

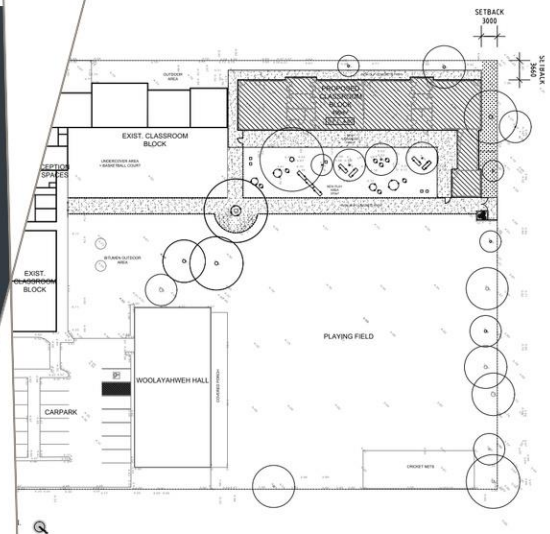
Transport Impact Assessment

Victoria Park Christian School

CW1167400

Prepared for
Adventist Education

15 March 2021



Contact Information

Cardno (WA) Pty Ltd

ABN 77 009 119 000

11 Harvest Terrace
West Perth WA 6005
Australia

www.cardno.com

Phone +61 8 9273 3888

Fax +61 8 9486 8664

Document Information

Prepared for	Adventist Education
Project Name	Victoria Park Christian School
File Reference	CW1167400-TR-RP-001-Victoria Park Christian School_TIA-V2EH-RJC.docx
Job Reference	CW1167400
Date	15 March 2021
Version Number	A

Author(s):

Edmond Hoang
Traffic Engineer

Effective Date 15/03/2021

Approved By:

Ray Cook
Business Leader – Traffic and Transport Planning

Date Approved 15/03/2021

Document History

Version	Effective Date	Description of Revision	Prepared by	Reviewed by
A	15/03/2021	For Issue	EH	RJC

© Cardno. Copyright in the whole and every part of this document belongs to Cardno and may not be used, sold, transferred, copied or reproduced in whole or in part in any manner or form or in or on any media to any person other than by agreement with Cardno.

This document is produced by Cardno solely for the benefit and use by the client in accordance with the terms of the engagement. Cardno does not and shall not assume any responsibility or liability whatsoever to any third party arising out of any use or reliance by any third party on the content of this document.

Our report is based on information made available by the client. The validity and comprehensiveness of supplied information has not been independently verified and, for the purposes of this report, it is assumed that the information provided to Cardno is both complete and accurate. Whilst, to the best of our knowledge, the information contained in this report is accurate at the date of issue, changes may occur to the site conditions, the site context or the applicable planning framework. This report should not be used after any such changes without consulting the provider of the report or a suitably qualified person.

Table of Contents

1	Introduction	1
1.1	Background	1
2	Existing Situation	2
2.1	Existing Site Context	2
2.2	Existing Site Development	3
2.3	Surrounding Land Use	3
2.4	Existing Site Access	5
2.5	Existing Site Traffic Generation and Land Uses	5
3	Road Network	6
3.1	Existing Road Network	6
3.2	Traffic Volumes	8
3.3	Existing Intersections	8
3.4	Future Road Network	9
3.5	Crash Assessment	9
4	Pedestrian/Cycle Network	10
4.1	Existing Pedestrian/Cycling Network	10
4.2	Future Pedestrian/Cycling Network	10
5	Public Transport Facilities	12
5.1	Existing Public Transport Facilities	12
5.2	Future Public Transport Facilities	13
6	Development Proposal	14
6.1	Proposed Development	14
6.2	Access Arrangements	14
6.3	Car Parking Provision	14
6.4	Service/Delivery Vehicles	16
7	Integration with Surrounding Area	17
7.1	Surrounding Major Attractors/Generators	17
7.2	Proposed Changes to the Surrounding Land Uses	17
8	Analysis of Transport Network	18
8.1	Assessment Years and Time Period	18
8.2	Traffic Generation	18
8.3	Development Traffic Distribution and Assignment	18
8.4	Transport Analysis Assumptions	18
8.5	Intersection Performance	19
9	Summary and Conclusions	25

Appendices

Appendix A WAPC Checklist

Appendix B Site Plans

Appendix C SIDRA Results

Tables

Table 3-1	Summary of Existing Road Network	7
Table 3-2	Existing Site Traffic	8
Table 3-3	Hordern Street (West)/Colombo Street (Nth) Intersection	9
Table 5-1	Bus Services and Frequency	13
Table 6-1	Parking Requirements and Provision	15
Table 8-1	Trip Generation Rate – Peak Hour Generator	18
Table 8-2	Total Trip Generation	18
Table 8-3	Level of Service (LOS) Performance Criteria	20
Table 8-4	SIDRA Layout for Oswald Street/Hordern Street Intersection – Scenario 1	21
Table 8-5	SIDRA Layout for Oswald Street/Hordern Street Intersection – Scenario 2	21
Table 8-6	SIDRA Layout for Oswald Street/Hordern Street Intersection – Scenario 3	22
Table 8-7	SIDRA Layout for Hordern Street/Colombo Street Intersection – Scenario 1	23
Table 8-8	SIDRA Layout for Hordern Street/Colombo Street Intersection – Scenario 2	24
Table 8-9	SIDRA Layout for Hordern Street/Colombo Street Intersection – Scenario 3	24

Figures

Figure 2-1	Site Location	2
Figure 2-2	Aerial View of the Site	3
Figure 2-3	Zoning Map	4
Figure 2-4	Existing Site Access Arrangement	5
Figure 3-1	Existing Road Hierarchy	6
Figure 3-2	Posted Speed Limit and School Zones	7
Figure 3-3	Oswald Street/Hordern Street Intersection	8
Figure 3-4	Hordern Street/Colombo Street Intersection	9
Figure 4-1	Existing Pedestrian / Cycle Networks	10
Figure 4-2	Proposed Networks for Cycle Routes	11
Figure 4-3	Proposed Bridge Construction	11
Figure 5-1	Existing Transperth Networks	12
Figure 5-2	Existing Transperth Networks	12
Figure 6-1	Site Plan	14

Figure 6-2	Verge Parking Along the School Frontage (Colombo Street)	15
Figure 6-3	On-street Parking Along School Frontage (Oswald Street)	16
Figure 7-1	Major Attractors/Generators	17
Figure 8-1	Hordern Street/Colombo Street intersection north eastern approach closure	19
Figure 8-2	SIDRA Layout for Oswald Street/Hordern Street Intersection	20
Figure 8-3	SIDRA Layout for Hordern Street/Colombo Street Intersection	23

1 Introduction

1.1 Background

Cardno have been commissioned by Matthews & Scavalli Architects on behalf of the Adventist Education 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 under the Western Australian Planning Commission (WAPC) *Transport Assessment Guidelines for Developments: Volume 4 Individual Developments (2016)*.

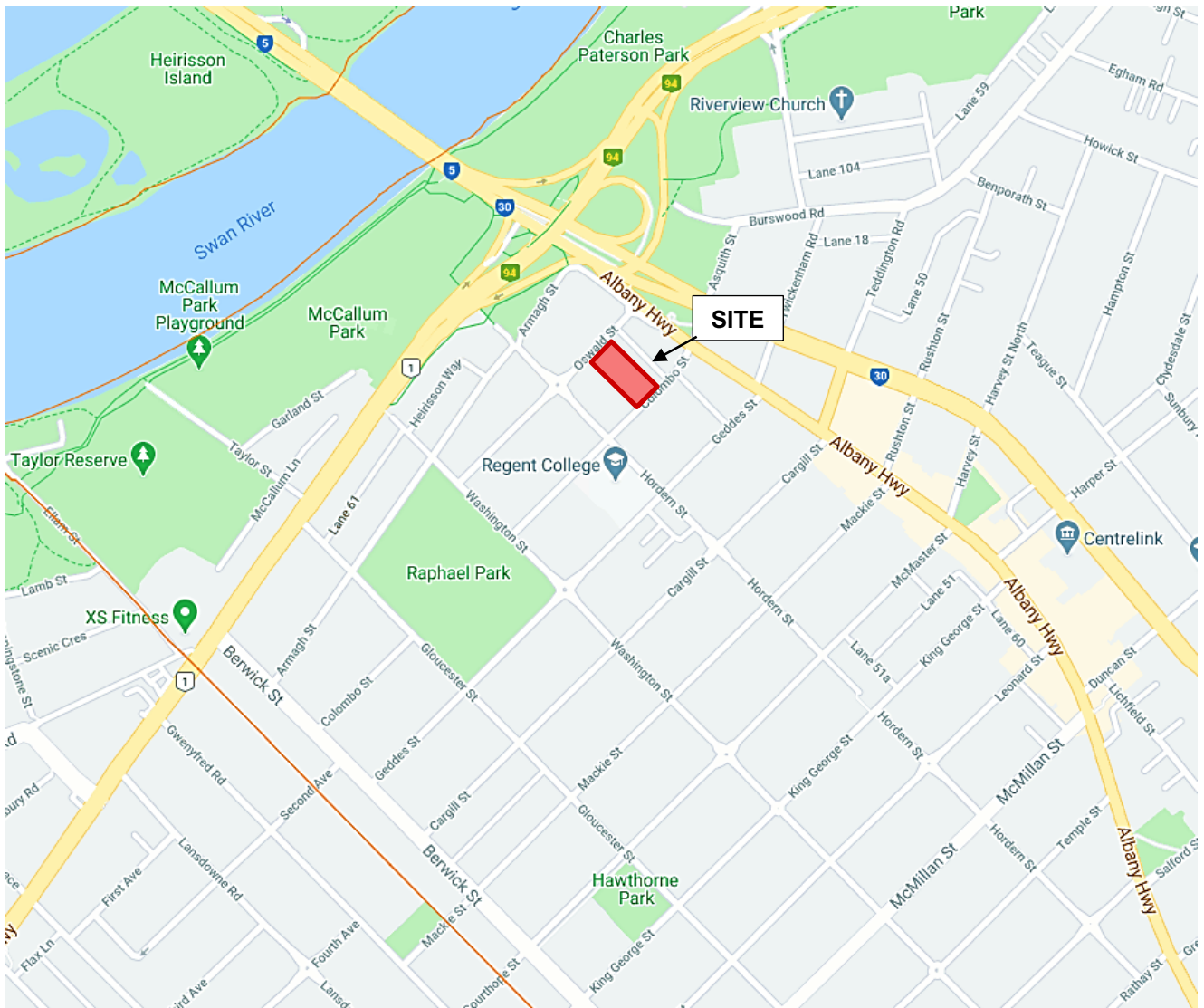
2 Existing Situation

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: Nearnap (2021)

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

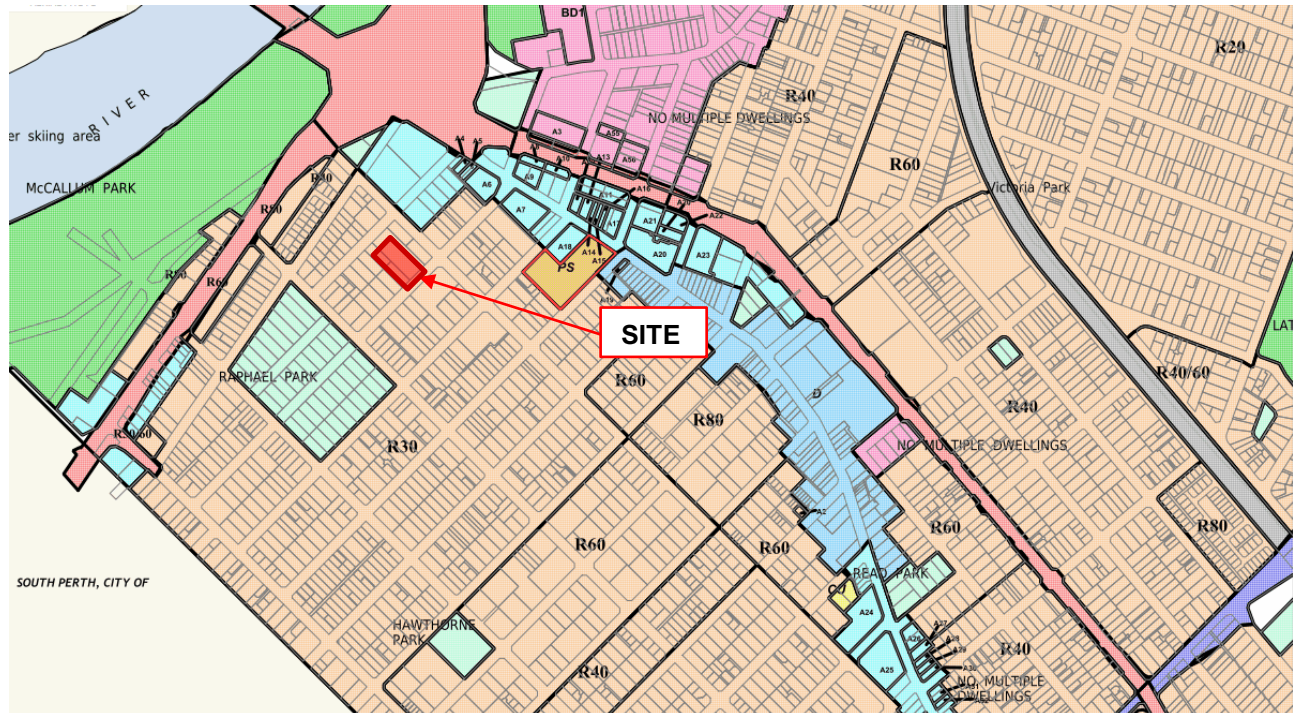


Source: Nearmap (2021)

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



- Commercial
- District Centre
- Industrial Area
- Local Centre
- Office/Residential
- Other Regional Roads (MRS)
- Parks and Recreation
- Parks and Recreation (MRS)
- Parks and Recreation Restricted (MRS)
- Primary Regional Roads (MRS)
- Public Purpose
- Public Purpose - High School (MRS)
- Public Purpose - Special Uses
- Public Purpose - Technical School (MRS)
- Public Purpose - University
- Public Purpose - SEC
- Railways (MRS)
- Residential R20
- Residential R30
- Residential R30 / 60

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



2.5 Existing Site Traffic Generation and Land Uses

The current student count in 2021 is 135 full time students and the current staff count is 10 full-time equivalent (FTE) staff.

