

# Transport Impact Assessment

Joseph Banks Secondary College  
Redevelopment

CW1152200



Prepared for  
With\_ Architecture Studio

18 March 2021

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# 1 Introduction

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## 1.1 Background

Cardno have been commissioned by With Architecture Studio on behalf of the Government of Western Australia, Department of Finance to prepare a Transport Impact Assessment (TIA) for the expansion of the Joseph Banks Secondary College ("the Site"). The Site is located at 40 Joseph Banks Boulevard, Banksia Grove, within the City of Wanneroo.

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

## 2 Existing Situation

### 2.1 Existing Site Context

The Site is located at the corner of Splendens Avenue and Pinjar Road and falls within the jurisdiction of the City of Wanneroo. The Site is bounded by Joseph Banks Boulevard to the east, Splendens Avenue to the south, and Pinjar Road to the west. The site is predominantly surrounded by residential development.

The location of the Site is illustrated in **Figure 2-1**.

Figure 2-1 Site Location



Source: Google Map

## 2.2 Existing Site Development

The existing Site is home to Joseph Banks Secondary College which has an enrolment of 1513 students and 155 employees (*Source: Department of Education website*) as at Semester 2 of 2020. The proposed expansion would be built on the southwest corner of the school, which is currently utilised as a hockey and soccer field.

An aerial view of the Site location is presented in **Figure 2-2**.

Figure 2-2 Aerial View of Site Location



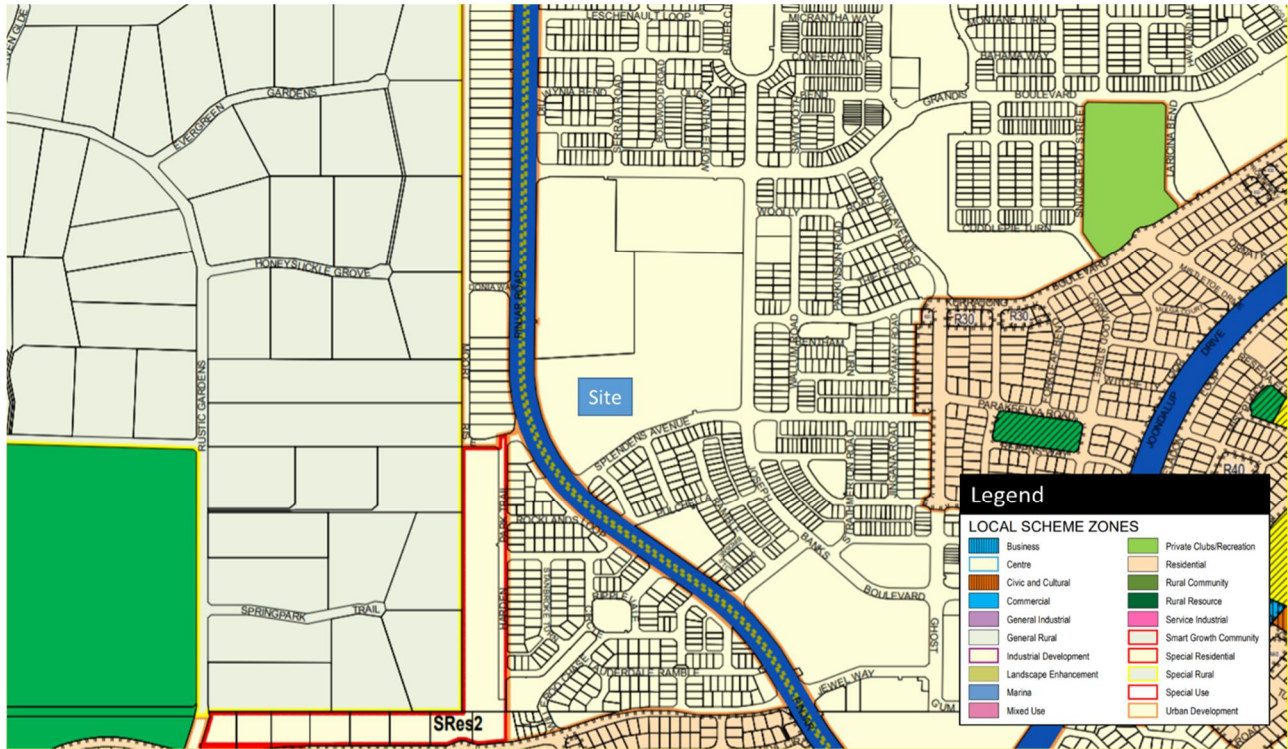
Source: Nearmap (2021)



### 2.3 Surrounding Land Uses

According to the *City of Wanneroo Town Planning Scheme No.2*, the Site is zoned as a “urban development” with the surrounding land uses consisting primarily of residential dwellings with some recreational uses. A detailed zoning map around the Site is presented in **Figure 2-3**.

Figure 2-3 Zoning Map



Source: City of Wanneroo Local Planning Scheme

### 2.4 Existing Site Access

Currently five access points are provided, leading to different areas of the Site.

- > Access 1 (Splendens Avenue) – left in and left out movement along Splendens Avenue leading to the northeast parking bays.
- > Access 2 – left in and right in only located along Splendens Avenue, entry to the drop-off/pick up area.
- > Access 3 – left out only located along Splendens Avenue, exiting from the drop-off/pick up area.
- > Access 4 – left in only to staff parking located along Joseph Banks Boulevard.
- > Access 5 – full movement located along Joseph Banks Boulevard. This provide access to the drop-off-pick-up area and staff parking.
- > Access 6 – left out only from drop-off-pick-up area which is located along Joseph Banks Boulevard.

