicles to wait behind the stop line. To model this arrangement, a short "left turn lane" has been included for left turning vehicles to provide a more accurate representation of what will generally occur at these approaches.
- For the purpose of this assessment, a 1% growth rate has been adopted for the background traffic growth which is consistent with the average traffic growth across all roads within metropolitan Perth.
- Heavy vehicle percentages were obtained from the Main Roads WA Traffic Map.

8.5 Intersection Performance

SIDRA analysis for the 30-minute school peak was undertaken at the following intersection to estimate the impact of the school generated traffic on the surrounding transport network:

- Oswald Street/Hordern Street Intersection; and
- Hordern Street/Colombo Street Intersection.

The visitor parking accesses have not been assessed as traffic entering and exiting this area is not expected to increase. The proposed expansion of the visitor pick-up/drop-off area effectively increases its traffic and queuing capacity.

SIDRA results for each approach are presented below in the form of Degree of Saturation (DOS), Average Delay, Level of Service (LOS) and 95th Percentile Queue. These characteristics are defined as follows:

- Degree of Saturation (DOS): is the ratio of the arrival traffic flow to the capacity of the approach during the same period. The DOS for an un-signalized intersection is considered critical where DOS > 0.80;
- 95th percentile Queue: is the statistical estimate of the queue length up to or below which 95% of all observed queues would be expected;
- Average Delay: is the average of all travel time delays for vehicles through the intersection; and
- Level of Service (LOS): is the qualitative measure describing operational conditions within a traffic stream and the perception by motorists and/or passengers. The different levels of service can generally be described as shown in **Table 8.3**.

Table 8.3 - Level of Service (LOS) Performance Criteria

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

Full SIDRA outputs are also provided in **Appendix C**.

8.5.1 Oswald Street/Hordern Street Intersection

- The results of the analysis of the Oswald Street/Hordern Street intersection for all scenarios is presented and summarised in this section. **Figure 8.5** is a SIDRA layout representation of the intersection. **Table 8.4**, **Table 8.5** and

Table 8.6 shows the results of the analysis.

Figure 8.5 - SIDRA Layout for Oswald Street/Hordern Street Intersection

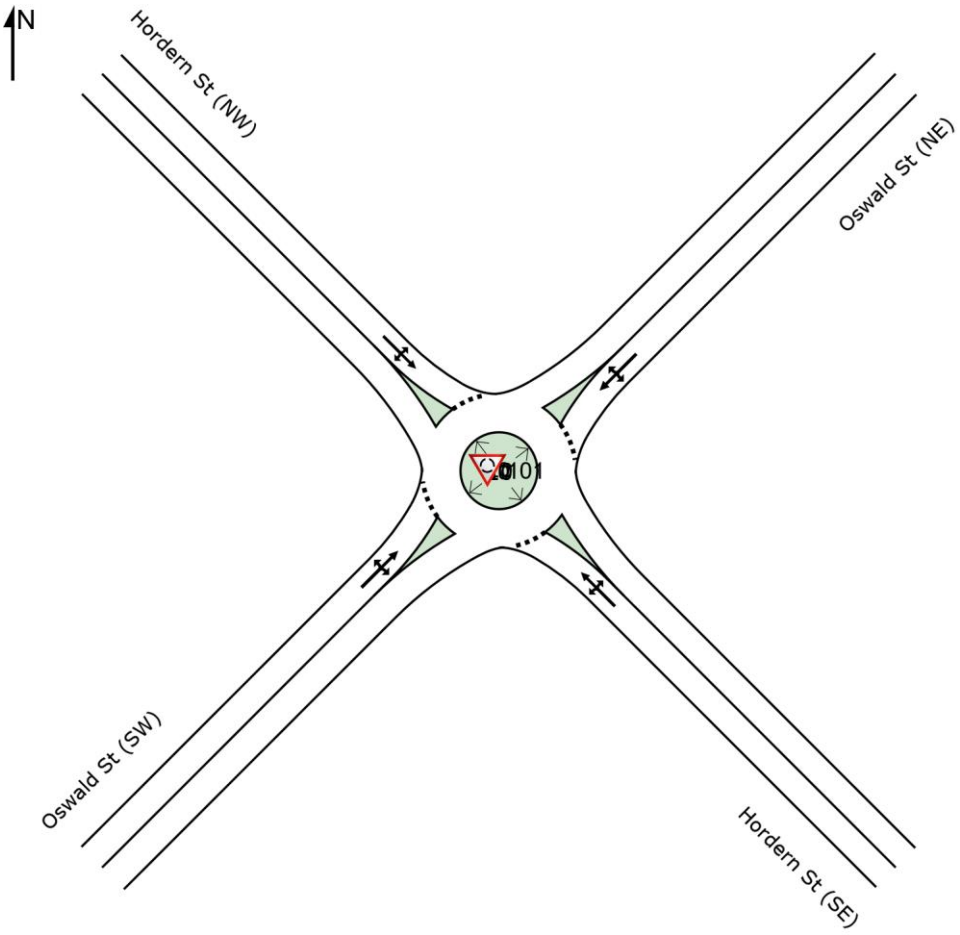


Table 8.4 - SIDRA Layout for Oswald Street/Hordern Street Intersection – Scenario 1

Intersection Approach		Background 2023 AM				Background 2023 PM			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
Hordern St (SE)	L	0.023	4.7	A	0.8	0.058	5	A	2.2
	T	0.023	4.8	A	0.8	0.058	5.1	A	2.2
	R	0.023	8.1	A	0.8	0.058	8.4	A	2.2
Oswald St (NE)	L	0.038	4.8	A	1.4	0.117	4.8	A	4.5
	T	0.038	4.9	A	1.4	0.117	4.9	A	4.5
	R	0.038	8.1	A	1.4	0.117	8.2	A	4.5
Hordern St (NW)	L	0.031	5.2	A	1.2	0.022	5	A	0.8
	T	0.031	5.3	A	1.2	0.022	5.1	A	0.8
	R	0.031	8.5	A	1.2	0.022	8.4	A	0.8
Oswald St (SW)	L	0.057	4.8	A	2.1	0.025	4.9	A	0.9
	T	0.057	4.9	A	2.1	0.025	5	A	0.9
	R	0.057	8.1	A	2.1	0.025	8.3	A	0.9
All Vehicles		0.057	5.5	A	2.1	0.117	5.7	A	4.5

Table 8.5 - SIDRA Layout for Oswald Street/Hordern Street Intersection – Scenario 2

Intersection Approach		Background 2025 + Dev (AM)				Background 2025 + Dev (PM)			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
Hordern St (SE)	L	0.037	4.8	A	1.4	0.067	5.2	A	2.6
	T	0.037	4.9	A	1.4	0.067	5.3	A	2.6
	R	0.037	8.2	A	1.4	0.067	8.5	A	2.6
Oswald St (NE)	L	0.05	4.9	A	1.8	0.137	4.9	A	5.4
	T	0.05	4.9	A	1.8	0.137	5	A	5.4
	R	0.05	8.2	A	1.8	0.137	8.3	A	5.4
Hordern St (NW)	L	0.035	5.4	A	1.3	0.024	5.2	A	0.9
	T	0.035	5.5	A	1.3	0.024	5.3	A	0.9
	R	0.035	8.7	A	1.3	0.024	8.6	A	0.9
Oswald St (SW)	L	0.079	4.8	A	2.9	0.049	5	A	1.8
	T	0.079	4.9	A	2.9	0.049	5	A	1.8
	R	0.079	8.2	A	2.9	0.049	8.3	A	1.8
All Vehicles		0.079	5.5	A	2.9	0.137	5.8	A	5.4