3 Road Network

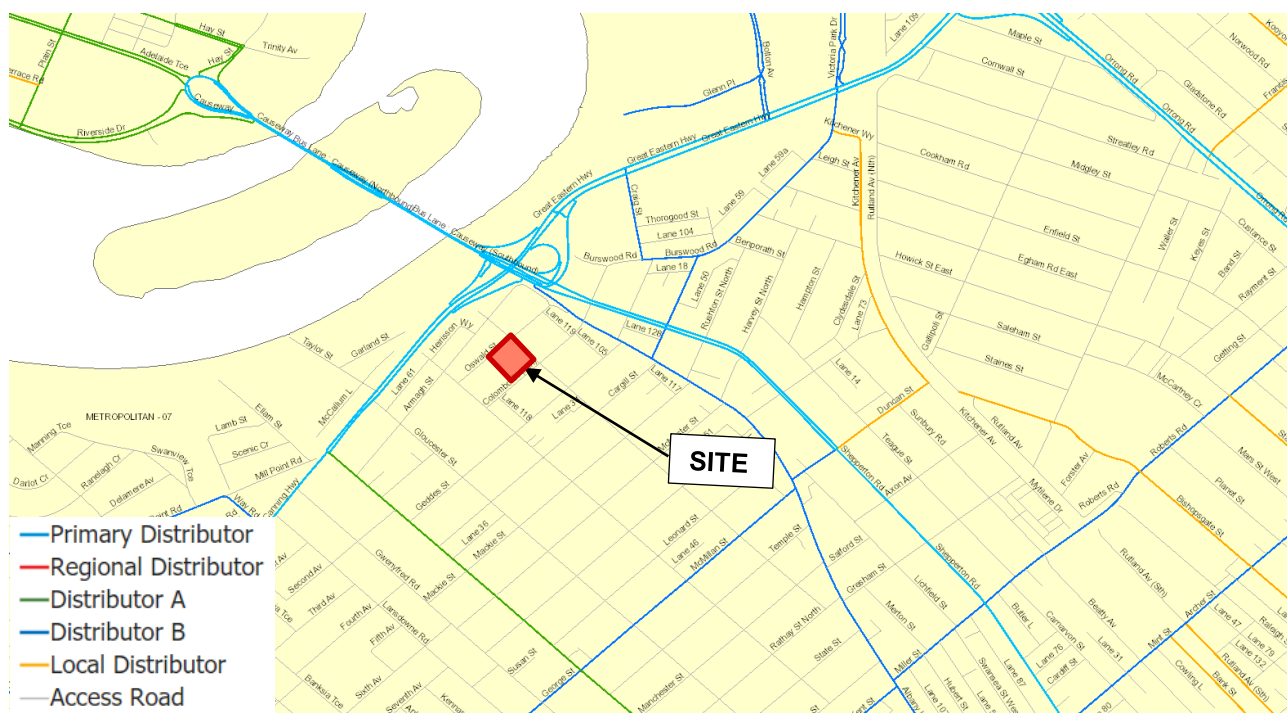
3.1 Existing Road Network

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 (2021)

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	Approximately 19.6m	60
Canning Highway	Primary Distributor	Local Government	5	2	Approximately 20.4m	60
Albany Highway	Distributor B	Local Government	2	2	Approximately 16.7m	50
Hordern Street	Access Road	Local Government	2	2	Approximately 10.2	50/40
Oswald Street	Access Road	Local Government	2	1	Approximately 10m	50/40
Colombo Street	Access Road	Local Government	2	2	Approximately 7.3m	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 (2021)

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 is summarised in **Table 3-2**.

Table 3-2 Existing Site Traffic

Road Name	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)	2018	16,584	1,317	1,384
Albany Highway (East of Geddes Street)	2020	7,522	829	505
Cargill Street (West of Albany Highway)	2020	1,191	271	128
Canning Hwy (At Albany Hwy Bridge)	2020	37,593	2,676	3,355

Source: Main Roads WA

3.3 Existing Intersections

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 3-3**.

Figure 3-3 Oswald Street/Hordern Street Intersection



Source: Nearmap (2021)

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 Odern Street. The intersection layout is shown in **Figure 3-4**.

Figure 3-4 Hordern Street/Colombo Street Intersection



Source: Nearmap (2021)

3.4 Future Road Network

Based on the information provided by the Town of Victoria Park and a desktop research 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 2015 and December 2019 has been undertaken. Of all the intersections and midblock sections along the frontage of the Site, the intersection of Hordern Street/Colombo Street was the only intersection with recorded crash data. The crash data is summarised in **Table 3-3**.

Table 3-3 Hordern Street (West)/Colombo Street (Nth) Intersection

Type of Crash (RUM Code)	Fatal	Hospital	Medical	Major Property Damage	Minor Property Damage	Not Stated	Total Crashes
Right Turn Thru	-	-	-	2	-	-	2
Right Angle	-	-	-	1	-	-	1
Total	0	0	0	3	0	0	3

A summary of the crash data are as follows;

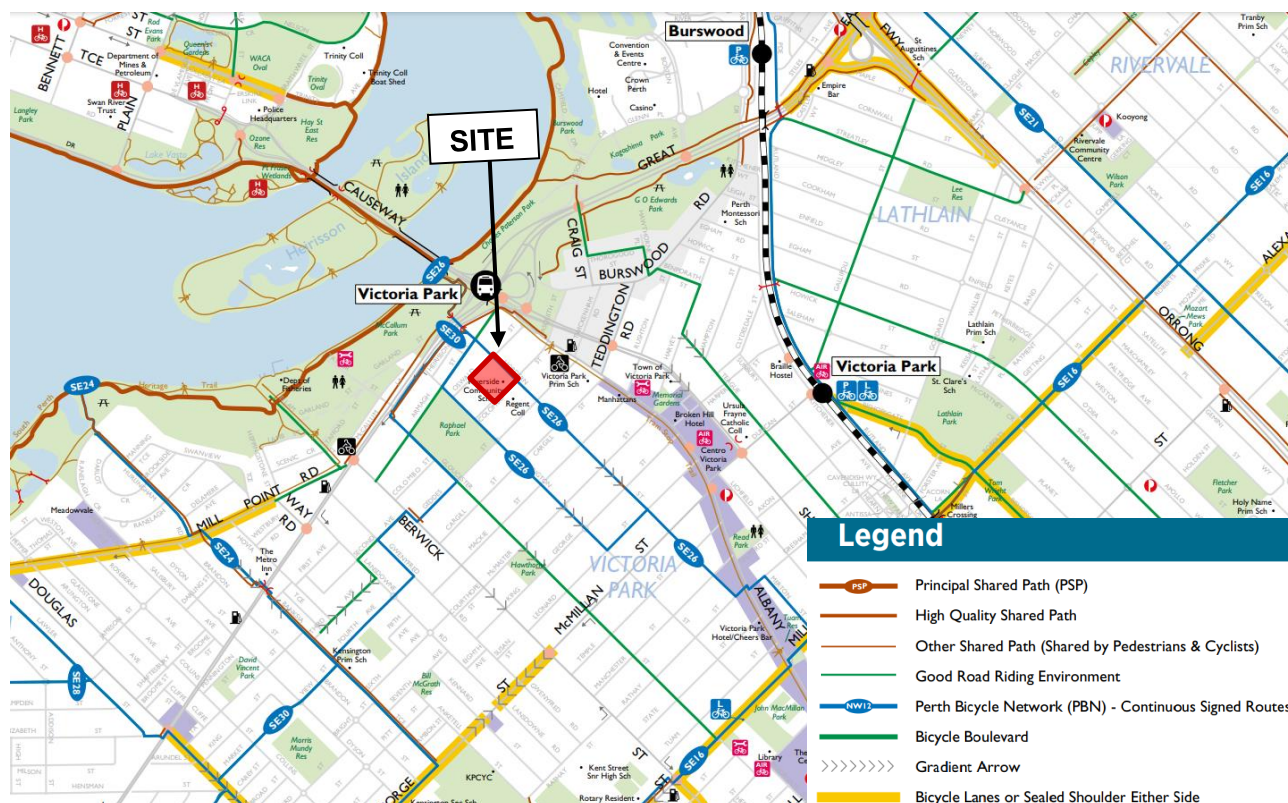
- > There was only crash data for the intersection at Hordern Street and Colombo Street. Having minimal crash data shows is a good sign for the future development within the area and at the projected site.
- > 3 crashes were recorded which had major property damage
- > Overall the number of crashes occurring near the Site is low.

4 Pedestrian/Cycle Network

4.1 Existing Pedestrian/Cycling Network

According to the *Department of Transport 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 Networks



Source: Department of Transport

4.2 Future Pedestrian/Cycling Network

4.2.1 Joint Bike Plan

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 travel from 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 an image of the projected bridge construction. It will be connected from Victoria Park foreshore with Heirisson Island and Perth's CBD. It is anticipated that the contract will be awarded late this year with commencement of construction to happen at the beginning of 2022.

Figure 4-3 Proposed Bridge Construction



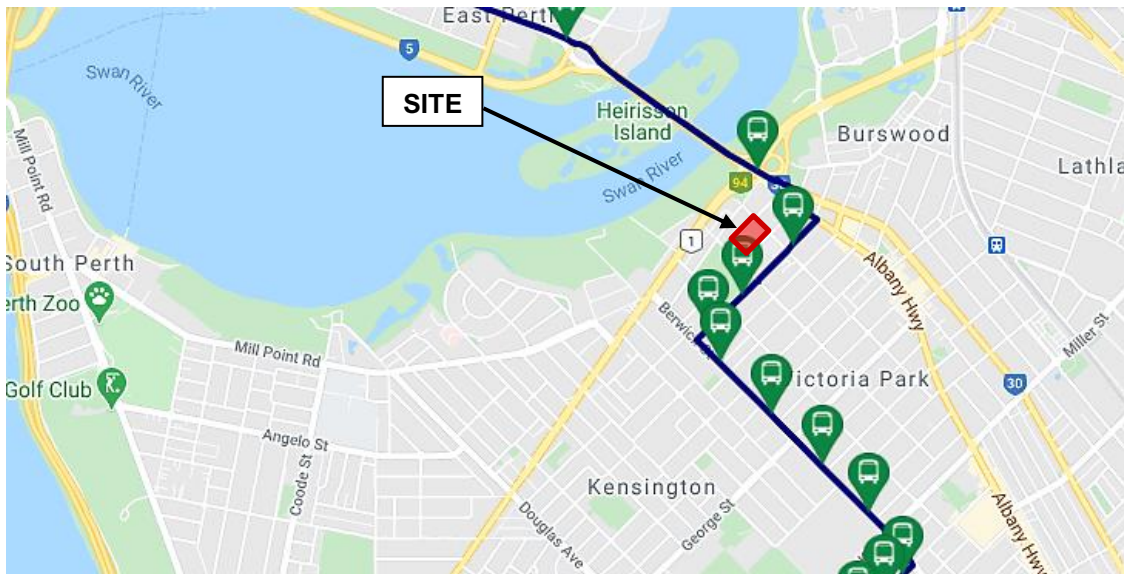
Source: Main Roads WA

5 Public Transport Facilities

5.1 Existing Public Transport Facilities

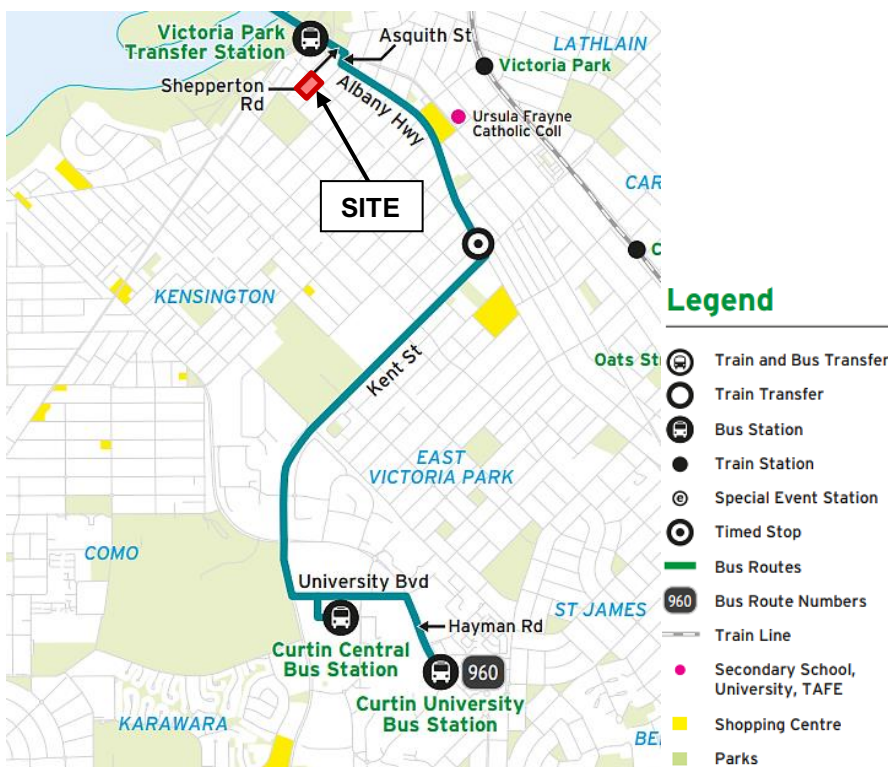
The closest Transperth bus services to the School are numbers 72,75 which travel from Elizabeth Quay Train Station to Canning Vale Bus Depot as shown in **Figure 5-1**. This bus route services specifically Canning College but bypasses Victoria Park Christian School. The closest bus stop is located along Geddes St Before Hordern St on the North entrance of campus (Stop ID: 11735).