The access points of the Site are illustrated in **Figure 2-4**.

Figure 2-4 Site Access Points



Source: Nearmap (2021))

### 3 Road Network

The layout and classification of the roads surrounding the Site are presented in **Figure 3-1**.

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

- > **Primary Distributors (light blue):** Form the regional and inter-regional grid of MRWA 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):** Performs 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.

Figure 3-1 Existing Road Network



Source: Main Roads Mapping Information Centre (2019)

The existing road network is as described below on **Table 3-1**.

Table 3-1 Existing Road Network

Road Hierarchy			Road Network			
Road Name	Road Hierarchy	Jurisdiction	Lanes	Footpaths	Width (m)	Posted Speed (km/h)
Pinjar Road	Distributor A	Local Government	2	2	3.6 in each direction	70
Splendens Avenue	Access Road	Local Government	2	2	3.3 in each direction	50 (40 during School Peaks)
Joseph Banks Boulevard	Access Road	Local Government	2	2	3.10 in each direction	50 (40 during School Peaks)

### 3.1 Existing Intersections

#### 3.1.1 Pinjar Road/Splendens Avenue

**Pinjar Road/ Splendens Avenue Intersection** is located to the southwest of the Site. It is a 3-way give-way controlled intersection with priority given to Pinjar Road. The intersection layout is shown in **Figure 3-2**.

Figure 3-2 Pinjar Road/ Splendens Avenue Intersection



Source: Nearmap (2021)

### 3.1.2 Joseph Banks Boulevard/Splendens Avenue

**Joseph Banks Boulevard/ Splendens Avenue Intersection** is a four-legged roundabout and is located on the southeast corner of the Site. The existing intersection layout is shown in **Figure 3-3**.

Figure 3-3 Joseph Banks Boulevard/ Splendens Avenue



Source: Nearmap (2021)

## 3.2 Existing Road Network Traffic Volumes

A traffic survey was conducted during the AM and PM school peak periods on 10 December 2020 at the Pinjar Road/Splendens Avenue and Joseph Banks Boulevard/Splendens Avenue intersections. Existing traffic volumes were also sourced from the City of Wanneroo and are 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	Source
Joseph Banks Boulevard North of Splendens Avenue	2016	2,033	299	276	City of Wanneroo
Pinjar Road North of Splendens Avenue	2017	5,827	466	561	City of Wanneroo
Splendens Avenue West of Joseph Banks Boulevard	2016	1,661	408	264	City of Wanneroo
Joseph Banks Boulevard North of Splendens Avenue	2020	-	336	303	Traffic Survey
Pinjar Road South of Splendens Avenue	2020	-	1,192	1,033	Traffic Survey
Splendens Avenue East of Pinjar Road	2020	-	580	264	Traffic Survey

Source: City of Wanneroo

### 3.3 Existing Operation

#### 3.3.1 Site Visit – Wednesday 2 December 2020

A site visit was undertaken on Wednesday 2 December 2020 to observe traffic operations along the existing frontage roads during the AM and PM school peak periods.

The following observations were recorded during the site visit:

- > Traffic operations during the AM peak indicated no significant congestion being experienced with vehicles entering the drop-off and pick-up area. No congestion in the surrounding area was also observed. Some parents however, were observe stopping within the northern carriageway of Splendens Avenue, where it is signed 'No Stopping on Road or Nature Strip', to drop-off students.
- > In the PM peak, vehicles were observed to arrive on site earlier than the school finish time and vehicles were parked in both pick-up areas located on the Splendens Avenue and Joseph Banks Boulevard frontage. At the Splendens Avenue pick-up area, vehicles would queue internally from Access 3 and extend towards Access 2 as shown in **Figure 3-4**. The observed queue extends to Access 2 although it does not create an obstruction on Splendens Avenue and the traffic flow remained unimpeded.
- > As vehicles commence leaving the pick-up area relatively quickly, a queue built up on Splendens Avenue west of Joseph Banks Boulevard roundabout that extended beyond Access 3 as shown in **Figure 3-5**. The queue was observed to dissipate quickly and traffic conditions returned to normal. This peak traffic condition was observed to be very short and lasted less than 10 minutes.
- > Drop-off and pick-up activity in the Joseph Banks Boulevard drop off/pick up area was observed to be far less congested and no significant queuing was observed.

Figure 3-4 Splendens Avenue Pick-up/drop-off Area Queue at PM peak 2 December 2020



Figure 3-5 Queue on Splendens Avenue Obstructing Access 3



### 3.3.2 Site Visit – Tuesday 16 February 2021

An additional site visit was undertaken on Tuesday 16 February 2021 at the request of the City of Wanneroo to observe traffic operations during the PM school peak periods. The following observations were recorded during the site visit which was not observed during the initial site visit conducted on Wednesday 2 December 2020:

- > Vehicular queues at Access 2 were observed to extend to Pinjar Road intersection as shown in **Figure 3-6**.
- > The queue from Access 2 also impacted traffic operations on Pinjar Road, particularly the right turn from Pinjar Road southern approach as shown in **Figure 3-7**.
- > It should be noted that the observed congestion only lasted for approximately 10-15 minutes and traffic operations returned to normal thereafter.