Table 8.6 - SIDRA Layout for Oswald Street/Hordern Street Intersection – Scenario 3

Intersection Approach		Background 2035 + Dev (AM)				Background 2035 + Dev (PM)			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
Hordern St (SE)	L	0.038	4.8	A	1.4	0.074	5.2	A	2.9
	T	0.038	4.9	A	1.4	0.074	5.3	A	2.9
	R	0.038	8.2	A	1.4	0.074	8.6	A	2.9
Oswald St (NE)	L	0.052	4.9	A	1.9	0.148	5	A	5.9
	T	0.052	4.9	A	1.9	0.148	5	A	5.9
	R	0.052	8.2	A	1.9	0.148	8.3	A	5.9
Hordern St (NW)	L	0.038	5.4	A	1.4	0.026	5.2	A	1
	T	0.038	5.5	A	1.4	0.026	5.3	A	1
	R	0.038	8.8	A	1.4	0.026	8.6	A	1
Oswald St (SW)	L	0.085	4.8	A	3.2	0.052	5	A	1.9
	T	0.085	4.9	A	3.2	0.052	5.1	A	1.9
	R	0.085	8.2	A	3.2	0.052	8.3	A	1.9
All Vehicles		0.085	5.5	A	3.2	0.148	5.9	A	5.9

Based on the above, the SIDRA results show that this intersection will operate at an acceptable level of service for all scenarios.

8.5.2 Hordern Street/Colombo Street Intersection

The results of the analysis of the Hordern Street/Colombo Street intersection for all scenarios is presented and summarised in this section. **Figure 8.6** is a SIDRA layout representation of the intersection. **Table 8.7**, **Table 8.8** and **Table 8.9** shows the results of the analysis.

Figure 8.6 - SIDRA Layout for Hordern Street/Colombo Street Intersection

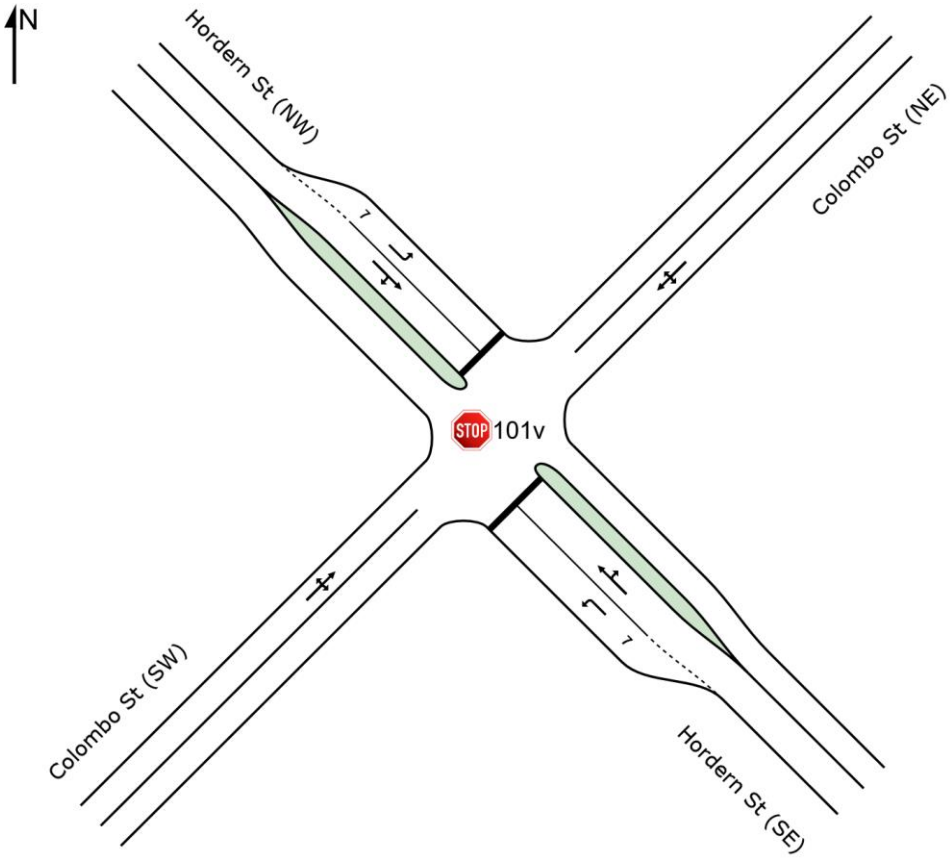


Table 8.7 - SIDRA Layout for Hordern Street/Colombo Street Intersection – Scenario 1

Intersection Approach		Background 2023 (AM)				Background 2023 (PM)			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
Hordern St (SE)	L	0.042	8.6	A	1.2	0.066	8.8	A	1.9
	T	0.137	9	A	3.6	0.238	9.8	A	6.6
	R	0.137	9.8	A	3.6	0.238	11.1	B	6.6
Colombo St (NE)	L	0.052	5.6	A	0.6	0.078	5.6	A	1
	T	0.052	0	A	0.6	0.078	0	A	1
	R	0.052	6.4	A	0.6	0.078	6.9	A	1
Hordern St (NW)	L	0.03	8.5	A	0.9	0.047	8.7	A	1.4
	T	0.024	8.8	A	0.6	0.042	9.5	A	1.1
	R	0.024	9.7	A	0.6	0.042	10.8	B	1.1
Colombo St (SW)	L	0.052	5.6	A	0.5	0.078	5.6	A	0.8
	T	0.052	0	A	0.5	0.078	0	A	0.8
	R	0.052	6.3	A	0.5	0.078	6.8	A	0.8
All Vehicles		0.137	5.4	A	3.6	0.238	5.8	A	6.6

Table 8.8 - SIDRA Layout for Hordern Street/Colombo Street Intersection – Scenario 2

Intersection Approach		Background 2025 (AM) + Dev				Background 2025 (PM) + Dev			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
Hordern St (SE)	L	0.053	8.7	A	1.6	0.067	8.8	A	2
	T	0.163	9.4	A	4.4	0.254	10.2	B	7.1
	R	0.163	10.3	B	4.4	0.254	11.6	B	7.1
Colombo St (NE)	L	0.062	5.6	A	0.6	0.08	5.6	A	1
	T	0.062	0	A	0.6	0.08	0	A	1
	R	0.062	6.7	A	0.6	0.08	7.1	A	1
Hordern St (NW)	L	0.031	8.6	A	0.9	0.049	8.8	A	1.4
	T	0.031	9.1	A	0.8	0.044	9.7	A	1.1
	R	0.031	10.3	B	0.8	0.044	11.1	B	1.1
Colombo St (SW)	L	0.068	5.6	A	0.7	0.094	5.6	A	1
	T	0.068	0	A	0.7	0.094	0	A	1
	R	0.068	6.6	A	0.7	0.094	6.9	A	1
All Vehicles		0.163	5.3	A	4.4	0.254	5.8	A	7.1

Table 8.9 - SIDRA Layout for Hordern Street/Colombo Street Intersection – Scenario 3

Intersection Approach		Background 2035 (AM) + Dev				Background 2035 (PM) + Dev			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
Hordern St (SE)	L	0.058	8.7	A	1.7	0.075	8.8	A	2.2
	T	0.18	9.6	A	4.9	0.292	10.7	B	8.9
	R	0.18	10.5	B	4.9	0.292	12.4	B	8.9
Colombo St (NE)	L	0.067	5.6	A	0.7	0.088	5.6	A	1.1
	T	0.067	0	A	0.7	0.088	0	A	1.1
	R	0.067	6.8	A	0.7	0.088	7.3	A	1.1
Hordern St (NW)	L	0.035	8.7	A	1	0.055	8.9	A	1.6
	T	0.034	9.3	A	0.9	0.049	9.9	A	1.3
	R	0.034	10.5	B	0.9	0.049	11.5	B	1.3
Colombo St (SW)	L	0.073	5.6	A	0.7	0.102	5.6	A	1.1
	T	0.073	0	A	0.7	0.102	0	A	1.1
	R	0.073	6.7	A	0.7	0.102	7	A	1.1
All Vehicles		0.18	5.4	A	4.9	0.292	6	A	8.9

The SIDRA results show that this intersection will operate at an acceptable level of service for all scenarios. Furthermore, the introduction of the pick-up/drop-off area will result in the school traffic being more evenly dispersed across the road network. This is especially beneficial for Colombo Street which currently accommodates traffic from both the Victoria Park Christian School and Regent College. The redirection of inbound school traffic through Oswald Street eases the traffic burden on Colombo Street.