Figure 5-1 Existing Transperth Networks



Source: Department of Transport

Figure 5-2 Existing Transperth Networks



Source: Department of Transport

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.

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)	10-15mins	60mins	60mins	60mins
178 (Bull Creek Stn – via Albany Highway, Shelley & Rossmoyne)	15-20mins	60mins	60mins	60mins
179 (Bull Creek Stn – via Albany Hwy & Riverton Forum Shop Ctr)	25-60mins	60mins	N/A	N/A
72 (Cannington Stn – via Victoria Park & Curtin University)	10-20mins	20-30mins	60minutes	60-90mins
75 (Canning Vale – via Victoria Park & Curtin University)	30mins	30-60mins	N/A	N/A
960 (Mirrabooka Bus Stn – Curtin University Bus Stn via Alexander Drive)	10-15mins	10-15mins	15-20mins	15-20mins
220 (Armadale Stn – Kelmscott Stn via Albany Hwy)	60mins	60mins	60mins	60-90mins

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 proposed 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. Some services will undergo route number changes associated with the Airport Line commissioning. There will still be high frequency services along Great Eastern Highway (Amended 39, New 270, Amended SuperBus 935, New SuperBus 940) and Shepperton Rd (Amended 38 / 282 / 283, Existing SuperBus 930).

6 Development Proposal

6.1 Proposed Development

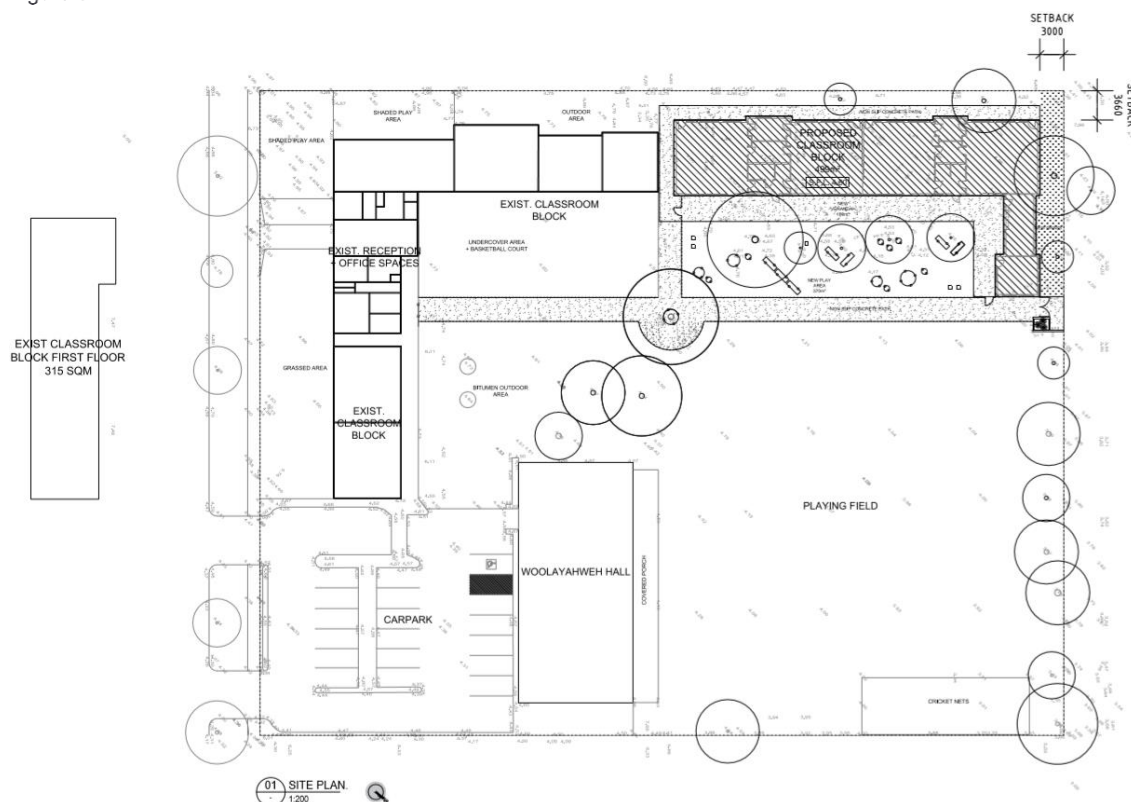
The proposed development comprises of upgrades to existing buildings and the provision of new school buildings which include the following:

- > Proposed classroom block
- > New outdoor sitting areas
- > Playing field including cricket nets
- > Shaded playing areas

Student numbers are expected to increase up to 180+ students with approximately 14 FTE staff. In the long term (5-6 years), anticipated student numbers are forecast to reach 230 students.

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**.

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 projected to increase by 45 students for the short term and up to 95 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
180	26	13	39
230	33	17	50

19 bays (including 1 ACROD bay) are currently provide on-site for staff which satisfies the requirements for both student thresholds. Currently verge parking is available for parents/visitors of the school along the southern frontage of the school (along Colombo Street) as well as on-street bays along the northern frontage of the school (along Oswald Street).

Figure 6-2 Verge Parking Along the School Frontage (Colombo Street)



Figure 6-3 On-street Parking Along School Frontage (Oswald Street)



In addition to the parking bay along the school frontage, on-street parking is also available on all nearby local road within the surrounding area with varying time limits and fees.

Furthermore, 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 30 students currently use this service (which is approximately 22% of the current student population).
- > Bike parking for staff and students is provided by the school (approximately 10 bike bays).

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), the current parking arrangement would be sufficient enough to accommodate the increase in student numbers.

6.4 Service/Delivery Vehicles

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

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 (Albany Highway)

Figure 7-1 Major Attractors/Generators



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 2021;
- > Scenario 2 – Background 2023 (assumed opening year) + Development Traffic (45 additional students); and
- > Scenario 3 – Background 2033 (10-year horizon) + Development Traffic (95 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 45 students, total 180 students)	23	23	23	23
School (additional 95 students, total 230 students)	48	48	48	48

The proposed development represents a trip generation of approximately 46 vehicles during the AM and PM peak hours for 45 additional students and 96 vehicles during the AM and PM peak hours for 95 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.

8.3 Development Traffic Distribution and Assignment

It is anticipated the majority of school traffic will be traveling to and from the east along Albany Highway.

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 8-1**).

Figure 8-1 Hordern Street/Colombo Street intersection north eastern approach closure



- > For the purpose of this assessment, it is assumed that the initial 45 student increase will occur when the proposed building upgrades are complete (Scenario 2). The 95 student increase is assumed to occur 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.
- > 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 sec	10-15 sec
C	At or near free-flow operations	20-35 sec	15-25 sec
D	Decreasing free-flow levels	35-55 sec	25-35 sec
E	Operations at capacity	55-80 sec	35-50 sec
F	A breakdown in vehicular flow (worst condition)	≥80 sec	≥50 sec

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

8.5.2 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 8-2** 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 8-2 SIDRA Layout for Oswald Street/Hordern Street Intersection

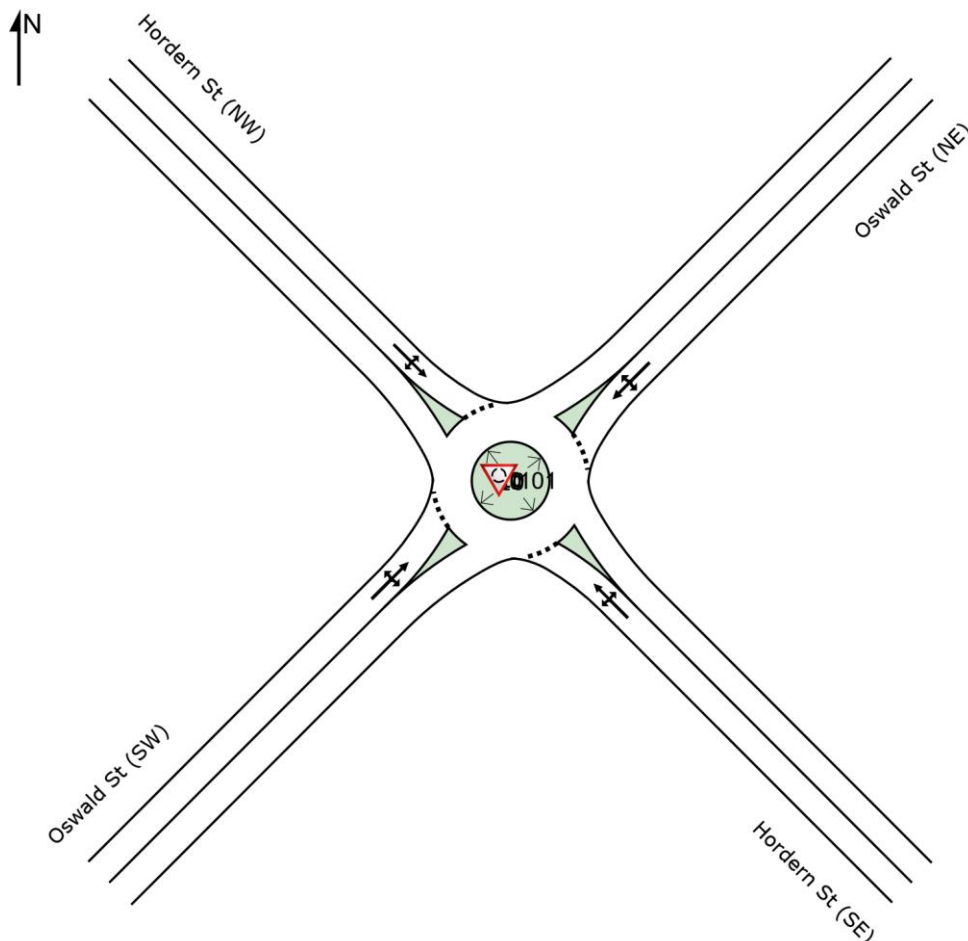


Table 8-4 SIDRA Layout for Oswald Street/Hordern Street Intersection – Scenario 1

Intersection Approach	Background 2021 + Dev (AM)					Background 2021 + Dev (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	0.056	5	A	2.1
	T	0.023	4.8	A	0.8	0.056	5.1	A	2.1
	R	0.023	8.1	A	0.8	0.056	8.4	A	2.1
Oswald St (NE)	L	0.037	4.8	A	1.4	0.114	4.8	A	4.4
	T	0.037	4.9	A	1.4	0.114	4.9	A	4.4
	R	0.037	8.1	A	1.4	0.114	8.2	A	4.4
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	0.025	4.9	A	0.9
	T	0.057	4.9	A	2	0.025	5	A	0.9
	R	0.057	8.1	A	2	0.025	8.3	A	0.9

Table 8-5 SIDRA Layout for Oswald Street/Hordern Street Intersection – Scenario 2

Intersection Approach	Background 2023 + Dev (AM)					Background 2023 + Dev (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	0.061	5.1	A	2.3
	T	0.023	4.8	A	0.8	0.061	5.2	A	2.3
	R	0.023	8.1	A	0.8	0.061	8.4	A	2.3
Oswald St (NE)	L	0.038	4.8	A	1.4	0.125	4.9	A	4.8
	T	0.038	4.9	A	1.4	0.125	4.9	A	4.8
	R	0.038	8.1	A	1.4	0.125	8.2	A	4.8
Hordern St (NW)	L	0.031	5.2	A	1.2	0.022	5.1	A	0.8
	T	0.031	5.3	A	1.2	0.022	5.2	A	0.8
	R	0.031	8.5	A	1.2	0.022	8.5	A	0.8
Oswald St (SW)	L	0.057	4.8	A	2.1	0.035	4.9	A	1.3
	T	0.057	4.9	A	2.1	0.035	5	A	1.3
	R	0.057	8.1	A	2.1	0.035	8.3	A	1.3

Table 8-6 SIDRA Layout for Oswald Street/Hordern Street Intersection – Scenario 3

Intersection Approach	Background 2033 + Dev (AM)					Background 2033 + Dev (PM)			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
Hordern St (SE)	L	0.026	4.7	A	0.9	0.072	5.2	A	2.8
	T	0.026	4.8	A	0.9	0.072	5.3	A	2.8
	R	0.026	8.1	A	0.9	0.072	8.5	A	2.8
Oswald St (NE)	L	0.042	4.8	A	1.5	0.145	5	A	5.8
	T	0.042	4.9	A	1.5	0.145	5	A	5.8
	R	0.042	8.2	A	1.5	0.145	8.3	A	5.8
Hordern St (NW)	L	0.036	5.2	A	1.3	0.026	5.2	A	1
	T	0.036	5.3	A	1.3	0.026	5.3	A	1
	R	0.036	8.6	A	1.3	0.026	8.6	A	1
Oswald St (SW)	L	0.063	4.8	A	2.3	0.05	5	A	1.8
	T	0.063	4.9	A	2.3	0.05	5	A	1.8
	R	0.063	8.2	A	2.3	0.05	8.3	A	1.8

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

8.5.3 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 8-3** 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 8-3 SIDRA Layout for Hordern Street/Colombo Street Intersection