Figure 3-6 Queue from Access 2 Extends into Pinjar Road Intersection



Figure 3-7 Queue on Pinjar Road Southern Approach Due to Congestion on Splendens Avenue



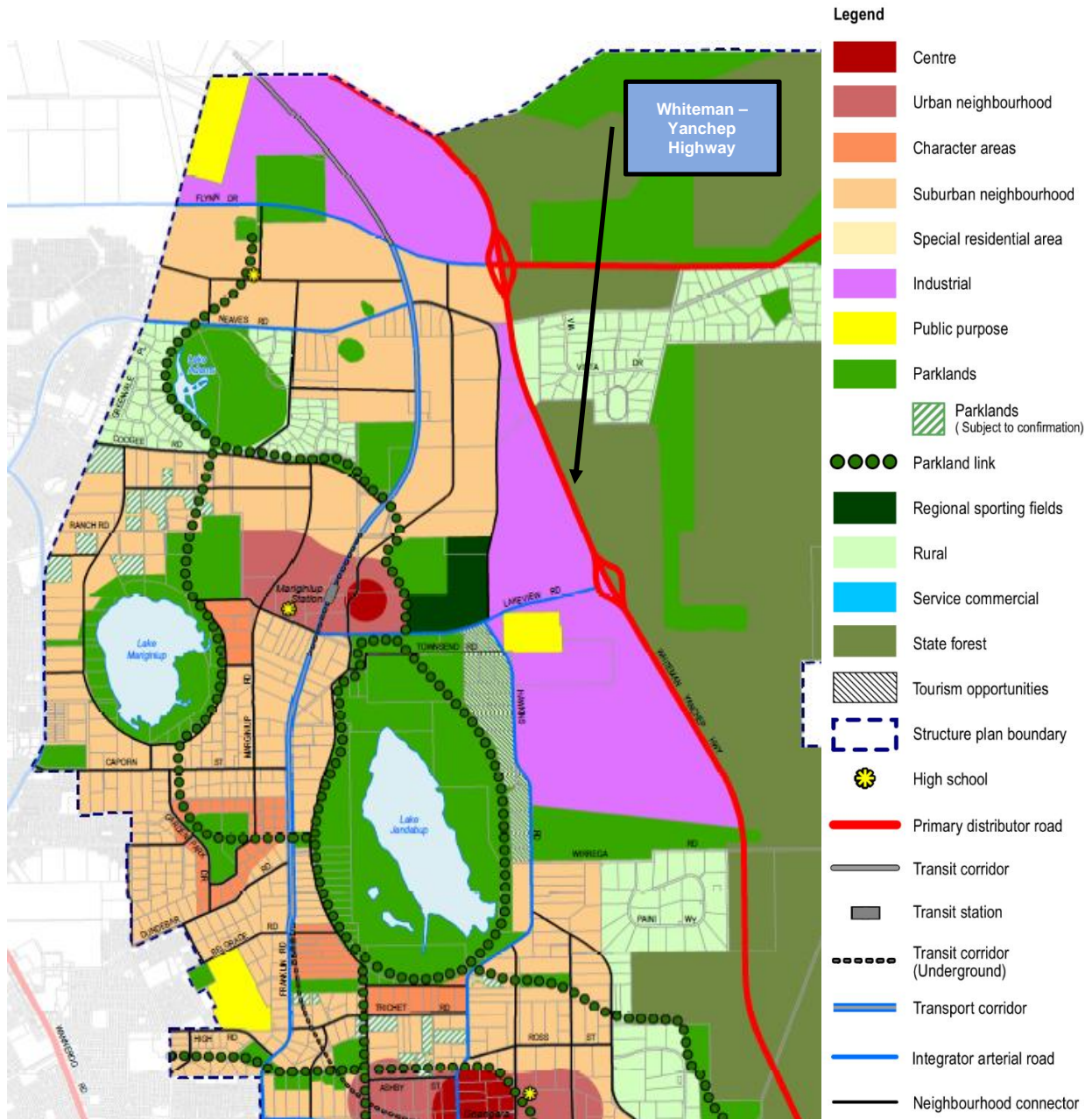


### 3.4 Future Road Network

The City of Wanneroo advised that there are plans to upgrade Pinjar Road however the timeframe for implementation of this is unknown.

Further away from the School, there are plans to construct a north-south route along East Wanneroo (Whiteman-Yanchep Highway) as shown in the Draft *East Wanneroo DSP* (Figure 3-8). This highway is expected to ease traffic pressures on Wanneroo Road and Mitchell Freeway and cater for future developments. The Site would be able to access the future highway from Flynn Drive.