Queuing at the proposed pick-up/drop-off area back onto Oswald Street is also a potential risk during the morning and afternoon peak periods.

- A well managed pick-up/drop-off area can significantly improve traffic efficiency and reduces the risk of queuing (**Section 6.5** provides a number of traffic management measures that can be considered). The staff member(s) that are assigned to monitor the drop-off/pick up area should also direct drivers to exit and circulate back around the site when all bays within the drop-off/pick up area are occupied to mitigate queuing.
- The traffic impacts associated with the school are generally over a short period of time (approximately 20-30 min) during the morning and afternoon. Outside of these specific periods, traffic volumes will be low with little risk of queuing.

9. Summary and Conclusions

This TIA assesses the proposed expansion of Victoria Park Christian School ("the Site") located on Colombo Street in Town of Victoria Park.

The following conclusions can be drawn from the TIA:

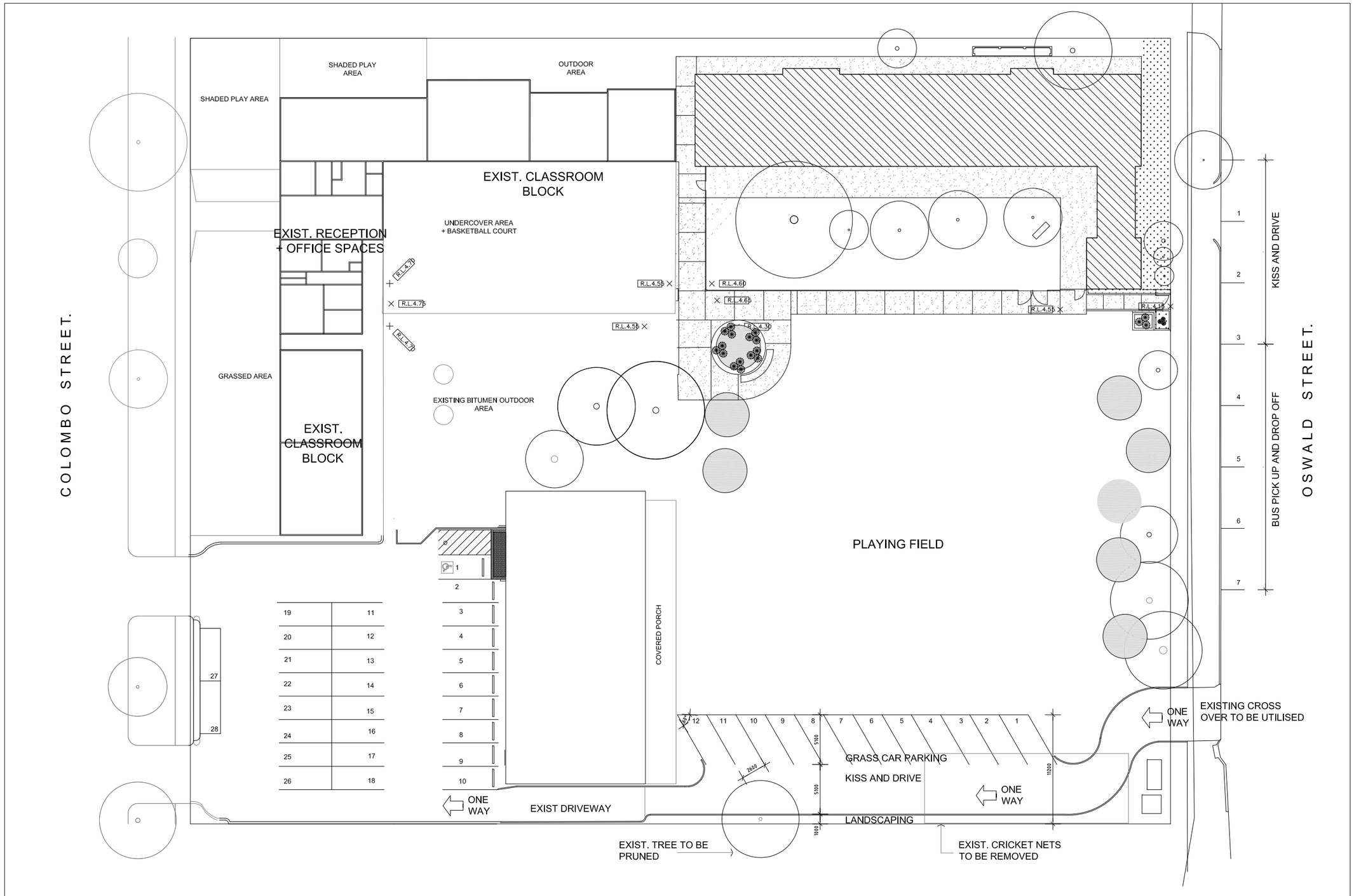
- The proposed development comprises of upgrades to existing building and the provision of new school buildings.
- Public transport is considered to be excellent as the School is well serviced by local and school bus services.
- Walking and cycling within the surrounding area is considered to be excellent with easily accessible high quality shared paths.
- The SIDRA assessment shows that the nearby intersections will operate at an acceptable level of service for all scenarios analysed.
- Given the availability of parking within the surrounding area of the School as well as initiatives aimed at reducing parking demand (e.g. the private bus service and cycling facilities), the current parking arrangement would be sufficient enough to accommodate the increase in student numbers.
- Overall, the number of crashes occurring near the Site is low.

Appendix A. WAPC Checklist

Item	Provided	Comments/Proposals
Summary		
Introduction/Background		
name of applicant and consultant	Section 1	
development location and context	Section 2	
brief description of development proposal	Section 2	
key issues	Section 2	
Background information	Section 1	
Existing situation		
existing site uses (if any)	Section 2	
existing parking and demand (if appropriate)	Section 2	
existing access arrangements	Section 2	
existing site traffic	Section 3	
surrounding land uses	Section 2	
surrounding road network	Section 3	
traffic management on frontage roads	NA	
traffic flows on surrounding roads (usually am and pm peak hours)	Section 2	
traffic flows at major intersections (usually am and pm peak hours)	Section 2	
operation of surrounding intersections	Section 8	
existing pedestrian/cycle networks	Section 4	
existing public transport services surrounding the development	Section 5	
Crash data	Section 3	
Development proposal		
regional context	Section 6	
proposed land uses	Section 6	
table of land uses and quantities	Section 6	
access arrangements	Section 6	
parking provision	Section 6	

end of trip facilities	N/A	
any specific issues	N/A	
road network	N/A	
intersection layouts and controls	Section 5	
pedestrian/cycle networks and crossing facilities	NA	
public transport services	Section 5	
Integration with surrounding area	Section 7	
surrounding major attractors/generators	Section 7	
committed developments and transport proposals	N/A	
proposed changes to land uses within 1200 metres	Section 7	
travel desire lines from development to these attractors/generators	N/A	
adequacy of existing transport networks	Section 6	
deficiencies in existing transport networks	N/A	
remedial measures to address deficiencies	N/A	
Analysis of transport networks		
assessment years	Section 8	
time periods	Section 8	
development generated traffic	Section 8	
distribution of generated traffic	Section 8	
parking supply & demand	Section 8	
base and "with development" traffic flows	Section 8	
analysis of development accesses	Section 8	
impact on surrounding roads	Section 8	
impact on intersections	Section 8	
impact on neighbouring areas	Section 8	
traffic noise and vibration	N/A	
road safety	N/A	
public transport access	Section 5	
pedestrian access / amenity	Section 4	
cycle access / amenity	Section 4	
analysis of pedestrian / cycle networks	Section 4	
safe walk/cycle to school (for residential and school site developments only)	N/A	
Traffic management plan (where appropriate)	N/A	