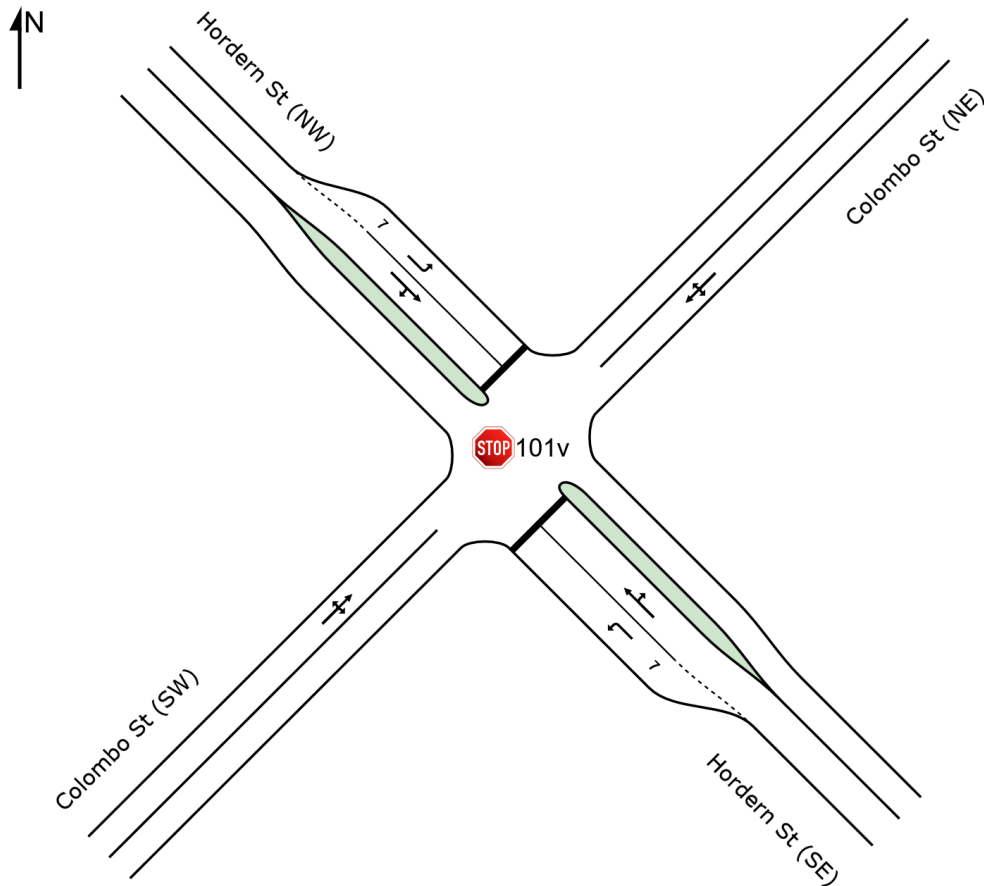


Table 8-7 SIDRA Layout for Hordern Street/Colombo Street Intersection – Scenario 1

Intersection Approach	Background 2021 (AM)				
		DOS	Delay (s)	LOS	95% Queue (m)
Hordern St (SE)	L	0.041	8.6	A	1.2
	T	0.133	9	A	3.5
	R	0.133	9.5	A	3.5
Colombo St (NE)	L	0.051	5.8	A	0.6
	T	0.051	0	A	0.6
	R	0.051	5.9	A	0.6
Hordern St (NW)	L	0.029	8.5	A	0.8
	T	0.024	8.8	A	0.6
	R	0.024	9.4	A	0.6
Colombo St (SW)	L	0.051	5.8	A	0.5
	T	0.051	0	A	0.5
	R	0.051	5.9	A	0.5

Table 8-8 SIDRA Layout for Hordern Street/Colombo Street Intersection – Scenario 2

Intersection Approach	Background 2023 + Dev (AM)				
		DOS	Delay (s)	LOS	95% Queue (m)
Hordern St (SE)	L	0.042	8.6	A	1.2
	T	0.136	9	A	3.6
	R	0.136	9.5	A	3.6
Colombo St (NE)	L	0.052	5.8	A	0.6
	T	0.052	0	A	0.6
	R	0.052	5.9	A	0.6
Hordern St (NW)	L	0.03	8.5	A	0.9
	T	0.024	8.8	A	0.6
	R	0.024	9.5	A	0.6
Colombo St (SW)	L	0.052	5.8	A	0.5
	T	0.052	0	A	0.5
	R	0.052	5.9	A	0.5

Table 8-9 SIDRA Layout for Hordern Street/Colombo Street Intersection – Scenario 3

Intersection Approach	Background 2033 + Dev (AM)				
		DOS	Delay (s)	LOS	95% Queue (m)
Hordern St (SE)	L	0.047	8.6	A	1.4
	T	0.154	9.2	A	4.1
	R	0.154	9.8	A	4.1
Colombo St (NE)	L	0.058	5.8	A	0.7
	T	0.058	0.1	A	0.7
	R	0.058	5.9	A	0.7
Hordern St (NW)	L	0.033	8.6	A	1
	T	0.026	8.9	A	0.7
	R	0.026	9.6	A	0.7
Colombo St (SW)	L	0.057	5.8	A	0.5
	T	0.057	0	A	0.5
	R	0.057	5.9	A	0.5

The SIDRA results show that this intersection will operate at an acceptable level of service for all scenarios.

9 Summary and Conclusions

This TIA assesses the proposed expansion of Victoria Park High 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 in addition to expanding the existing drop-off/pick-up area and providing more parking.
- > 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), 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	

Item	Provided	Comments/Proposals
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

GENERAL NOTES.

ALL DIMENSIONS ARE IN METRIC MILLIMETRES

THE CONTRACTOR SHALL CARRY OUT THE WORK IN ACCORDANCE WITH THE N.C.C. & LOCAL AUTHORITY REQUIREMENTS.

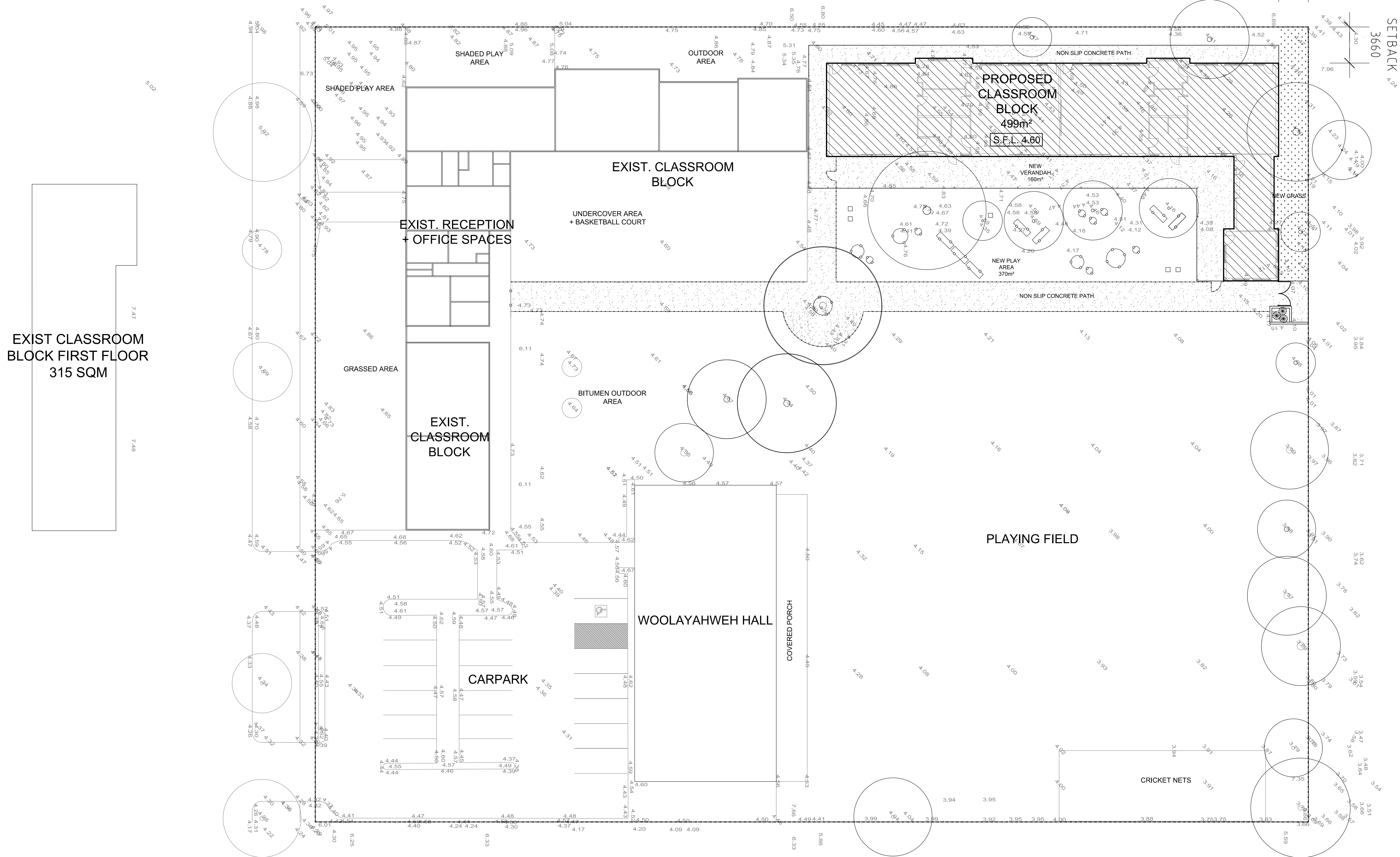
ALL MATERIAL SHALL BE OF NEW, GOOD QUALITY & CONFORM TO WHAT IS SHOW ON THE DRAWINGS.

ABBREVIATIONS.

COL STEEL COLUMN - REFER TO S.E. DWGS.
CONC CONCRETE FLOOR SLAB - REFER TO S.E. DWGS.
F.L. FLOOR LEVEL
R.L. REDUCED LEVEL
RWP RAIN WATER PIPE
S.E. STRUCTURAL ENGINEER
UAT UNIVERSAL ACCESS TOILET.

LEGEND.

S.F.L. 27.100	PROPOSED FLOOR LEVEL.
R.L. 27.60	PROPOSED FINISHED LEVEL.
34.470	EXISTING SITE LEVEL.



01 SITE PLAN.
1:200



DEVELOPMENT APPROVAL.

Architectural documents are to be read in conjunction with relevant structural, fire service, mechanical, hydraulic, electrical, civil and landscaping documents. Drawings are to be read in conjunction with the appropriate sections of technical applications.

Do not scale drawings. Use figured dimensions only. Inform Architect of any conflict between the site conditions and documents. Contractor to verify all dimensions on site before commencing work.

Copyright of designs shown herein is retained by this office. Written authority is required for any reproduction.

Rev	Date	Comment
0	11.12.20	DEVELOPMENT APPLICATION.



#: P O Box 131, Applecross WA 6953
t: (08) 9316 0531
f: (08) 9316 0531
w: mandsarchitects.com.au
ABWA Reg 2222

Project	Victoria Park Christian Primary School.
Client	Adventist Education.
Drawing Title	PROPOSED SITE PLAN.

Designed	M&S	Reduction
Drawn	M&S	

Project No.	20002	Scale	@A1	Drawing No.	Rev No.
		1:200.		SK01	0

GENERAL NOTES.

ALL DIMENSIONS ARE IN METRIC MILLIMETRES

THE CONTRACTOR SHALL CARRY OUT THE WORK IN ACCORDANCE WITH THE N.C.C. & LOCAL AUTHORITY REQUIREMENTS.

ALL MATERIAL SHALL BE OF NEW, GOOD QUALITY & CONFORM TO WHAT IS SHOW ON THE DRAWINGS.

ABBREVIATIONS.