Figure 3-8 Proposed Whiteman Yanchep Highway



(Source: Draft East Wanneroo District Structure Plan)

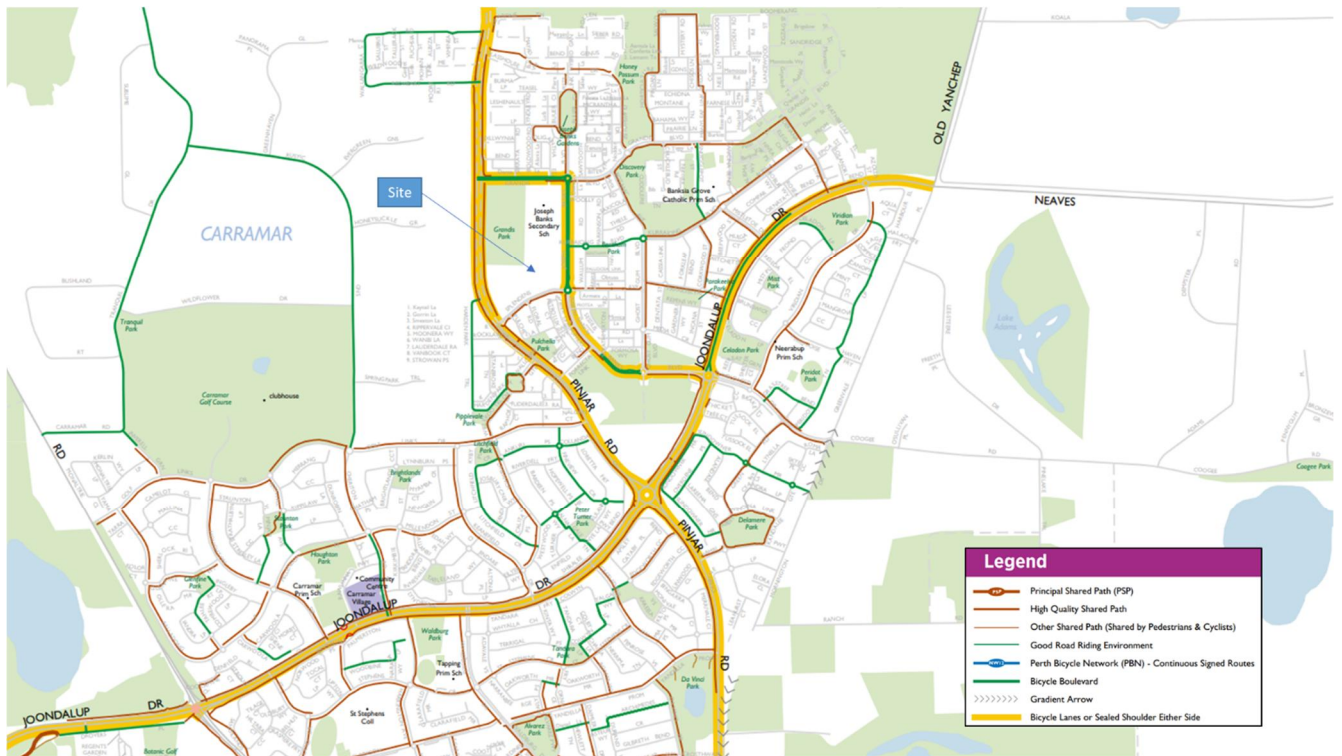
## 4 Pedestrian / Cycle Networks

### 4.1 Existing Pedestrian/Cycling Network

According to DoT’s *Joondalup and Stirling Comprehensive Bike Map*, there are relatively high-quality shared paths surrounding the Joseph Banks Secondary College that provides good cycling environment to cyclists. There is also a warden-controlled crossing on Pinjar Road.