Appendix B. Site Plans



VICTORIA PARK CHRISTIAN SCHOOL COLOMBO ST VICTORIA PARK

PROPOSED NEW CARPARK

SEPT 2023 SCALE 1:400 @ A3

N

MATTHEWS & SCAVALLI ARCHITECTS

Appendix C. SIDRA Results

MOVEMENT SUMMARY

Site: 101 [S1-Oswald St/Hordern St AM (Site Folder: Scenario 1)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Hordern St (SE)															
21	L2	All MCs	9	6.0	9	6.0	0.023	4.7	LOS A	0.1	0.8	0.11	0.58	0.11	47.8
22	T1	All MCs	4	6.0	4	6.0	0.023	4.8	LOS A	0.1	0.8	0.11	0.58	0.11	48.4
23	R2	All MCs	15	6.0	15	6.0	0.023	8.1	LOS A	0.1	0.8	0.11	0.58	0.11	47.3
Approach			28	6.0	28	6.0	0.023	6.5	LOS A	0.1	0.8	0.11	0.58	0.11	47.7
NorthEast: Oswald St (NE)															
24	L2	All MCs	27	6.0	27	6.0	0.038	4.8	LOS A	0.2	1.4	0.13	0.53	0.13	48.9
25	T1	All MCs	12	6.0	12	6.0	0.038	4.9	LOS A	0.2	1.4	0.13	0.53	0.13	53.1
26	R2	All MCs	8	6.0	8	6.0	0.038	8.1	LOS A	0.2	1.4	0.13	0.53	0.13	52.3
Approach			47	6.0	47	6.0	0.038	5.4	LOS A	0.2	1.4	0.13	0.53	0.13	50.9
NorthWest: Hordern St (NW)															
27	L2	All MCs	18	6.0	18	6.0	0.031	5.2	LOS A	0.2	1.2	0.26	0.50	0.26	52.6
28	T1	All MCs	17	6.0	17	6.0	0.031	5.3	LOS A	0.2	1.2	0.26	0.50	0.26	49.5
29	R2	All MCs	1	6.0	1	6.0	0.031	8.5	LOS A	0.2	1.2	0.26	0.50	0.26	52.2
Approach			36	6.0	36	6.0	0.031	5.3	LOS A	0.2	1.2	0.26	0.50	0.26	51.5
SouthWest: Oswald St (SW)															
30	L2	All MCs	1	6.0	1	6.0	0.057	4.8	LOS A	0.3	2.1	0.13	0.49	0.13	52.7
31	T1	All MCs	62	6.0	62	6.0	0.057	4.9	LOS A	0.3	2.1	0.13	0.49	0.13	53.2
32	R2	All MCs	11	6.0	11	6.0	0.057	8.1	LOS A	0.3	2.1	0.13	0.49	0.13	48.5
Approach			74	6.0	74	6.0	0.057	5.3	LOS A	0.3	2.1	0.13	0.49	0.13	52.7
All Vehicles			185	6.0	185	6.0	0.057	5.5	LOS A	0.3	2.1	0.15	0.52	0.15	51.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [S1-Oswald St/Hordern St PM (Site Folder: Scenario 1)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Hordern St (SE)															
21	L2	All MCs	28	6.0	28	6.0	0.058	5.0	LOS A	0.3	2.2	0.23	0.58	0.23	47.3
22	T1	All MCs	2	6.0	2	6.0	0.058	5.1	LOS A	0.3	2.2	0.23	0.58	0.23	47.9
23	R2	All MCs	37	6.0	37	6.0	0.058	8.4	LOS A	0.3	2.2	0.23	0.58	0.23	46.8
Approach			67	6.0	67	6.0	0.058	6.9	LOS A	0.3	2.2	0.23	0.58	0.23	47.1
NorthEast: Oswald St (NE)															
24	L2	All MCs	88	6.0	88	6.0	0.117	4.8	LOS A	0.6	4.5	0.14	0.51	0.14	49.2
25	T1	All MCs	56	6.0	56	6.0	0.117	4.9	LOS A	0.6	4.5	0.14	0.51	0.14	53.3
26	R2	All MCs	11	6.0	11	6.0	0.117	8.2	LOS A	0.6	4.5	0.14	0.51	0.14	52.5
Approach			155	6.0	155	6.0	0.117	5.1	LOS A	0.6	4.5	0.14	0.51	0.14	51.3
NorthWest: Hordern St (NW)															
27	L2	All MCs	8	6.0	8	6.0	0.022	5.0	LOS A	0.1	0.8	0.22	0.49	0.22	52.6
28	T1	All MCs	15	6.0	15	6.0	0.022	5.1	LOS A	0.1	0.8	0.22	0.49	0.22	49.5
29	R2	All MCs	2	6.0	2	6.0	0.022	8.4	LOS A	0.1	0.8	0.22	0.49	0.22	52.2
Approach			25	6.0	25	6.0	0.022	5.4	LOS A	0.1	0.8	0.22	0.49	0.22	51.1
SouthWest: Oswald St (SW)															
30	L2	All MCs	2	6.0	2	6.0	0.025	4.9	LOS A	0.1	0.9	0.18	0.56	0.18	51.8
31	T1	All MCs	13	6.0	13	6.0	0.025	5.0	LOS A	0.1	0.9	0.18	0.56	0.18	52.2
32	R2	All MCs	15	6.0	15	6.0	0.025	8.3	LOS A	0.1	0.9	0.18	0.56	0.18	47.2
Approach			29	6.0	29	6.0	0.025	6.6	LOS A	0.1	0.9	0.18	0.56	0.18	50.2
All Vehicles			277	6.0	277	6.0	0.117	5.7	LOS A	0.6	4.5	0.17	0.53	0.17	50.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101v [S1-Colombo St/Hordern St AM (Site Folder: Scenario 1)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