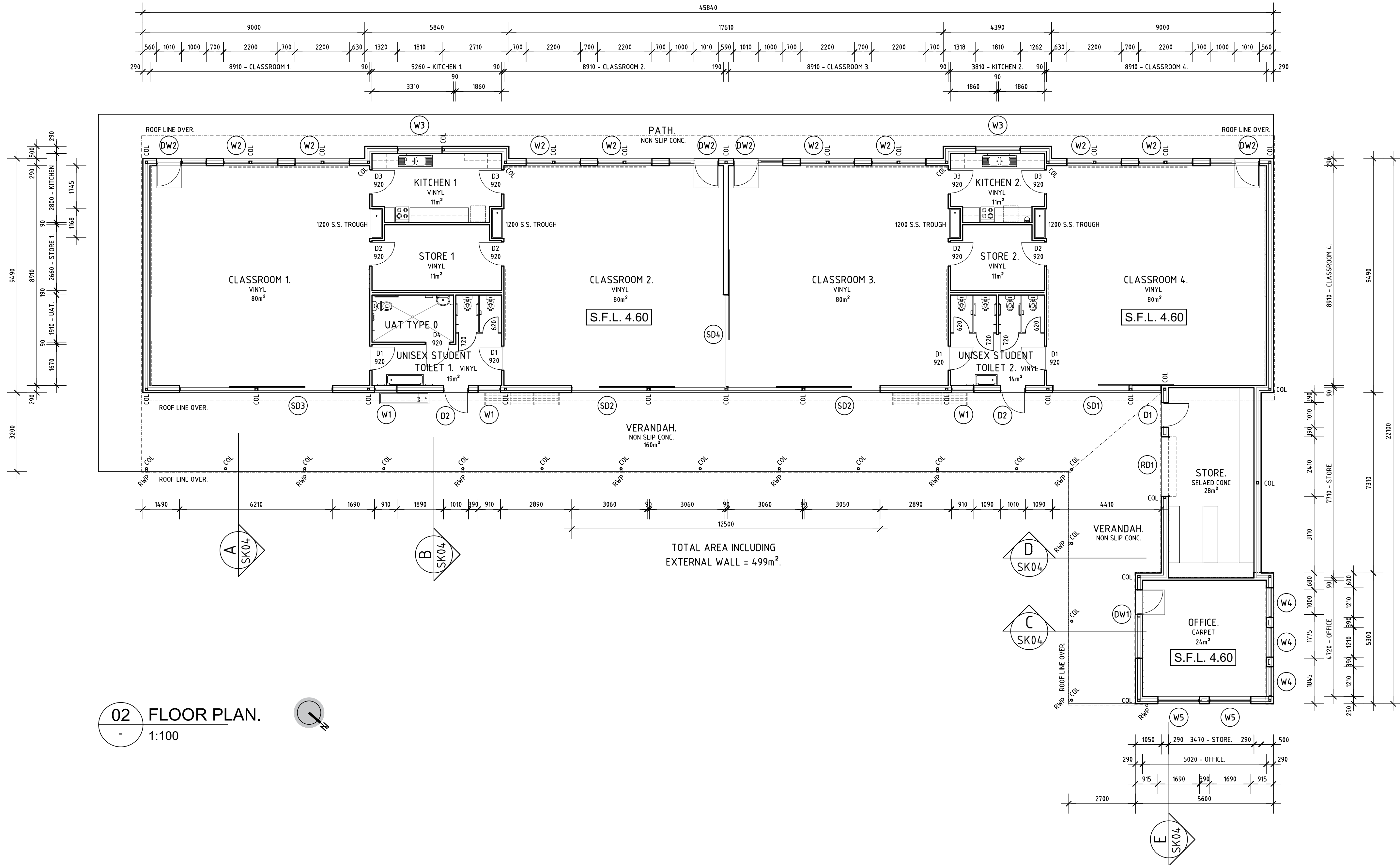
COL STEEL COLUMN - REFER TO S.E. DWGS.
CONC CONCRETE FLOOR SLAB - REFER TO S.E. DWGS.
F.L. FLOOR LEVEL
R.L. REDUCED LEVEL
RWP RAIN WATER PIPE
S.E. STRUCTURAL ENGINEER
UAT UNIVERSAL ACCESS TOILET.

LEGEND.

S.F.L. 27.100 PROPOSED FLOOR LEVEL.

R.L. 27.60 PROPOSED FINISHED LEVEL.

34.470 EXISTING SITE LEVEL.



DEVELOPMENT APPROVAL.

Architectural documents are to be read in conjunction with relevant structural, fire service, mechanical, hydraulic, electrical, civil and landscaping documents. Drawings are to be read in conjunction with the appropriate sections of technical applications.

Do not scale drawings. Use figured dimensions only. Inform Architect of any conflict between the site conditions and documents. Contractor to verify all dimensions on site before commencing work.

Copyright of designs shown herein is retained by this office. Written authority is required for any reproduction.

Rev	Date	Comment
0	11.12.20	DEVELOPMENT APPLICATION



at: P.O. Box 131, Applecross WA 6953
t: (08) 9316 0531
f: (08) 9316 0531
w: mandsarchitects.com.au
ABWA Reg 2222

Project	Victoria Park Christian Primary School.
Client	Adventist Education.
Drawing Title	PROPOSED SITE PLAN. PROPOSED FLOOR PLAN.
Designed	M&S Reduction
Drawn	M&S
Project No.	20002
Scale	@A1
Drawing No.	SK02
Rev No.	0

GENERAL NOTES.

ALL DIMENSIONS ARE IN METRIC MILLIMETRES

THE CONTRACTOR SHALL CARRY OUT THE WORK IN ACCORDANCE WITH THE N.C.C. & LOCAL AUTHORITY REQUIREMENTS.

ALL MATERIAL SHALL BE OF NEW, GOOD QUALITY & CONFORM TO WHAT IS SHOWN ON THE DRAWINGS.

ROOF LEGEND.

COLORBOND METAL DECKING AT X° PITCH ON STEEL PURLINS AS SPECIFIED. REFER TO S.E. DWGS.

SELECTED TRANSLUCENT ROOF SHEETING AS SPECIFIED.

X° FALL DIRECTION OF ROOF FALL.

SKYLIGHT AS SPECIFIED.

MECHANICAL EQUIPMENT. REFER TO MECH DWGS.

EJ EXPANSION JOINT.

O/P OVERFLOW POP FROM GUTTER.

RWP RAINWATER OUTLET IN GUTTER.

EXHAUST FAN REFER TO MECH DRAWINGS

ROOF COWL FOR EXHAUST. REFER TO MECH DRAWINGS

ROOF NOTES.

BUILDER TO PROVIDE SAFE ACCESS CONNECTIONS TO ALL PARTS OF THE ROOF IN ACCORDANCE WITH AS 1657.

CEILING LEGEND.

X TYPE OF CEILING
XX HEIGHT OF CEILING ABOVE MAIN FLOOR LEVEL, (NOT PAVING LEVEL).

FPB FLUSH PLASTERBOARD CEILING WITH 'RONDO' P50 SHADOW ANGLE CORNICE TO PERIMETER UNLESS OTHERWISE NOTED.

APT ACOUSTIC PLY TIMBER PANEL CEILING ON SUSPENDED CONCEALED CEILING SYSTEM.

NC NO CEILING - UNDERSIDE OF ROOF INSULATION.

X° PITCH DIRECTION OF FALL OF CEILING.

AP ACCESS PANEL

WALLS BUILT UP TO UNDERSIDE OF ROOF SHEETING OR STEEL STRUCTURE.

DEVELOPMENT APPROVAL.

Architectural documents are to be read in conjunction with relevant structural, fire service, mechanical, hydraulic, electrical, civil and landscaping documents. Drawings are to be read in conjunction with the appropriate sections of technical applications.

Do not scale drawings. Use figured dimensions only. Inform Architect of any conflict between the site conditions and documents. Contractor to verify all dimensions on site before commencing work.

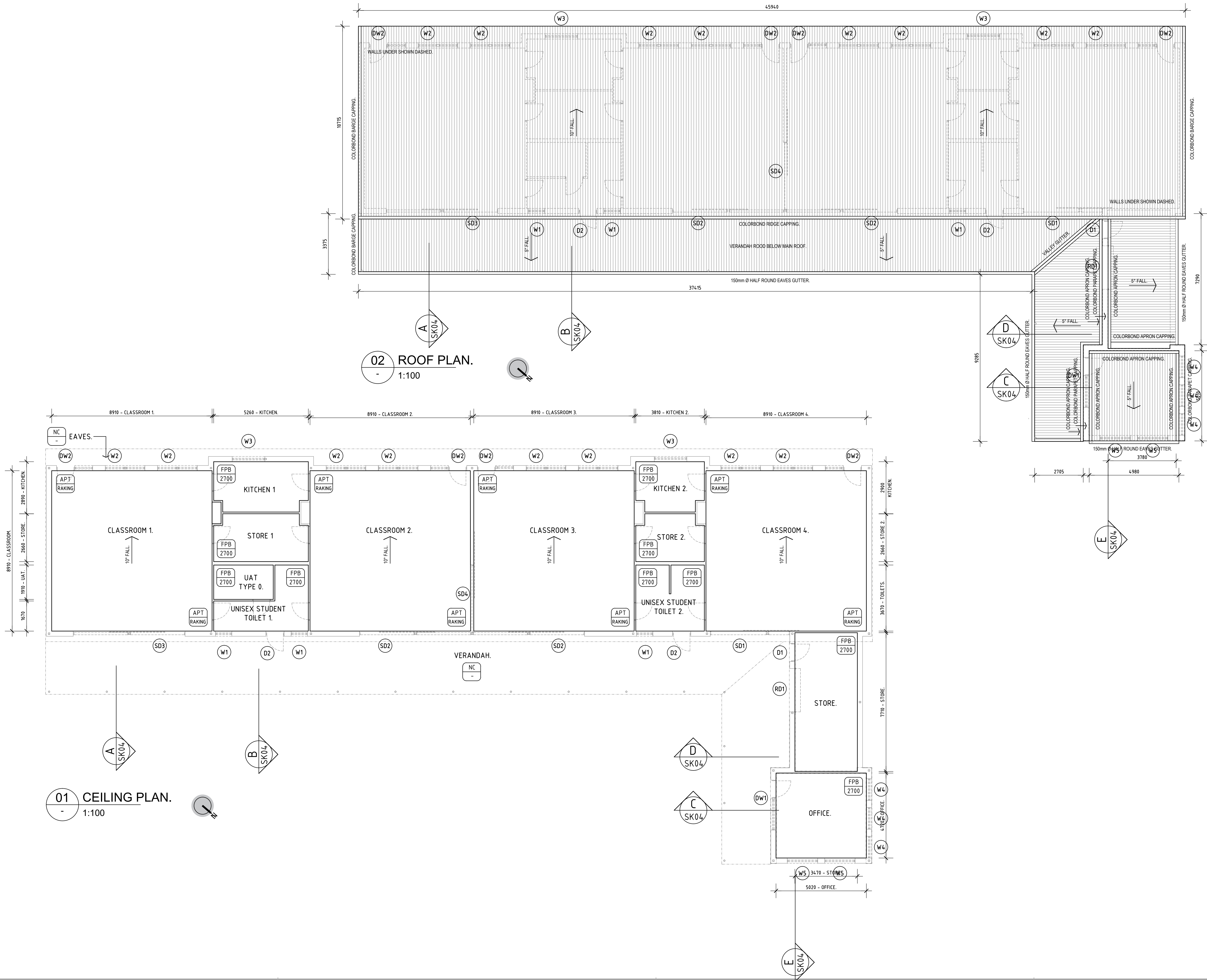
Copyright of designs shown herein is retained by this office. Written authority is required for any reproduction.

Rev	Date	Comment
0	11.12.20	DEVELOPMENT APPLICATION.

M&S
MATTHEWS & SCAVALLI
ARCHITECTS

a: P.O. Box 131, Applecross WA 6953
t: (08) 9316 0531
f: (08) 9316 0531
w: mandsarchitects.com.au
ABWA Reg. 2222

Project	Victoria Park Christian Primary School.		
Client	Adventist Education.		
Drawing Title	PROPOSED CEILING PLAN. PROPOSED ROOF PLAN.		
Designed	M&S	Reduction	SCALE 1:100
Drawn	M&S	SCALE 1:200	SCALE 1:200
Project No.	20002	Scale	SHOWN.
		Drawing No.	SK03
		Rev No.	0



GENERAL NOTES.

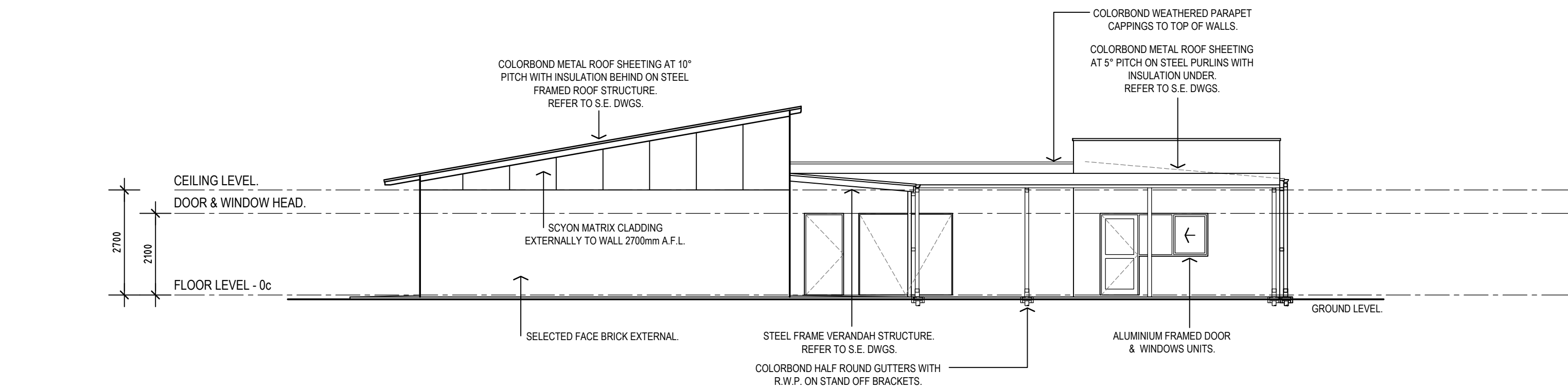
ALL DIMENSIONS ARE IN METRIC MILLIMETRES

THE CONTRACTOR SHALL CARRY OUT THE WORK IN ACCORDANCE WITH THE N.C.C. & LOCAL AUTHORITY REQUIREMENTS.

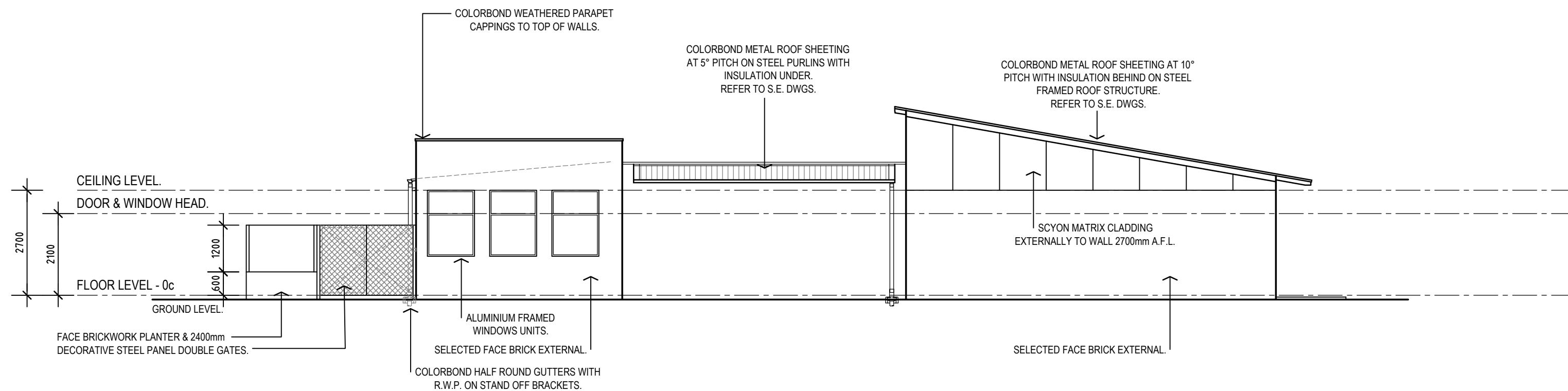
ALL MATERIAL SHALL BE OF NEW, GOOD QUALITY & CONFORM TO WHAT IS SHOW ON THE DRAWINGS.