**Figure 4-1** shows the bicycle network within the surrounding area of the Site.

Figure 4-1 Existing Pedestrian / Cycle Networks

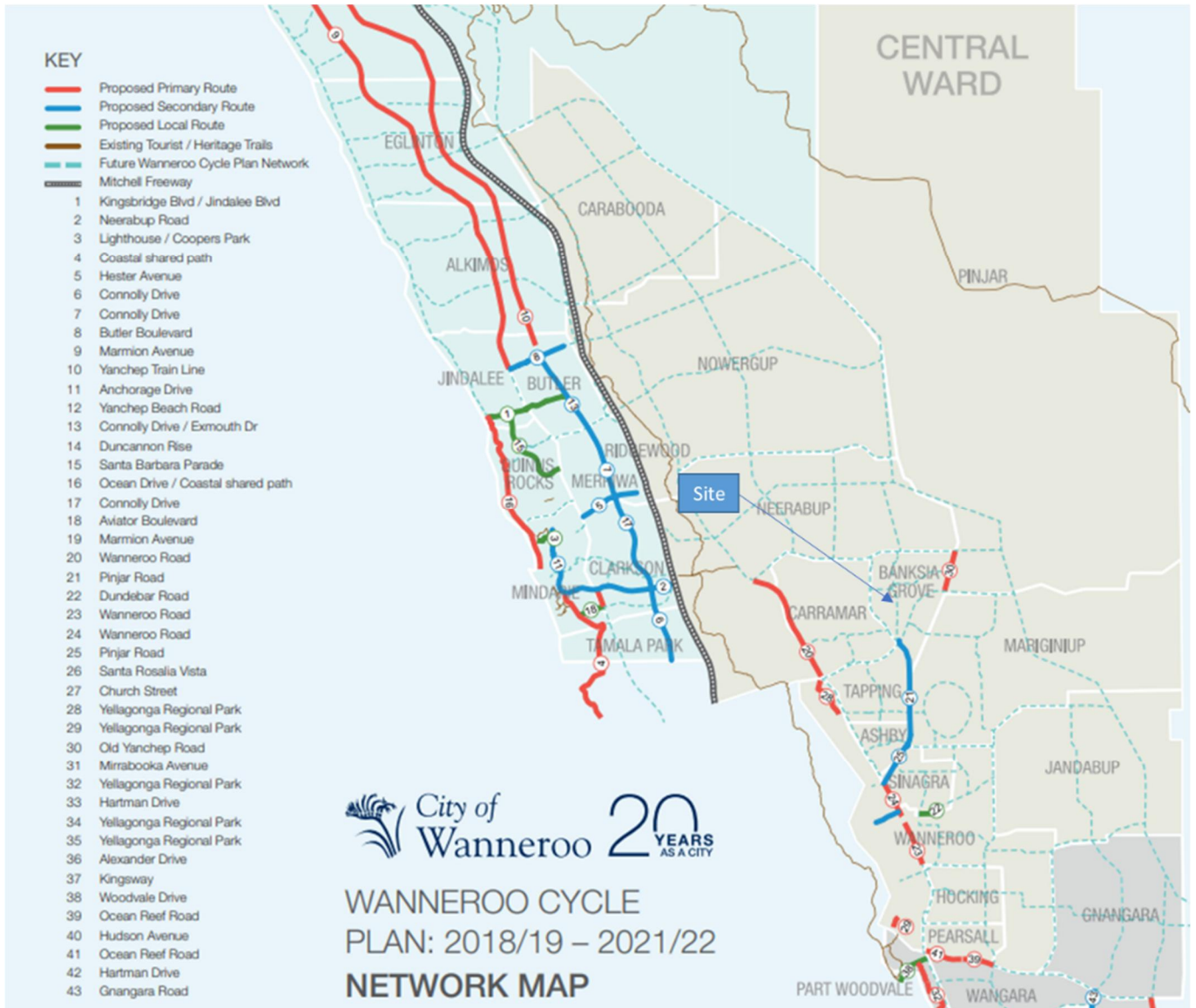


Source: Department of Transportation

### 4.2 Future Pedestrian/Cycling Network

The City of Wanneroo has developed a Cycle Plan that aims to create a cycle friendly environment that is attractive, desirable and accessible to all. **Figure 4-2** shows the proposed cycling network within the surrounding area of the Site in the short to medium term. Based on the current plan, there are no proposed upgrades near the school.

Figure 4-2 Cycle Plan Network Map



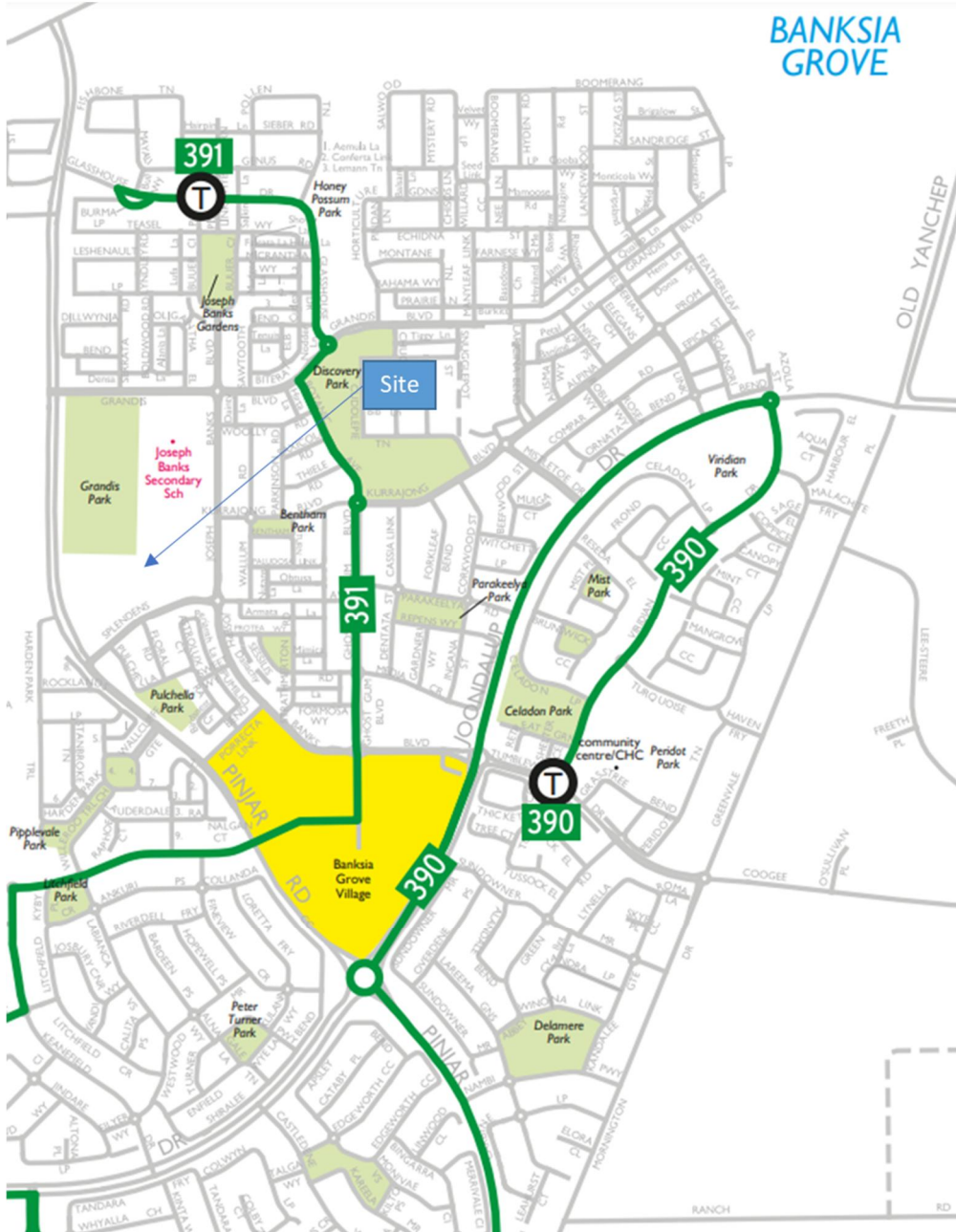
Source: City of Wanneroo Cycle Plan 2018/19 – 2021/22 (2017)