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

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Hordern St (SE)															
21	L2	All MCs	55	6.0	55	6.0	0.042	8.6	LOS A	0.2	1.2	0.18	0.90	0.18	50.8
22	T1	All MCs	9	6.0	9	6.0	0.137	9.0	LOS A	0.5	3.6	0.36	0.92	0.36	45.6
23	R2	All MCs	95	6.0	95	6.0	0.137	9.8	LOS A	0.5	3.6	0.36	0.92	0.36	50.2
Approach			159	6.0	159	6.0	0.137	9.3	LOS A	0.5	3.6	0.30	0.91	0.30	50.2
NorthEast: Colombo St (NE)															
24	L2	All MCs	8	6.0	8	6.0	0.052	5.6	LOS A	0.1	0.6	0.06	0.13	0.06	56.0
25	T1	All MCs	77	6.0	77	6.0	0.052	0.0	LOS A	0.1	0.6	0.06	0.13	0.06	58.7
26	R2	All MCs	11	6.0	11	6.0	0.052	6.4	LOS A	0.1	0.6	0.06	0.13	0.06	40.9
Approach			96	6.0	96	6.0	0.052	1.2	NA	0.1	0.6	0.06	0.13	0.06	56.7
NorthWest: Hordern St (NW)															
27	L2	All MCs	39	6.0	39	6.0	0.030	8.5	LOS A	0.1	0.9	0.18	0.89	0.18	46.2
28	T1	All MCs	21	6.0	21	6.0	0.024	8.8	LOS A	0.1	0.6	0.30	0.93	0.30	46.2
29	R2	All MCs	1	6.0	1	6.0	0.024	9.7	LOS A	0.1	0.6	0.30	0.93	0.30	46.1
Approach			61	6.0	61	6.0	0.030	8.7	LOS A	0.1	0.9	0.23	0.91	0.23	46.2
SouthWest: Colombo St (SW)															
30	L2	All MCs	6	6.0	6	6.0	0.052	5.6	LOS A	0.1	0.5	0.05	0.10	0.05	31.3
31	T1	All MCs	82	6.0	82	6.0	0.052	0.0	LOS A	0.1	0.5	0.05	0.10	0.05	59.0
32	R2	All MCs	8	6.0	8	6.0	0.052	6.3	LOS A	0.1	0.5	0.05	0.10	0.05	56.4
Approach			97	6.0	97	6.0	0.052	0.9	NA	0.1	0.5	0.05	0.10	0.05	56.7
All Vehicles			413	6.0	413	6.0	0.137	5.4	NA	0.5	3.6	0.17	0.54	0.17	52.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101v [S1-Colombo St/Hordern St PM (Site Folder: Scenario 1)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

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

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Hordern St (SE)															
21	L2	All MCs	82	6.0	82	6.0	0.066	8.8	LOS A	0.3	1.9	0.23	0.89	0.23	50.8
22	T1	All MCs	15	6.0	15	6.0	0.238	9.8	LOS A	0.9	6.6	0.48	0.94	0.48	44.6
23	R2	All MCs	141	6.0	141	6.0	0.238	11.1	LOS B	0.9	6.6	0.48	0.94	0.48	49.4
Approach			238	6.0	238	6.0	0.238	10.2	LOS B	0.9	6.6	0.39	0.92	0.39	49.7
NorthEast: Colombo St (NE)															
24	L2	All MCs	13	6.0	13	6.0	0.078	5.6	LOS A	0.1	1.0	0.08	0.14	0.08	55.9
25	T1	All MCs	115	6.0	115	6.0	0.078	0.0	LOS A	0.1	1.0	0.08	0.14	0.08	58.6
26	R2	All MCs	16	6.0	16	6.0	0.078	6.9	LOS A	0.1	1.0	0.08	0.14	0.08	40.9
Approach			144	6.0	144	6.0	0.078	1.3	NA	0.1	1.0	0.08	0.14	0.08	56.6
NorthWest: Hordern St (NW)															
27	L2	All MCs	58	6.0	58	6.0	0.047	8.7	LOS A	0.2	1.4	0.23	0.88	0.23	46.2
28	T1	All MCs	32	6.0	32	6.0	0.042	9.5	LOS A	0.1	1.1	0.38	0.94	0.38	45.7
29	R2	All MCs	2	6.0	2	6.0	0.042	10.8	LOS B	0.1	1.1	0.38	0.94	0.38	45.7
Approach			92	6.0	92	6.0	0.047	9.0	LOS A	0.2	1.4	0.29	0.90	0.29	46.0
SouthWest: Colombo St (SW)															
30	L2	All MCs	10	6.0	10	6.0	0.078	5.6	LOS A	0.1	0.8	0.06	0.11	0.06	31.3
31	T1	All MCs	121	6.0	121	6.0	0.078	0.0	LOS A	0.1	0.8	0.06	0.11	0.06	58.9
32	R2	All MCs	13	6.0	13	6.0	0.078	6.8	LOS A	0.1	0.8	0.06	0.11	0.06	56.3
Approach			144	6.0	144	6.0	0.078	1.0	NA	0.1	0.8	0.06	0.11	0.06	56.5
All Vehicles			617	6.0	617	6.0	0.238	5.8	NA	0.9	6.6	0.23	0.55	0.23	52.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [S2-Oswald St/Hordern St AM (Site Folder: Scenario 2)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Hordern St (SE)															
21	L2	All MCs	22	6.0	22	6.0	0.037	4.8	LOS A	0.2	1.4	0.16	0.55	0.16	48.2
22	T1	All MCs	6	6.0	6	6.0	0.037	4.9	LOS A	0.2	1.4	0.16	0.55	0.16	48.8
23	R2	All MCs	16	6.0	16	6.0	0.037	8.2	LOS A	0.2	1.4	0.16	0.55	0.16	47.6
Approach			44	6.0	44	6.0	0.037	6.0	LOS A	0.2	1.4	0.16	0.55	0.16	48.1
NorthEast: Oswald St (NE)															
24	L2	All MCs	27	6.0	27	6.0	0.050	4.9	LOS A	0.3	1.8	0.15	0.51	0.15	48.9
25	T1	All MCs	26	6.0	26	6.0	0.050	4.9	LOS A	0.3	1.8	0.15	0.51	0.15	53.1
26	R2	All MCs	8	6.0	8	6.0	0.050	8.2	LOS A	0.3	1.8	0.15	0.51	0.15	52.3
Approach			62	6.0	62	6.0	0.050	5.3	LOS A	0.3	1.8	0.15	0.51	0.15	51.6
NorthWest: Hordern St (NW)															
27	L2	All MCs	19	6.0	19	6.0	0.035	5.4	LOS A	0.2	1.3	0.30	0.51	0.30	52.4
28	T1	All MCs	18	6.0	18	6.0	0.035	5.5	LOS A	0.2	1.3	0.30	0.51	0.30	49.2
29	R2	All MCs	2	6.0	2	6.0	0.035	8.7	LOS A	0.2	1.3	0.30	0.51	0.30	52.0
Approach			39	6.0	39	6.0	0.035	5.6	LOS A	0.2	1.3	0.30	0.51	0.30	51.3
SouthWest: Oswald St (SW)															
30	L2	All MCs	1	6.0	1	6.0	0.079	4.8	LOS A	0.4	2.9	0.14	0.49	0.14	52.7
31	T1	All MCs	86	6.0	86	6.0	0.079	4.9	LOS A	0.4	2.9	0.14	0.49	0.14	53.1
32	R2	All MCs	15	6.0	15	6.0	0.079	8.2	LOS A	0.4	2.9	0.14	0.49	0.14	48.5
Approach			102	6.0	102	6.0	0.079	5.4	LOS A	0.4	2.9	0.14	0.49	0.14	52.6
All Vehicles			247	6.0	247	6.0	0.079	5.5	LOS A	0.4	2.9	0.17	0.51	0.17	51.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [S2-Oswald St/Hordern St PM (Site Folder: Scenario 2)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Hordern St (SE)															
21	L2	All MCs	37	6.0	37	6.0	0.067	5.2	LOS A	0.4	2.6	0.27	0.57	0.27	47.4
22	T1	All MCs	2	6.0	2	6.0	0.067	5.3	LOS A	0.4	2.6	0.27	0.57	0.27	48.0
23	R2	All MCs	37	6.0	37	6.0	0.067	8.5	LOS A	0.4	2.6	0.27	0.57	0.27	46.9
Approach			76	6.0	76	6.0	0.067	6.8	LOS A	0.4	2.6	0.27	0.57	0.27	47.2
NorthEast: Oswald St (NE)															
24	L2	All MCs	89	6.0	89	6.0	0.137	4.9	LOS A	0.7	5.4	0.19	0.50	0.19	49.0
25	T1	All MCs	75	6.0	75	6.0	0.137	5.0	LOS A	0.7	5.4	0.19	0.50	0.19	53.2
26	R2	All MCs	11	6.0	11	6.0	0.137	8.3	LOS A	0.7	5.4	0.19	0.50	0.19	52.4
Approach			175	6.0	175	6.0	0.137	5.2	LOS A	0.7	5.4	0.19	0.50	0.19	51.4
NorthWest: Hordern St (NW)															
27	L2	All MCs	8	6.0	8	6.0	0.024	5.2	LOS A	0.1	0.9	0.26	0.50	0.26	52.4
28	T1	All MCs	16	6.0	16	6.0	0.024	5.3	LOS A	0.1	0.9	0.26	0.50	0.26	49.1
29	R2	All MCs	3	6.0	3	6.0	0.024	8.6	LOS A	0.1	0.9	0.26	0.50	0.26	52.0
Approach			27	6.0	27	6.0	0.024	5.6	LOS A	0.1	0.9	0.26	0.50	0.26	50.8
SouthWest: Oswald St (SW)															
30	L2	All MCs	4	6.0	4	6.0	0.049	5.0	LOS A	0.2	1.8	0.18	0.56	0.18	51.8
31	T1	All MCs	25	6.0	25	6.0	0.049	5.0	LOS A	0.2	1.8	0.18	0.56	0.18	52.2
32	R2	All MCs	29	6.0	29	6.0	0.049	8.3	LOS A	0.2	1.8	0.18	0.56	0.18	47.2
Approach			59	6.0	59	6.0	0.049	6.6	LOS A	0.2	1.8	0.18	0.56	0.18	50.2
All Vehicles			337	6.0	337	6.0	0.137	5.8	LOS A	0.7	5.4	0.21	0.53	0.21	50.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101v [S2-Colombo St/Hordern St AM (Site Folder: Scenario 2)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