ABBREVIATIONS.

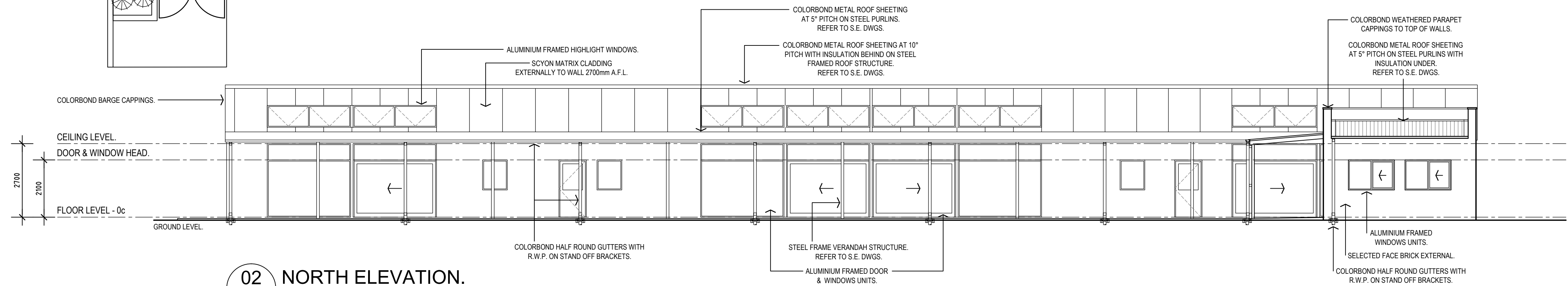
COL. STEEL COLUMN - REFER TO S.E. DWGS.
CONC. CONCRETE FLOOR SLAB - REFER TO S.E. DWGS.
F.L. FLOOR LEVEL
R.W.P. RAIN WATER PIPE
S.E. STRUCTURAL ENGINEER.



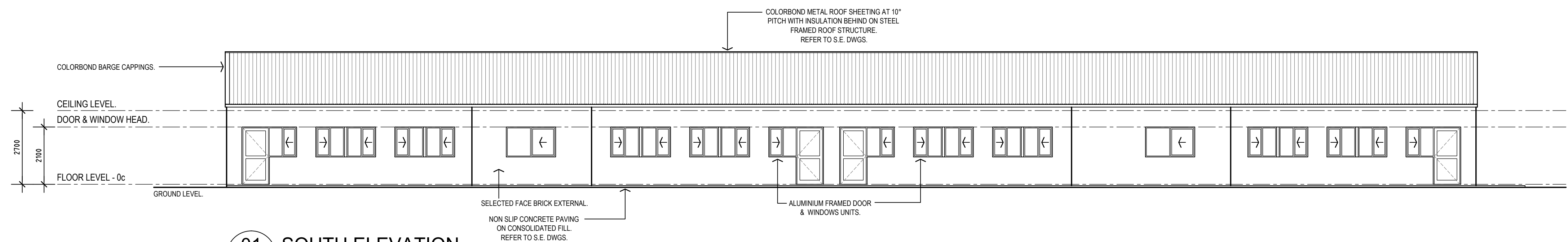
04 EAST ELEVATION.
- 1:100



03 WEST ELEVATION.
- 1:100



02 NORTH ELEVATION.
- 1:100



01 SOUTH ELEVATION.
- 1:100

DEVELOPMENT APPROVAL.

Architectural documents are to be read in conjunction with relevant structural, fire service, mechanical, hydraulic, electrical, civil and landscaping documents. Drawings are to be read in conjunction with the appropriate sections of technical applications.

Do not scale drawings. Use figured dimensions only. Inform Architect of any conflict between the site conditions and documents. Contractor to verify all dimensions on site before commencing work.

Copyright of designs shown herein is retained by this office. Written authority is required for any reproduction.

Rev	Date	Comment
0	11.12.20	DEVELOPMENT APPLICATION.



at: P.O. Box 131, Applecross WA 6953
t: (08) 9316 0531
f: (08) 9316 0531
w: mandsarchitects.com.au
ABWA Reg. 2222

Project	Victoria Park Christian Primary School.		
Client	Adventist Education.		
Drawing Title	PROPOSED ELEVATIONS.		
Designed	M&S	Reduction	
Drawn	M&S		
Project No.	20002	Scale	@A1
	1:100	Drawing No.	SK04
		Rev No.	0

ALL DIMENSIONS ARE IN METRIC MILLIMETRES

THE CONTRACTOR SHALL CARRY OUT THE WORK
IN ACCORDANCE WITH THE N.C.C. & LOCAL
AUTHORITY REQUIREMENTS.

ALL MATERIAL SHALL BE OF NEW, GOOD QUALITY
CONFORM TO WHAT IS SHOW ON THE DRAWINGS.

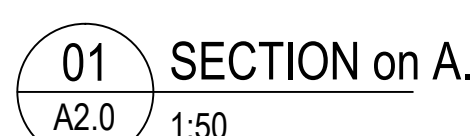
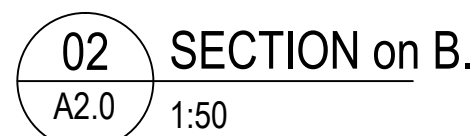
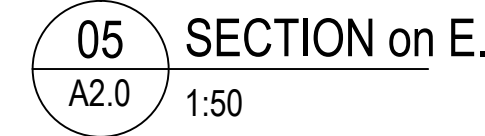
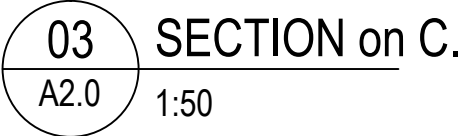
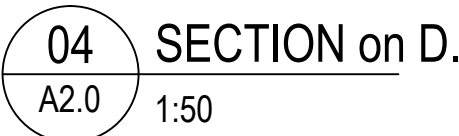
COL STEEL COLUMN - REFER TO S.E. DWGS.

CONC CONCRETE FLOOR SLAB - REFER TO S.E. DWG
F1 FLOOR LEVEL

R.L. REDUCED LEVEL.

S.E. STRUCTURAL ENGINEER.

UAT UNIVERSAL ACCESS TOILET.

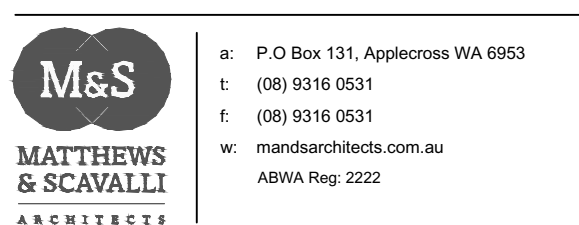


Architectural documents are to be read in conjunction with relevant structural, fire service, mechanical, hydraulic, electrical, civil and landscaping documents. Drawings are to be read in conjunction with the appropriate sections of technical applications.

Do not scale drawings. Use figured dimensions only. Inform Architect of any conflict between the site conditions and documents. Contractor to verify all dimensions on site before commencing work.

Copyright of designs shown herein is retained by this office.
Written authority is required for any reproduction.

Rev	Date	Comment
0	11.12.20	DEVELOPMENT APPLICATION.



Project	Victoria Park Christian Primary School.			
Client	Adventist Education.			
Drawing Title	PROPOSED SECTIONS.			
Designed	M&S	Reduction		
Drawn	M&S			
Project No.	20002	Scale	@A1	Drawing No.
		1:50		SK05
				0

APPENDIX

C

SIDRA RESULTS

MOVEMENT SUMMARY

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

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] m				
SouthEast: Hordern St (SE)														
21	L2	37	6.0	39	6.0	0.072	5.2	LOSA	0.4	2.8	0.27	0.58	0.27	48.0
22	T1	2	6.0	2	6.0	0.072	5.3	LOSA	0.4	2.8	0.27	0.58	0.27	49.2
23	R2	38	6.0	40	6.0	0.072	8.5	LOSA	0.4	2.8	0.27	0.58	0.27	48.6
Approach		77	6.0	81	6.0	0.072	6.8	LOSA	0.4	2.8	0.27	0.58	0.27	48.3
NorthEast: Oswald St (NE)														
24	L2	92	6.0	97	6.0	0.145	5.0	LOSA	0.8	5.8	0.19	0.51	0.19	49.6
25	T1	74	6.0	78	6.0	0.145	5.0	LOSA	0.8	5.8	0.19	0.51	0.19	54.1
26	R2	11	6.0	12	6.0	0.145	8.3	LOSA	0.8	5.8	0.19	0.51	0.19	53.7
Approach		177	6.0	186	6.0	0.145	5.2	LOSA	0.8	5.8	0.19	0.51	0.19	52.2
NorthWest: Hordern St (NW)														
27	L2	9	6.0	9	6.0	0.026	5.2	LOSA	0.1	1.0	0.27	0.50	0.27	52.8
28	T1	16	6.0	17	6.0	0.026	5.3	LOSA	0.1	1.0	0.27	0.50	0.27	49.1
29	R2	3	6.0	3	6.0	0.026	8.6	LOSA	0.1	1.0	0.27	0.50	0.27	53.3
Approach		28	6.0	29	6.0	0.026	5.6	LOSA	0.1	1.0	0.27	0.50	0.27	51.2
SouthWest: Oswald St (SW)														
30	L2	4	6.0	4	6.0	0.050	5.0	LOSA	0.3	1.8	0.19	0.56	0.19	52.2
31	T1	24	6.0	25	6.0	0.050	5.0	LOSA	0.3	1.8	0.19	0.56	0.19	53.1
32	R2	28	6.0	29	6.0	0.050	8.3	LOSA	0.3	1.8	0.19	0.56	0.19	47.2
Approach		56	6.0	59	6.0	0.050	6.7	LOSA	0.3	1.8	0.19	0.56	0.19	50.6
All Vehicles		338	6.0	356	6.0	0.145	5.8	LOSA	0.8	5.8	0.22	0.53	0.22	51.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site 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 (Geometric Delay is included).

Queue Model: SIDRA Standard.

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

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

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

Organisation: CARDNO PTY LTD | Licence: NETWORK / Enterprise | Processed: Friday, 12 March 2021 11:11:39 AM

Project: K:\Projects\CW1167400_Adventist Education WA_TIS_Victoria Park Christian School\5_Technical\Traffic\Modelling\SIDRA Model (no PM for colombo-hordern).sip9

MOVEMENT SUMMARY

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

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %	v/c	sec		[Veh. veh	Dist] m				km/h
SouthEast: Hordern St (SE)														
21	L2	9	6.0	9	6.0	0.023	4.7	LOS A	0.1	0.8	0.11	0.58	0.11	48.5
22	T1	4	6.0	4	6.0	0.023	4.8	LOS A	0.1	0.8	0.11	0.58	0.11	49.7
23	R2	14	6.0	15	6.0	0.023	8.1	LOS A	0.1	0.8	0.11	0.58	0.11	49.1
Approach		27	6.0	28	6.0	0.023	6.5	LOS A	0.1	0.8	0.11	0.58	0.11	49.0
NorthEast: Oswald St (NE)														
24	L2	25	6.0	26	6.0	0.037	4.8	LOS A	0.2	1.4	0.13	0.53	0.13	49.5
25	T1	11	6.0	12	6.0	0.037	4.9	LOS A	0.2	1.4	0.13	0.53	0.13	54.1
26	R2	8	6.0	8	6.0	0.037	8.1	LOS A	0.2	1.4	0.13	0.53	0.13	53.6
Approach		44	6.0	46	6.0	0.037	5.4	LOS A	0.2	1.4	0.13	0.53	0.13	51.9
NorthWest: Hordern St (NW)														
27	L2	17	6.0	18	6.0	0.031	5.2	LOS A	0.2	1.2	0.26	0.50	0.26	53.1
28	T1	16	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	1	6.0	1	6.0	0.031	8.5	LOS A	0.2	1.2	0.26	0.50	0.26	53.6
Approach		34	6.0	36	6.0	0.031	5.3	LOS A	0.2	1.2	0.26	0.50	0.26	51.8
SouthWest: Oswald St (SW)														
30	L2	1	6.0	1	6.0	0.057	4.8	LOS A	0.3	2.0	0.13	0.49	0.13	53.2
31	T1	58	6.0	61	6.0	0.057	4.9	LOS A	0.3	2.0	0.13	0.49	0.13	54.1
32	R2	10	6.0	11	6.0	0.057	8.1	LOS A	0.3	2.0	0.13	0.49	0.13	48.5
Approach		69	6.0	73	6.0	0.057	5.4	LOS A	0.3	2.0	0.13	0.49	0.13	53.5
All Vehicles		174	6.0	183	6.0	0.057	5.5	LOS A	0.3	2.0	0.15	0.52	0.15	52.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site 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 (Geometric Delay is included).