## 5 Public Transport Facilities

### 5.1 Existing Public Transport Facilities

Figure 5-1 shows the surrounding bus routes around the school. Regular route 391 does not service the school, however Transperth provides route deviations with bus stops on Joseph Banks Boulevard. The frequency of these bus services is summarised in Table 5-1.

Figure 5-1 Existing Bus Services



Source: Transperth (2021)

Table 5-1 Bus Services and Frequency

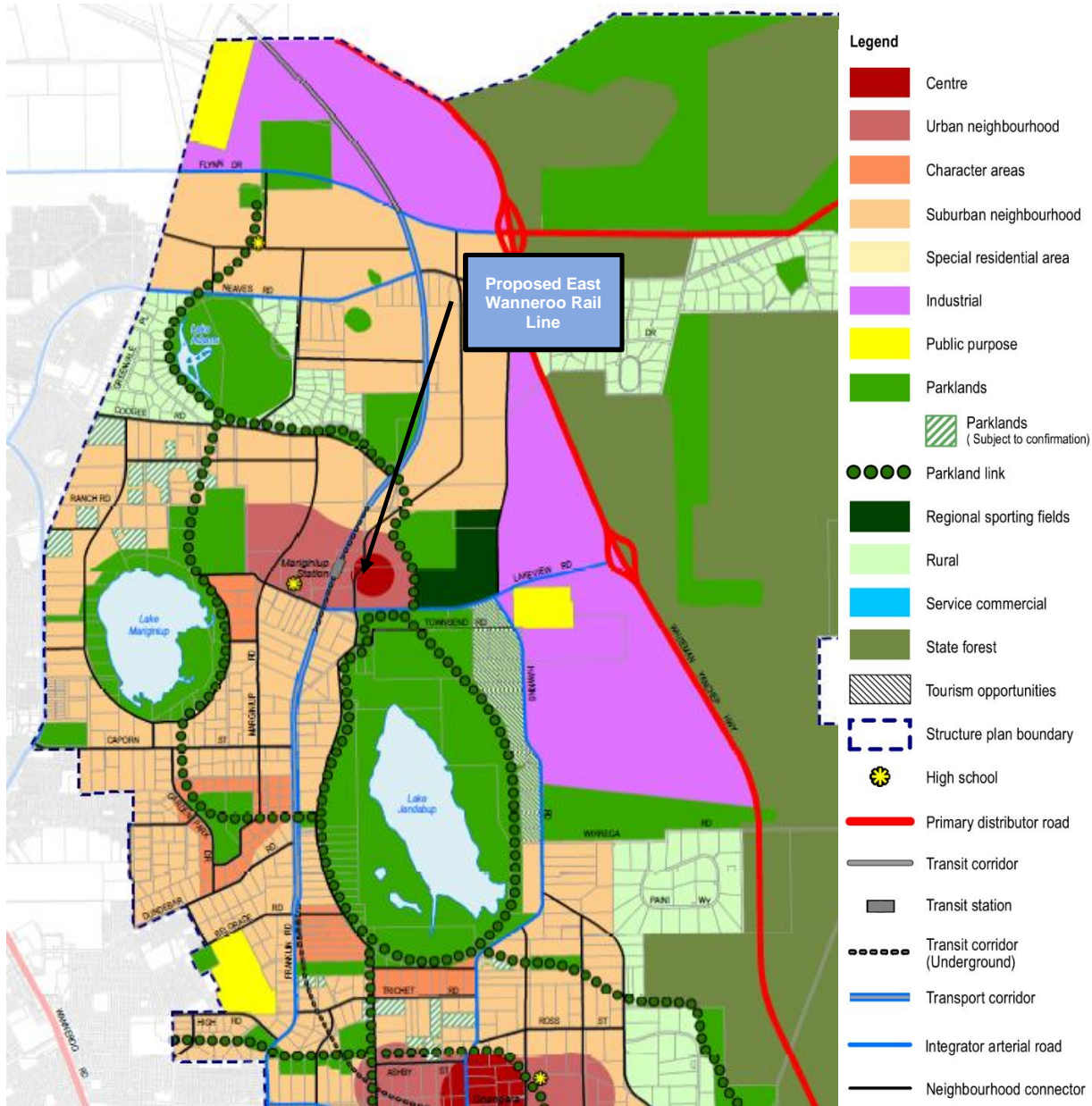
Bus Service	Weekday Peak	Weekday Off-peak	Saturday	Sunday & Public Holiday
391 (Banksia Grove to Joondalup Station)	15 minutes	30-60 minutes	60 minutes	60 minutes

## 5.2 Future Pubic Transport Facilities

The Public Transport Authority (PTA) have advised that there are no immediate plans to change or add new routes near the Site. Necessary changes may only occur if the demand from the school community grows hence ensuring there is sufficient capacity on relevant routes.