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

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Hordern St (SE)															
21	L2	All MCs	67	6.0	67	6.0	0.053	8.7	LOS A	0.2	1.6	0.20	0.89	0.20	50.8
22	T1	All MCs	22	6.0	22	6.0	0.163	9.4	LOS A	0.6	4.4	0.41	0.93	0.41	45.3
23	R2	All MCs	97	6.0	97	6.0	0.163	10.3	LOS B	0.6	4.4	0.41	0.93	0.41	50.0
Approach			186	6.0	186	6.0	0.163	9.6	LOS A	0.6	4.4	0.33	0.92	0.33	49.9
NorthEast: Colombo St (NE)															
24	L2	All MCs	8	6.0	8	6.0	0.062	5.6	LOS A	0.1	0.6	0.06	0.11	0.06	56.2
25	T1	All MCs	95	6.0	95	6.0	0.062	0.0	LOS A	0.1	0.6	0.06	0.11	0.06	58.8
26	R2	All MCs	11	6.0	11	6.0	0.062	6.7	LOS A	0.1	0.6	0.06	0.11	0.06	41.1
Approach			114	6.0	114	6.0	0.062	1.0	NA	0.1	0.6	0.06	0.11	0.06	57.2
NorthWest: Hordern St (NW)															
27	L2	All MCs	39	6.0	39	6.0	0.031	8.6	LOS A	0.1	0.9	0.21	0.88	0.21	46.2
28	T1	All MCs	26	6.0	26	6.0	0.031	9.1	LOS A	0.1	0.8	0.34	0.93	0.34	46.0
29	R2	All MCs	1	6.0	1	6.0	0.031	10.3	LOS B	0.1	0.8	0.34	0.93	0.34	45.9
Approach			66	6.0	66	6.0	0.031	8.9	LOS A	0.1	0.9	0.27	0.90	0.27	46.1
SouthWest: Colombo St (SW)															
30	L2	All MCs	8	6.0	8	6.0	0.068	5.6	LOS A	0.1	0.7	0.06	0.11	0.06	31.3
31	T1	All MCs	106	6.0	106	6.0	0.068	0.0	LOS A	0.1	0.7	0.06	0.11	0.06	58.9
32	R2	All MCs	12	6.0	12	6.0	0.068	6.6	LOS A	0.1	0.7	0.06	0.11	0.06	56.3
Approach			126	6.0	126	6.0	0.068	1.0	NA	0.1	0.7	0.06	0.11	0.06	56.6
All Vehicles			493	6.0	493	6.0	0.163	5.3	NA	0.6	4.4	0.19	0.52	0.19	52.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101v [S2-Colombo St/Hordern St PM (Site Folder: Scenario 2)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