Queue Model: SIDRA Standard.

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

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

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

Organisation: CARDNO PTY LTD | Licence: NETWORK / Enterprise | Processed: Friday, 12 March 2021 11:11:25 AM

Project: K:\Projects\CW1167400_Adventist Education WA_TIS_Victoria Park Christian School\5_Technical\Traffic\Modelling\SIDRA Model (no PM for colombo-hordern).sip9

MOVEMENT SUMMARY

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

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %	v/c	sec		[Veh. veh	Dist] m				km/h
SouthEast: Hordern St (SE)														
21	L2	26	6.0	27	6.0	0.056	5.0	LOS A	0.3	2.1	0.23	0.58	0.23	48.0
22	T1	2	6.0	2	6.0	0.056	5.1	LOS A	0.3	2.1	0.23	0.58	0.23	49.2
23	R2	34	6.0	36	6.0	0.056	8.4	LOS A	0.3	2.1	0.23	0.58	0.23	48.6
Approach		62	6.0	65	6.0	0.056	6.9	LOS A	0.3	2.1	0.23	0.58	0.23	48.4
NorthEast: Oswald St (NE)														
24	L2	82	6.0	86	6.0	0.114	4.8	LOS A	0.6	4.4	0.14	0.51	0.14	49.8
25	T1	52	6.0	55	6.0	0.114	4.9	LOS A	0.6	4.4	0.14	0.51	0.14	54.3
26	R2	10	6.0	11	6.0	0.114	8.2	LOS A	0.6	4.4	0.14	0.51	0.14	53.9
Approach		144	6.0	152	6.0	0.114	5.1	LOS A	0.6	4.4	0.14	0.51	0.14	52.2
NorthWest: Hordern St (NW)														
27	L2	8	6.0	8	6.0	0.022	5.0	LOS A	0.1	0.8	0.22	0.49	0.22	53.1
28	T1	14	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	2	6.0	2	6.0	0.022	8.4	LOS A	0.1	0.8	0.22	0.49	0.22	53.5
Approach		24	6.0	25	6.0	0.022	5.4	LOS A	0.1	0.8	0.22	0.49	0.22	51.4
SouthWest: Oswald St (SW)														
30	L2	2	6.0	2	6.0	0.025	4.9	LOS A	0.1	0.9	0.18	0.56	0.18	52.2
31	T1	12	6.0	13	6.0	0.025	5.0	LOS A	0.1	0.9	0.18	0.56	0.18	53.1
32	R2	14	6.0	15	6.0	0.025	8.3	LOS A	0.1	0.9	0.18	0.56	0.18	47.2
Approach		28	6.0	29	6.0	0.025	6.6	LOS A	0.1	0.9	0.18	0.56	0.18	50.7
All Vehicles		258	6.0	272	6.0	0.114	5.7	LOS A	0.6	4.4	0.17	0.53	0.17	51.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site 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 (Geometric Delay is included).

Queue Model: SIDRA Standard.

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

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

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

Organisation: CARDNO PTY LTD | Licence: NETWORK / Enterprise | Processed: Friday, 12 March 2021 11:11:26 AM

Project: K:\Projects\CW1167400_Adventist Education WA_TIS_Victoria Park Christian School\5_Technical\Traffic\Modelling\SIDRA Model (no PM for colombo-hordern).sip9

MOVEMENT SUMMARY

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

New Site

Site Category: (None)

Stop (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] m				
SouthEast: Hordern St (SE)														
21	L2	51	6.0	54	6.0	0.041	8.6	LOSA	0.2	1.2	0.18	0.90	0.18	51.5
22	T1	9	6.0	9	6.0	0.133	9.0	LOSA	0.5	3.5	0.36	0.92	0.36	46.3
23	R2	88	6.0	93	6.0	0.133	9.5	LOSA	0.5	3.5	0.36	0.92	0.36	50.7
Approach		148	6.0	156	6.0	0.133	9.1	LOSA	0.5	3.5	0.30	0.91	0.30	50.8
NorthEast: Colombo St (NE)														
24	L2	8	6.0	8	6.0	0.051	5.8	LOSA	0.1	0.6	0.06	0.11	0.06	56.8
25	T1	72	6.0	76	6.0	0.051	0.0	LOSA	0.1	0.6	0.06	0.11	0.06	58.7
26	R2	10	6.0	11	6.0	0.051	5.9	LOSA	0.1	0.6	0.06	0.11	0.06	41.5
Approach		90	6.0	95	6.0	0.051	1.2	NA	0.1	0.6	0.06	0.11	0.06	56.9
NorthWest: Hordern St (NW)														
27	L2	36	6.0	38	6.0	0.029	8.5	LOSA	0.1	0.8	0.18	0.90	0.18	47.2
28	T1	20	6.0	21	6.0	0.024	8.8	LOSA	0.1	0.6	0.29	0.93	0.29	46.8
29	R2	1	6.0	1	6.0	0.024	9.4	LOSA	0.1	0.6	0.29	0.93	0.29	46.8
Approach		57	6.0	60	6.0	0.029	8.6	LOSA	0.1	0.8	0.22	0.91	0.22	47.0
SouthWest: Colombo St (SW)														
30	L2	6	6.0	6	6.0	0.051	5.8	LOSA	0.1	0.5	0.05	0.09	0.05	31.3
31	T1	76	6.0	80	6.0	0.051	0.0	LOSA	0.1	0.5	0.05	0.09	0.05	59.0
32	R2	8	6.0	8	6.0	0.051	5.9	LOSA	0.1	0.5	0.05	0.09	0.05	57.1
Approach		90	6.0	95	6.0	0.051	0.9	NA	0.1	0.5	0.05	0.09	0.05	56.7
All Vehicles		385	6.0	405	6.0	0.133	5.3	NA	0.5	3.5	0.17	0.53	0.17	53.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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

Queue Model: SIDRA Standard.

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

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

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

Organisation: CARDNO PTY LTD | Licence: NETWORK / Enterprise | Processed: Friday, 12 March 2021 11:11:26 AM

Project: K:\Projects\CW1167400_Adventist Education WA_TIS_Victoria Park Christian School\5_Technical\Traffic\Modelling\SIDRA Model (no PM for colombo-hordern).sip9

MOVEMENT SUMMARY

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

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %	v/c	sec		[Veh. veh	Dist m				km/h
SouthEast: Hordern St (SE)														
21	L2	9	6.0	9	6.0	0.023	4.7	LOS A	0.1	0.8	0.11	0.58	0.11	48.5
22	T1	4	6.0	4	6.0	0.023	4.8	LOS A	0.1	0.8	0.11	0.58	0.11	49.7
23	R2	14	6.0	15	6.0	0.023	8.1	LOS A	0.1	0.8	0.11	0.58	0.11	49.1
Approach		27	6.0	28	6.0	0.023	6.5	LOS A	0.1	0.8	0.11	0.58	0.11	49.0
NorthEast: Oswald St (NE)														
24	L2	26	6.0	27	6.0	0.038	4.8	LOS A	0.2	1.4	0.13	0.53	0.13	49.6
25	T1	11	6.0	12	6.0	0.038	4.9	LOS A	0.2	1.4	0.13	0.53	0.13	54.1
26	R2	8	6.0	8	6.0	0.038	8.1	LOS A	0.2	1.4	0.13	0.53	0.13	53.6
Approach		45	6.0	47	6.0	0.038	5.4	LOS A	0.2	1.4	0.13	0.53	0.13	51.8
NorthWest: Hordern St (NW)														
27	L2	17	6.0	18	6.0	0.031	5.2	LOS A	0.2	1.2	0.26	0.50	0.26	53.1
28	T1	16	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	1	6.0	1	6.0	0.031	8.5	LOS A	0.2	1.2	0.26	0.50	0.26	53.6
Approach		34	6.0	36	6.0	0.031	5.3	LOS A	0.2	1.2	0.26	0.50	0.26	51.8
SouthWest: Oswald St (SW)														
30	L2	1	6.0	1	6.0	0.057	4.8	LOS A	0.3	2.1	0.13	0.49	0.13	53.2
31	T1	59	6.0	62	6.0	0.057	4.9	LOS A	0.3	2.1	0.13	0.49	0.13	54.1
32	R2	10	6.0	11	6.0	0.057	8.1	LOS A	0.3	2.1	0.13	0.49	0.13	48.5
Approach		70	6.0	74	6.0	0.057	5.3	LOS A	0.3	2.1	0.13	0.49	0.13	53.5
All Vehicles		176	6.0	185	6.0	0.057	5.5	LOS A	0.3	2.1	0.15	0.52	0.15	52.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site 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 (Geometric Delay is included).

Queue Model: SIDRA Standard.

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

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

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

Organisation: CARDNO PTY LTD | Licence: NETWORK / Enterprise | Processed: Friday, 12 March 2021 11:11:32 AM

Project: K:\Projects\CW1167400_Adventist Education WA_TIS_Victoria Park Christian School\5_Technical\Traffic\Modelling\SIDRA Model (no PM for colombo-hordern).sip9

MOVEMENT SUMMARY

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

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %	v/c	sec		[Veh. veh	Dist] m				km/h
SouthEast: Hordern St (SE)														
21	L2	30	6.0	32	6.0	0.061	5.1	LOS A	0.3	2.3	0.24	0.58	0.24	48.0
22	T1	2	6.0	2	6.0	0.061	5.2	LOS A	0.3	2.3	0.24	0.58	0.24	49.2
23	R2	35	6.0	37	6.0	0.061	8.4	LOS A	0.3	2.3	0.24	0.58	0.24	48.6
Approach		67	6.0	71	6.0	0.061	6.8	LOS A	0.3	2.3	0.24	0.58	0.24	48.3
NorthEast: Oswald St (NE)														
24	L2	84	6.0	88	6.0	0.125	4.9	LOS A	0.7	4.8	0.16	0.51	0.16	49.8
25	T1	61	6.0	64	6.0	0.125	4.9	LOS A	0.7	4.8	0.16	0.51	0.16	54.2
26	R2	10	6.0	11	6.0	0.125	8.2	LOS A	0.7	4.8	0.16	0.51	0.16	53.8
Approach		155	6.0	163	6.0	0.125	5.1	LOS A	0.7	4.8	0.16	0.51	0.16	52.3
NorthWest: Hordern St (NW)														
27	L2	8	6.0	8	6.0	0.022	5.1	LOS A	0.1	0.8	0.24	0.49	0.24	53.0
28	T1	14	6.0	15	6.0	0.022	5.2	LOS A	0.1	0.8	0.24	0.49	0.24	49.4
29	R2	2	6.0	2	6.0	0.022	8.5	LOS A	0.1	0.8	0.24	0.49	0.24	53.5
Approach		24	6.0	25	6.0	0.022	5.4	LOS A	0.1	0.8	0.24	0.49	0.24	51.3
SouthWest: Oswald St (SW)														
30	L2	3	6.0	3	6.0	0.035	4.9	LOS A	0.2	1.3	0.18	0.56	0.18	52.2
31	T1	17	6.0	18	6.0	0.035	5.0	LOS A	0.2	1.3	0.18	0.56	0.18	53.1
32	R2	20	6.0	21	6.0	0.035	8.3	LOS A	0.2	1.3	0.18	0.56	0.18	47.2
Approach		40	6.0	42	6.0	0.035	6.6	LOS A	0.2	1.3	0.18	0.56	0.18	50.6
All Vehicles		286	6.0	301	6.0	0.125	5.8	LOS A	0.7	4.8	0.19	0.53	0.19	51.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site 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 (Geometric Delay is included).

Queue Model: SIDRA Standard.

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

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

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

Organisation: CARDNO PTY LTD | Licence: NETWORK / Enterprise | Processed: Friday, 12 March 2021 11:11:32 AM

Project: K:\Projects\CW1167400_Adventist Education WA_TIS_Victoria Park Christian School\5_Technical\Traffic\Modelling\SIDRA Model (no PM for colombo-hordern).sip9

MOVEMENT SUMMARY

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

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

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total HV] [Total veh/h %]		DEMAND FLOWS [Total HV] [Total veh/h %]		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. Dist] [Veh. veh m]		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Hordern St (SE)														
21	L2	52	6.0	55	6.0	0.042	8.6	LOS A	0.2	1.2	0.18	0.90	0.18	51.5
22	T1	9	6.0	9	6.0	0.136	9.0	LOS A	0.5	3.6	0.36	0.92	0.36	46.3
23	R2	90	6.0	95	6.0	0.136	9.5	LOS A	0.5	3.6	0.36	0.92	0.36	50.7
Approach		151	6.0	159	6.0	0.136	9.2	LOS A	0.5	3.6	0.30	0.91	0.30	50.8
NorthEast: Colombo St (NE)														
24	L2	8	6.0	8	6.0	0.052	5.8	LOS A	0.1	0.6	0.06	0.11	0.06	56.8
25	T1	73	6.0	77	6.0	0.052	0.0	LOS A	0.1	0.6	0.06	0.11	0.06	58.7
26	R2	10	6.0	11	6.0	0.052	5.9	LOS A	0.1	0.6	0.06	0.11	0.06	41.5
Approach		91	6.0	96	6.0	0.052	1.2	NA	0.1	0.6	0.06	0.11	0.06	56.9
NorthWest: Hordern St (NW)														
27	L2	37	6.0	39	6.0	0.030	8.5	LOS A	0.1	0.9	0.18	0.89	0.18	47.2
28	T1	20	6.0	21	6.0	0.024	8.8	LOS A	0.1	0.6	0.30	0.93	0.30	46.8
29	R2	1	6.0	1	6.0	0.024	9.5	LOS A	0.1	0.6	0.30	0.93	0.30	46.8
Approach		58	6.0	61	6.0	0.030	8.6	LOS A	0.1	0.9	0.23	0.91	0.23	47.0
SouthWest: Colombo St (SW)														
30	L2	6	6.0	6	6.0	0.052	5.8	LOS A	0.1	0.5	0.05	0.09	0.05	31.3
31	T1	78	6.0	82	6.0	0.052	0.0	LOS A	0.1	0.5	0.05	0.09	0.05	59.0
32	R2	8	6.0	8	6.0	0.052	5.9	LOS A	0.1	0.5	0.05	0.09	0.05	57.1
Approach		92	6.0	97	6.0	0.052	0.9	NA	0.1	0.5	0.05	0.09	0.05	56.8
All Vehicles		392	6.0	413	6.0	0.136	5.3	NA	0.5	3.6	0.17	0.53	0.17	53.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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

Queue Model: SIDRA Standard.