Under the draft East Wanneroo DSP, a rail line is proposed through the centre of the DSP area as shown in **Figure 5-2** with the closest station at Marignilup. No timeframe or commitment have been made for the line, however if constructed it is expected that existing bus routes would be reviewed or new routes added to support the new rail service.

Figure 5-2 Proposed East Wanneroo Rail Line



(Source: Draft East Wanneroo District Structure Plan)

## 6 Development Proposal

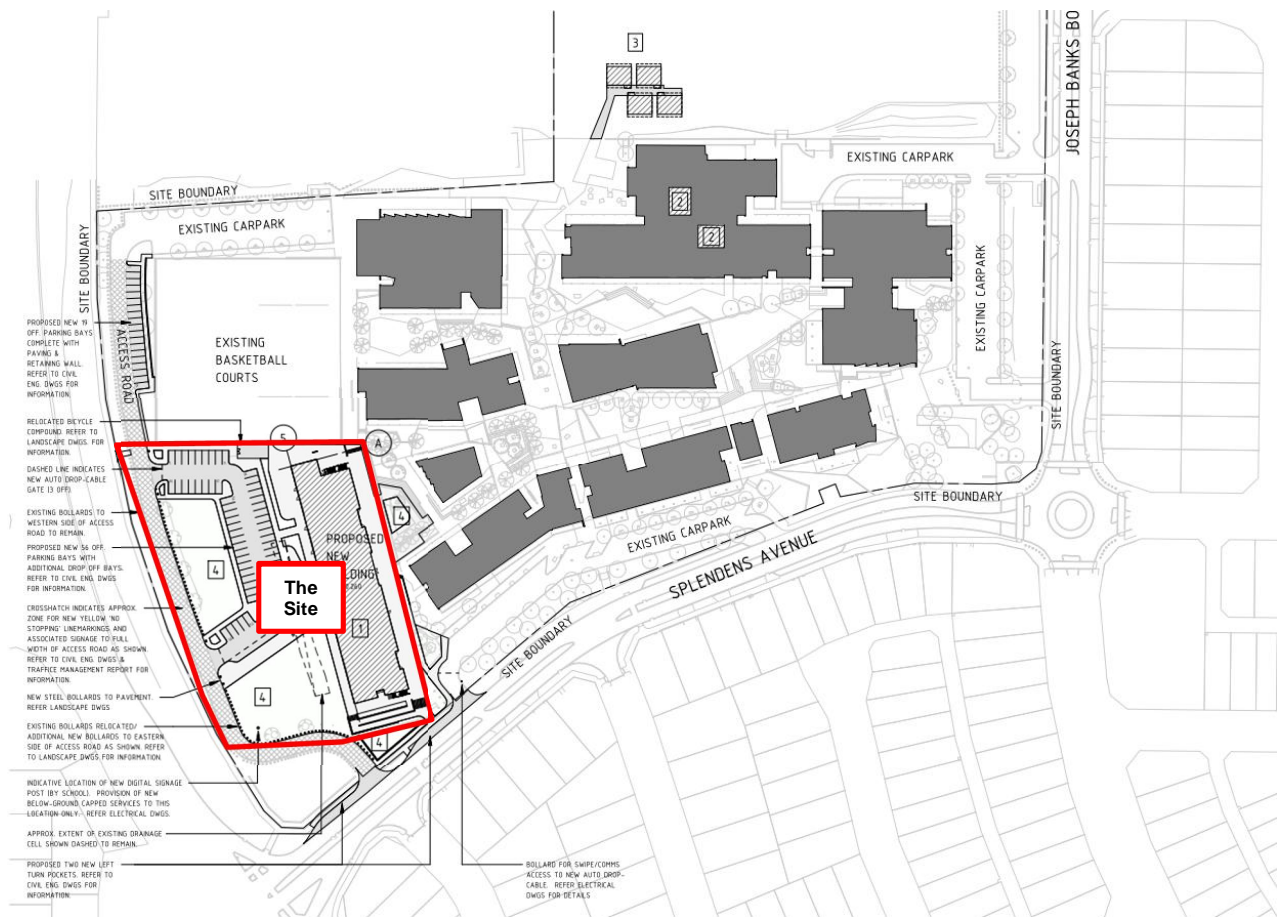
### 6.1 Proposed Development

The expansion to the Joseph Banks Secondary College is proposed on the western boundary of the school site and the access to the proposed development is anticipated to be via the existing access road that intersects with Splendens Avenue.

The proposed expansion consists of the provision of new school facilities including a new car park for staff. New facilities for this school include:

- > Increase capacity for additional 500 students (total of 2000 enrolments) and 41 staff members.
- > New buildings
- > New Parking Facility for staff
- > Drop-off/pick-up bays

Figure 6-1 Proposed Redevelopment Location



#### KEY

1. NEW TWO-STOREY CLASSROOM BLOCK.
2. NEW ENGINEERING WORKSHOP & TEXTILE STUDIO REFURBISHMENTS. REFER TO A10 SERIES FOR INFORMATION.
3. RELOCATED TRANSPORTABLE CLASSROOMS & ASSOCIATED SERVICES AND LANDSCAPE WORKS. **NOT IN CONTRACT**. ALL WORKS TO BE COMPLETE BY PRINCIPAL.
4. NEW HARD/SOFT LANDSCAPING. REFER TO LANDSCAPE DWGS FOR INFORMATION.