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

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Hordern St (SE)															
21	L2	All MCs	83	6.0	83	6.0	0.067	8.8	LOS A	0.3	2.0	0.23	0.89	0.23	50.8
22	T1	All MCs	16	6.0	16	6.0	0.254	10.2	LOS B	1.0	7.1	0.50	0.95	0.51	44.2
23	R2	All MCs	143	6.0	143	6.0	0.254	11.6	LOS B	1.0	7.1	0.50	0.95	0.51	49.2
Approach			242	6.0	242	6.0	0.254	10.5	LOS B	1.0	7.1	0.41	0.93	0.41	49.5
NorthEast: Colombo St (NE)															
24	L2	All MCs	13	6.0	13	6.0	0.080	5.6	LOS A	0.1	1.0	0.09	0.15	0.09	55.9
25	T1	All MCs	117	6.0	117	6.0	0.080	0.0	LOS A	0.1	1.0	0.09	0.15	0.09	58.5
26	R2	All MCs	17	6.0	17	6.0	0.080	7.1	LOS A	0.1	1.0	0.09	0.15	0.09	40.8
Approach			146	6.0	146	6.0	0.080	1.3	NA	0.1	1.0	0.09	0.15	0.09	56.5
NorthWest: Hordern St (NW)															
27	L2	All MCs	59	6.0	59	6.0	0.049	8.8	LOS A	0.2	1.4	0.26	0.88	0.26	46.2
28	T1	All MCs	33	6.0	33	6.0	0.044	9.7	LOS A	0.2	1.1	0.40	0.94	0.40	45.5
29	R2	All MCs	2	6.0	2	6.0	0.044	11.1	LOS B	0.2	1.1	0.40	0.94	0.40	45.5
Approach			94	6.0	94	6.0	0.049	9.2	LOS A	0.2	1.4	0.31	0.90	0.31	45.9
SouthWest: Colombo St (SW)															
30	L2	All MCs	12	6.0	12	6.0	0.094	5.6	LOS A	0.1	1.0	0.06	0.11	0.06	31.3
31	T1	All MCs	146	6.0	146	6.0	0.094	0.0	LOS A	0.1	1.0	0.06	0.11	0.06	58.9
32	R2	All MCs	16	6.0	16	6.0	0.094	6.9	LOS A	0.1	1.0	0.06	0.11	0.06	56.3
Approach			174	6.0	174	6.0	0.094	1.0	NA	0.1	1.0	0.06	0.11	0.06	56.6
All Vehicles			656	6.0	656	6.0	0.254	5.8	NA	1.0	7.1	0.23	0.53	0.23	52.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [S3-Oswald St/Hordern St AM (Site Folder: Scenario 3)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Hordern St (SE)															
21	L2	All MCs	22	6.0	22	6.0	0.038	4.8	LOS A	0.2	1.4	0.16	0.55	0.16	48.1
22	T1	All MCs	6	6.0	6	6.0	0.038	4.9	LOS A	0.2	1.4	0.16	0.55	0.16	48.7
23	R2	All MCs	17	6.0	17	6.0	0.038	8.2	LOS A	0.2	1.4	0.16	0.55	0.16	47.6
Approach			45	6.0	45	6.0	0.038	6.1	LOS A	0.2	1.4	0.16	0.55	0.16	48.0
NorthEast: Oswald St (NE)															
24	L2	All MCs	27	6.0	27	6.0	0.052	4.9	LOS A	0.3	1.9	0.15	0.51	0.15	48.9
25	T1	All MCs	27	6.0	27	6.0	0.052	4.9	LOS A	0.3	1.9	0.15	0.51	0.15	53.1
26	R2	All MCs	9	6.0	9	6.0	0.052	8.2	LOS A	0.3	1.9	0.15	0.51	0.15	52.3
Approach			64	6.0	64	6.0	0.052	5.4	LOS A	0.3	1.9	0.15	0.51	0.15	51.6
NorthWest: Hordern St (NW)															
27	L2	All MCs	20	6.0	20	6.0	0.038	5.4	LOS A	0.2	1.4	0.31	0.51	0.31	52.4
28	T1	All MCs	19	6.0	19	6.0	0.038	5.5	LOS A	0.2	1.4	0.31	0.51	0.31	49.2
29	R2	All MCs	2	6.0	2	6.0	0.038	8.8	LOS A	0.2	1.4	0.31	0.51	0.31	52.0
Approach			41	6.0	41	6.0	0.038	5.6	LOS A	0.2	1.4	0.31	0.51	0.31	51.2
SouthWest: Oswald St (SW)															
30	L2	All MCs	2	6.0	2	6.0	0.085	4.8	LOS A	0.4	3.2	0.14	0.49	0.14	52.7
31	T1	All MCs	93	6.0	93	6.0	0.085	4.9	LOS A	0.4	3.2	0.14	0.49	0.14	53.1
32	R2	All MCs	16	6.0	16	6.0	0.085	8.2	LOS A	0.4	3.2	0.14	0.49	0.14	48.4
Approach			111	6.0	111	6.0	0.085	5.4	LOS A	0.4	3.2	0.14	0.49	0.14	52.6
All Vehicles			261	6.0	261	6.0	0.085	5.5	LOS A	0.4	3.2	0.18	0.51	0.18	51.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [S3-Oswald St/Hordern St PM (Site Folder: Scenario 3)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Hordern St (SE)															
21	L2	All MCs	40	6.0	40	6.0	0.074	5.2	LOS A	0.4	2.9	0.28	0.57	0.28	47.3
22	T1	All MCs	2	6.0	2	6.0	0.074	5.3	LOS A	0.4	2.9	0.28	0.57	0.28	47.9
23	R2	All MCs	41	6.0	41	6.0	0.074	8.6	LOS A	0.4	2.9	0.28	0.57	0.28	46.8
Approach			83	6.0	83	6.0	0.074	6.9	LOS A	0.4	2.9	0.28	0.57	0.28	47.1
NorthEast: Oswald St (NE)															
24	L2	All MCs	98	6.0	98	6.0	0.148	5.0	LOS A	0.8	5.9	0.19	0.50	0.19	49.0
25	T1	All MCs	80	6.0	80	6.0	0.148	5.0	LOS A	0.8	5.9	0.19	0.50	0.19	53.2
26	R2	All MCs	12	6.0	12	6.0	0.148	8.3	LOS A	0.8	5.9	0.19	0.50	0.19	52.4
Approach			189	6.0	189	6.0	0.148	5.2	LOS A	0.8	5.9	0.19	0.50	0.19	51.4
NorthWest: Hordern St (NW)															
27	L2	All MCs	9	6.0	9	6.0	0.026	5.2	LOS A	0.1	1.0	0.27	0.50	0.27	52.4
28	T1	All MCs	17	6.0	17	6.0	0.026	5.3	LOS A	0.1	1.0	0.27	0.50	0.27	49.1
29	R2	All MCs	3	6.0	3	6.0	0.026	8.6	LOS A	0.1	1.0	0.27	0.50	0.27	52.0
Approach			29	6.0	29	6.0	0.026	5.7	LOS A	0.1	1.0	0.27	0.50	0.27	50.8
SouthWest: Oswald St (SW)															
30	L2	All MCs	4	6.0	4	6.0	0.052	5.0	LOS A	0.3	1.9	0.20	0.56	0.20	51.7
31	T1	All MCs	26	6.0	26	6.0	0.052	5.1	LOS A	0.3	1.9	0.20	0.56	0.20	52.2
32	R2	All MCs	31	6.0	31	6.0	0.052	8.3	LOS A	0.3	1.9	0.20	0.56	0.20	47.2
Approach			61	6.0	61	6.0	0.052	6.7	LOS A	0.3	1.9	0.20	0.56	0.20	50.1
All Vehicles			363	6.0	363	6.0	0.148	5.9	LOS A	0.8	5.9	0.22	0.53	0.22	50.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101v [S3-Colombo St/Hordern St AM (Site Folder: Scenario 3)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

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

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Hordern St (SE)															
21	L2	All MCs	73	6.0	73	6.0	0.058	8.7	LOS A	0.2	1.7	0.21	0.89	0.21	50.8
22	T1	All MCs	22	6.0	22	6.0	0.180	9.6	LOS A	0.7	4.9	0.43	0.93	0.43	45.1
23	R2	All MCs	105	6.0	105	6.0	0.180	10.5	LOS B	0.7	4.9	0.43	0.93	0.43	49.8
Approach			200	6.0	200	6.0	0.180	9.8	LOS A	0.7	4.9	0.35	0.92	0.35	49.8
NorthEast: Colombo St (NE)															
24	L2	All MCs	9	6.0	9	6.0	0.067	5.6	LOS A	0.1	0.7	0.06	0.12	0.06	56.1
25	T1	All MCs	102	6.0	102	6.0	0.067	0.0	LOS A	0.1	0.7	0.06	0.12	0.06	58.8
26	R2	All MCs	12	6.0	12	6.0	0.067	6.8	LOS A	0.1	0.7	0.06	0.12	0.06	41.0
Approach			123	6.0	123	6.0	0.067	1.1	NA	0.1	0.7	0.06	0.12	0.06	57.1
NorthWest: Hordern St (NW)															
27	L2	All MCs	43	6.0	43	6.0	0.035	8.7	LOS A	0.1	1.0	0.22	0.88	0.22	46.2
28	T1	All MCs	28	6.0	28	6.0	0.034	9.3	LOS A	0.1	0.9	0.35	0.93	0.35	45.9
29	R2	All MCs	1	6.0	1	6.0	0.034	10.5	LOS B	0.1	0.9	0.35	0.93	0.35	45.8
Approach			73	6.0	73	6.0	0.035	8.9	LOS A	0.1	1.0	0.28	0.90	0.28	46.1
SouthWest: Colombo St (SW)															
30	L2	All MCs	9	6.0	9	6.0	0.073	5.6	LOS A	0.1	0.7	0.06	0.11	0.06	31.3
31	T1	All MCs	115	6.0	115	6.0	0.073	0.0	LOS A	0.1	0.7	0.06	0.11	0.06	58.9
32	R2	All MCs	12	6.0	12	6.0	0.073	6.7	LOS A	0.1	0.7	0.06	0.11	0.06	56.3
Approach			136	6.0	136	6.0	0.073	1.0	NA	0.1	0.7	0.06	0.11	0.06	56.5
All Vehicles			532	6.0	532	6.0	0.180	5.4	NA	0.7	4.9	0.20	0.52	0.20	52.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101v [S3-Colombo St/Hordern St PM (Site Folder: Scenario 3)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