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

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

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

Organisation: CARDNO PTY LTD | Licence: NETWORK / Enterprise | Processed: Friday, 12 March 2021 11:11:33 AM

Project: K:\Projects\CW1167400_Adventist Education WA_TIS_Victoria Park Christian School\5_Technical\Traffic\Modelling\SIDRA Model (no PM for colombo-hordern).sip9

MOVEMENT SUMMARY

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

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total HV] veh/h %		DEMAND FLOWS [Total HV] veh/h %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. Dist] veh m		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Hordern St (SE)														
21	L2	10	6.0	11	6.0	0.026	4.7	LOS A	0.1	0.9	0.12	0.58	0.12	48.4
22	T1	4	6.0	4	6.0	0.026	4.8	LOS A	0.1	0.9	0.12	0.58	0.12	49.7
23	R2	16	6.0	17	6.0	0.026	8.1	LOS A	0.1	0.9	0.12	0.58	0.12	49.1
Approach		30	6.0	32	6.0	0.026	6.5	LOS A	0.1	0.9	0.12	0.58	0.12	48.9
NorthEast: Oswald St (NE)														
24	L2	28	6.0	29	6.0	0.042	4.8	LOS A	0.2	1.5	0.14	0.53	0.14	49.5
25	T1	12	6.0	13	6.0	0.042	4.9	LOS A	0.2	1.5	0.14	0.53	0.14	54.0
26	R2	9	6.0	9	6.0	0.042	8.2	LOS A	0.2	1.5	0.14	0.53	0.14	53.6
Approach		49	6.0	52	6.0	0.042	5.5	LOS A	0.2	1.5	0.14	0.53	0.14	51.8
NorthWest: Hordern St (NW)														
27	L2	19	6.0	20	6.0	0.036	5.2	LOS A	0.2	1.3	0.27	0.50	0.27	53.0
28	T1	18	6.0	19	6.0	0.036	5.3	LOS A	0.2	1.3	0.27	0.50	0.27	49.4
29	R2	1	6.0	1	6.0	0.036	8.6	LOS A	0.2	1.3	0.27	0.50	0.27	53.5
Approach		38	6.0	40	6.0	0.036	5.4	LOS A	0.2	1.3	0.27	0.50	0.27	51.7
SouthWest: Oswald St (SW)														
30	L2	1	6.0	1	6.0	0.063	4.8	LOS A	0.3	2.3	0.13	0.49	0.13	53.1
31	T1	65	6.0	68	6.0	0.063	4.9	LOS A	0.3	2.3	0.13	0.49	0.13	54.1
32	R2	11	6.0	12	6.0	0.063	8.2	LOS A	0.3	2.3	0.13	0.49	0.13	48.5
Approach		77	6.0	81	6.0	0.063	5.4	LOS A	0.3	2.3	0.13	0.49	0.13	53.5
All Vehicles		194	6.0	204	6.0	0.063	5.6	LOS A	0.3	2.3	0.16	0.52	0.16	52.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site 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 (Geometric Delay is included).

Queue Model: SIDRA Standard.

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

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

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

Organisation: CARDNO PTY LTD | Licence: NETWORK / Enterprise | Processed: Friday, 12 March 2021 11:11:38 AM

Project: K:\Projects\CW1167400_Adventist Education WA_TIS_Victoria Park Christian School\5_Technical\Traffic\Modelling\SIDRA Model (no PM for colombo-hordern).sip9

MOVEMENT SUMMARY

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

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

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total HV] veh/h %		DEMAND FLOWS [Total HV] veh/h %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. Dist] veh m		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Hordern St (SE)														
21	L2	57	6.0	60	6.0	0.047	8.6	LOS A	0.2	1.4	0.19	0.89	0.19	51.5
22	T1	10	6.0	11	6.0	0.154	9.2	LOS A	0.6	4.1	0.39	0.93	0.39	46.1
23	R2	99	6.0	104	6.0	0.154	9.8	LOS A	0.6	4.1	0.39	0.93	0.39	50.5
Approach		166	6.0	175	6.0	0.154	9.3	LOS A	0.6	4.1	0.32	0.92	0.32	50.7
NorthEast: Colombo St (NE)														
24	L2	9	6.0	9	6.0	0.058	5.8	LOS A	0.1	0.7	0.06	0.11	0.06	56.8
25	T1	81	6.0	85	6.0	0.058	0.1	LOS A	0.1	0.7	0.06	0.11	0.06	58.7
26	R2	11	6.0	12	6.0	0.058	5.9	LOS A	0.1	0.7	0.06	0.11	0.06	41.5
Approach		101	6.0	106	6.0	0.058	1.2	NA	0.1	0.7	0.06	0.11	0.06	56.9
NorthWest: Hordern St (NW)														
27	L2	40	6.0	42	6.0	0.033	8.6	LOS A	0.1	1.0	0.19	0.89	0.19	47.2
28	T1	22	6.0	23	6.0	0.026	8.9	LOS A	0.1	0.7	0.31	0.93	0.31	46.7
29	R2	1	6.0	1	6.0	0.026	9.6	LOS A	0.1	0.7	0.31	0.93	0.31	46.7
Approach		63	6.0	66	6.0	0.033	8.7	LOS A	0.1	1.0	0.24	0.91	0.24	47.0
SouthWest: Colombo St (SW)														
30	L2	7	6.0	7	6.0	0.057	5.8	LOS A	0.1	0.5	0.05	0.09	0.05	31.3
31	T1	85	6.0	89	6.0	0.057	0.0	LOS A	0.1	0.5	0.05	0.09	0.05	58.9
32	R2	9	6.0	9	6.0	0.057	5.9	LOS A	0.1	0.5	0.05	0.09	0.05	57.1
Approach		101	6.0	106	6.0	0.057	1.0	NA	0.1	0.5	0.05	0.09	0.05	56.6
All Vehicles		431	6.0	454	6.0	0.154	5.4	NA	0.6	4.1	0.18	0.53	0.18	53.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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

Queue Model: SIDRA Standard.

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

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

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

Organisation: CARDNO PTY LTD | Licence: NETWORK / Enterprise | Processed: Friday, 12 March 2021 11:11:39 AM

Project: K:\Projects\CW1167400_Adventist Education WA_TIS_Victoria Park Christian School\5_Technical\Traffic\Modelling\SIDRA Model (no PM for colombo-hordern).sip9

Title	Transport Impact Assessment Addendum	Client	Adventist Education
Project Number	CW1167400	Date	04/05/2021
Author	Edmond Hoang	Reviewer	Ray Cook
Status	For Issue (Rev A)	Discipline	Traffic and Transport

1 Introduction

This Transport Impact Assessment (TIA) Addendum aims to address the comments provided by the Town of Victoria Park in regards to traffic and parking. The Town's comments are as listed below:

- > *The Town would consider a "Kiss n drive" zone on Oswald Street utilising the schools frontage. This request would have to be supported by a traffic management plan. It should be noted that "Kiss n Drive" zones only work effectively when parents/ care givers do not leave their car.*
- > *It is correct that the traffic report has advised of many transport modes. However, the breakdown of travel modes does not indicate the existing school parking can support the proposed expansion.*
- > *It is estimated that 51 students will use the school bus service. It's all so noted that walking and cycling trips will be very low. This is likely because of the school not being catchment based. Thus this leaves 179 car trips that will either use the "Kiss n drive", existing street parking or on-site school parking. The proposed on-site supply of 1 car park is considered inadequate. This is not practical for kindergarten and pre-primary students who are likely to require parents/care givers to park and leave their cars to assist them during drop-off and pick-up. The risk of queuing out of the car park and along Oswald Street is also concerning.*

The following three Sections address the above 3 comments in sequence in a manner agreed with the City via email communication on 22 April 2021.

2 Oswald Street Kiss and Drop Traffic Management

Figure 2-1 shows the existing on-street bays proposed to be utilised as a kiss and drop.

Figure 2-1 Delineated Bays Along the School Frontage on Oswald Street



The proposed and drop zone would be utilised by Kindy to Year 2 families from Monday to Friday. A staff member would be allocated each morning and afternoon to supervise this area. The operating times for this kiss and drop arrangement would be between 8:30-8:45am and 3:00-3:30pm. The parents would approach from the eastern end of Oswald and exit to the west utilising the already existing parallel parking delineated on the street. To ensure that parents are not parking for long periods, school staff will ask them to leave after a short period and circulate around the block.

Prior to the operation of the proposed kiss and drop, parents will be educated via newsletters and school information on the appropriate etiquette for the kiss and ride area to prevent any potential queuing of other traffic issues.

3 Breakdown of Transport Modes

The school operates a private bus service to transport students to and from school. Approximately 30 students currently use this service (which is approximately 22% of the current student population of 135). It is assumed that the same proportion of students will also use the private bus service in the future (for the medium term student population of 180, approximately 40 students are estimated to use the private bus service and for a future student population of 230, approximately 51 students are estimated to use the private bus service.)

This leaves approximately 179 students who are likely to travel via private vehicle. It is likely that there will be some students that will walk however this is likely to be low. To determine the actual number of vehicle trips, there is a need to account for the fact that families can potentially have more than one child attending the same school who are likely to be dropped-off/picked-up at the same time.

Additional information provided by the school mentions that there are currently 90 families which are a part of the school. Therefore, for a school population of 135 students this equates to approximately 1.5 students per family. As each family is likely to only perform a single trip during pick-up and drop-off periods, the anticipated number of vehicle trips is approximately 120 ($179/1.5$).

Table 3-1 provides a summary of the anticipated number of vehicle trips for the medium term (180 students) and long term (230 students).

Table 3-1 Transport modes breakdown – Medium term and Long term

Anticipated Student Numbers	Students using bus service	Students traveling by car	Total car trips
180	40	140	94
230	51	179	120

4 Parking Impact within the Surrounding Area

Based on the above assessment, the likely demand during the morning and afternoon school pick-up and drop-off is 94 vehicles in the medium term and 120 vehicles in the long term.

Table provides a summary of the parking available within the school and the surrounding area and its estimated capacity. The following assumptions for this high level parking impact assessment are as follows:

- > There are a total of 21 bays within the school car park. It is assumed that 15 of these bays will be assigned to staff and the remaining 6 for visitors.
- > It is assumed that the duration of pick-up/drop-off during the morning and afternoon is approximately 30mins.
- > For quick drop-offs/pick-ups it is assumed that these people stay 5 mins on average.
- > For drop-offs/pick-ups which involve a long period of stay (e.g. parents guiding kindy and pre-primary students to the school), it is assumed that these users stay for approximately 15 mins.
- > Nearby on-street parking within 200m has also been considered as parents are likely to also park in these locations and walk to the school with their child due to limited parking available adjacent to the school. As this is considered to be public parking, it is assumed that only 50% of these bays will be available to account for other users.

Table 4-1 Parking Capacity

Parking Location	Parking duration	Number of bays available	Total number of cars that can be accommodated over a 30 min period
Current kiss and drop	5 mins	2	12*
Proposed Oswald Street kiss and drop	5 mins	7	42
Verge parking along Colombo Street on school frontage	15 mins	Approximately 15 bays	30
School car park (visitor)	15 mins	6 bays	12
Oswald Street (between Washington Street and Albany Highway)	15 mins (2P time limit)	Approximately 27	27
Hordern Street (between Armagh Street and Colombo Street)	15 mins (2P time limit)	Approximately 38	38
Colombo Street (between Washington Street and Albany Highway)	15 mins (2P time limit)	Approximately 30	30
Total			191

* Based on the information provided by the school, it is estimated that approximately 20 vehicles use the existing kiss and drop facility within the car park each day. Given to low volume of user of this kiss and ride, queuing and compliance does not appear to be an issue.

The above demonstrates that the school surrounds has/will have capacity to service around 191 vehicles during the pick-up/drop-off periods which is adequate for the demand of 120 vehicles estimated in the long term scenario. As is typically expected at most schools, the pick-up/drop-off periods will be quite busy but only for a short period (typically no longer than 30 mins).

Figure 4-2 Current Parking Arrangement for the Site



4.2 Parking Management Measures

The following is a list of additional parking management measures that the school will consider to reduce the impact of parking within the surrounding area of the school.

4.2.1 Staggered start and finish times for different year levels

By designating different start and finishing times for certain year levels, the level of traffic during pick-up and drop-off times can be managed to a certain extent by reducing the peak demand. However, this may increase the duration of the demand period.

4.2.2 Verge Parking along Colombo Street on School Frontage

Though the verge is not considered to be a formalised parking area, it is still currently being used by the school as an area where parents can park.

4.2.3 Encouraging use of School Bus Service

Almost a quarter of the school population currently utilise the school bus service which helps to reduce the traffic and parking impact to the school and surrounding area. Promoting and encouraging more families to use this service is likely to reduce vehicle trips to and from the school.

4.2.4 Future Additional Parking

The Victoria Parking Christian School Master Development Plan (2018) includes plans to provide an additional 6 parking bays for staff and visitors at the south west corner of the School. Note that the provision of these bays is likely to be under a separated application for the future student population of 230 students.