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

Vehicle Movement Performance

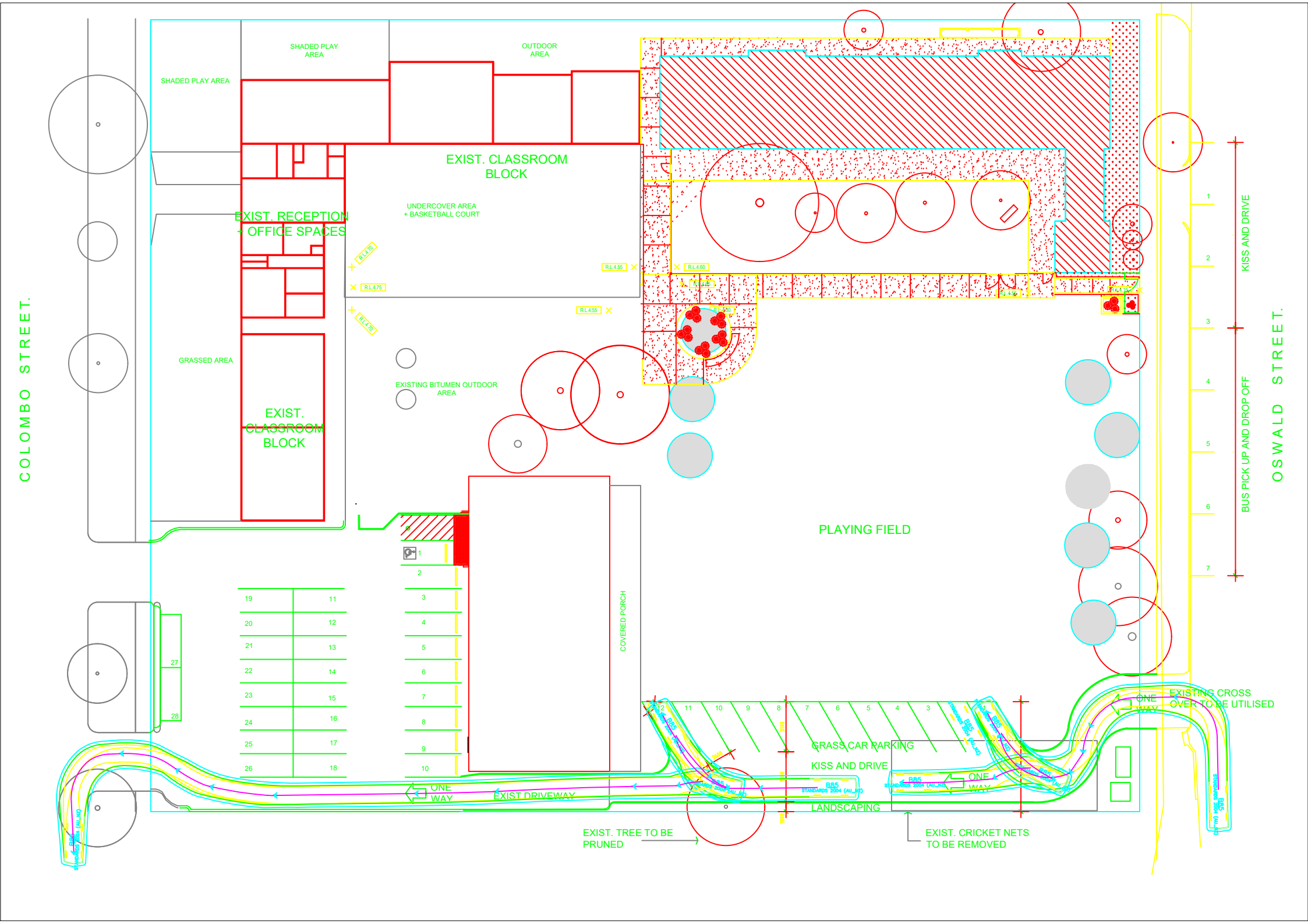
Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Hordern St (SE)															
21	L2	All MCs	92	6.0	92	6.0	0.075	8.8	LOS A	0.3	2.2	0.25	0.88	0.25	50.8
22	T1	All MCs	17	6.0	17	6.0	0.292	10.7	LOS B	1.2	8.9	0.53	0.98	0.59	43.6
23	R2	All MCs	157	6.0	157	6.0	0.292	12.4	LOS B	1.2	8.9	0.53	0.98	0.59	48.7
Approach			265	6.0	265	6.0	0.292	11.0	LOS B	1.2	8.9	0.44	0.95	0.47	49.2
NorthEast: Colombo St (NE)															
24	L2	All MCs	14	6.0	14	6.0	0.088	5.6	LOS A	0.2	1.1	0.09	0.15	0.09	55.9
25	T1	All MCs	128	6.0	128	6.0	0.088	0.0	LOS A	0.2	1.1	0.09	0.15	0.09	58.5
26	R2	All MCs	18	6.0	18	6.0	0.088	7.3	LOS A	0.2	1.1	0.09	0.15	0.09	40.8
Approach			161	6.0	161	6.0	0.088	1.3	NA	0.2	1.1	0.09	0.15	0.09	56.5
NorthWest: Hordern St (NW)															
27	L2	All MCs	65	6.0	65	6.0	0.055	8.9	LOS A	0.2	1.6	0.28	0.88	0.28	46.1
28	T1	All MCs	36	6.0	36	6.0	0.049	9.9	LOS A	0.2	1.3	0.42	0.95	0.42	45.4
29	R2	All MCs	2	6.0	2	6.0	0.049	11.5	LOS B	0.2	1.3	0.42	0.95	0.42	45.3
Approach			103	6.0	103	6.0	0.055	9.3	LOS A	0.2	1.6	0.33	0.90	0.33	45.9
SouthWest: Colombo St (SW)															
30	L2	All MCs	13	6.0	13	6.0	0.102	5.6	LOS A	0.1	1.1	0.07	0.11	0.07	31.3
31	T1	All MCs	159	6.0	159	6.0	0.102	0.0	LOS A	0.1	1.1	0.07	0.11	0.07	58.9
32	R2	All MCs	17	6.0	17	6.0	0.102	7.0	LOS A	0.1	1.1	0.07	0.11	0.07	56.3
Approach			188	6.0	188	6.0	0.102	1.0	NA	0.1	1.1	0.07	0.11	0.07	56.5
All Vehicles			718	6.0	718	6.0	0.292	6.0	NA	1.2	8.9	0.25	0.54	0.26	52.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Appendix D. Nearby Parking


Legend
2P Ticket
2P
Unrestricted
Verge / Verge or Road
7:30-9:00 2:30-4:00
7:30-9:00 2:30-4:00
8:00-5:00 Mon-Fri
Transperth Bus Stop

Appendix E. Swept Path


COLOMBO STREET.
OSWALD STREET.
SHADED PLAY AREA
SHADED PLAY AREA
OUTDOOR AREA
EXIST. CLASSROOM BLOCK
UNDERCOVER AREA + BASKETBALL COURT
EXIST. RECEPTION + OFFICE SPACES
GRASSED AREA
EXISTING BITUMEN OUTDOOR AREA
EXIST. CLASSROOM BLOCK
COVERED PORCH
PLAYING FIELD
KISS AND DRIVE
BUS PICK UP AND DROP OFF
ONE WAY
EXIST DRIVEWAY
GRASS CAR PARKING
KISS AND DRIVE
LANDSCAPING
ONE WAY
ONE WAY
EXISTING CROSS OVER TO BE UTILISED
EXIST. TREE TO BE PRUNED
EXIST. CRICKET NETS TO BE REMOVED

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