(Source: With Architecture Studio)

## 6.2 Access Arrangements

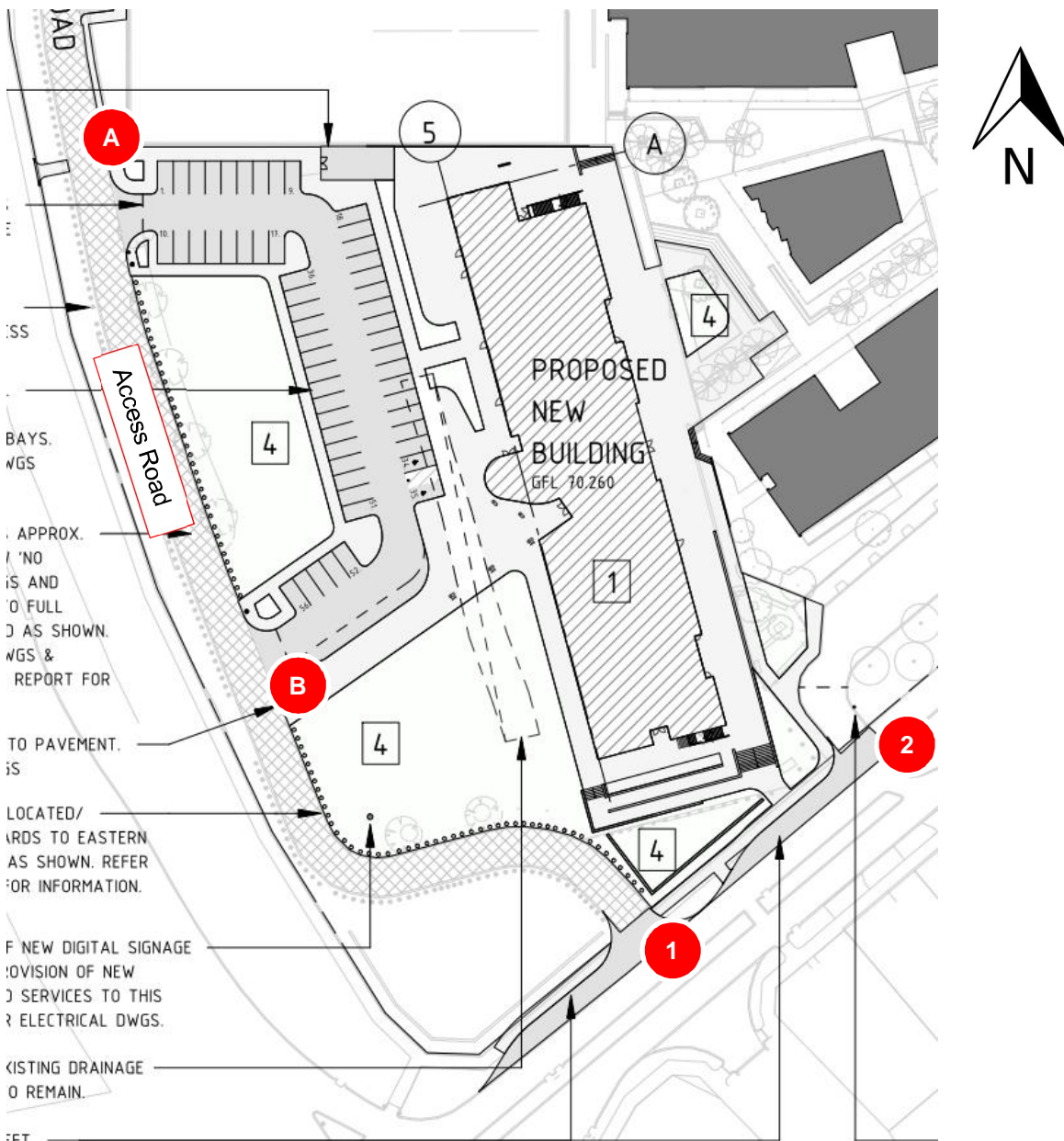
Access to the new facilities will be via the internal access road (Access 1) from Splendens Avenue. **Figure 6-2** shows the location of the new facilities and the proposed car park with entry and exit points:

- > Access A is entry only (left-in, right in)
- > Access B is exit only (left-out, right-out)

The car park will have a one-way clockwise traffic flow circulation which is aimed to provide efficient movement though the site and ensuring that delays are minimised. The distance from Access A and Access 1 is approximately 160m which would provide additional queuing space if required and as such no queue overspill is expected onto Splendens Avenue.

In addition, left turn pockets for existing Access 1 and 2 will be provided to assist with traffic operations during school peak hours.

Figure 6-2 Access Arrangements



(Source: With Architecture Studio)

## 6.3 Car Parking

56 bays are proposed in the new car park and 19 bays adjacent to the existing basketball hardcourts. Drop-off / pick-up bays are provided on the southern side of the car park near Access B. In accordance with the *Secondary School Planning Guide Section 6.6 – Traffic Management*, no additional parking is provided for students who drive.

### 6.3.1 Car Parking Requirements

Car parking requirements are set out in the Secondary School Planning Guide Section 6.6 – Traffic Management. These parking rates are as follows:

- > 10 staff bays per 100 students
- > 7 embayment bays per 100 students

The City of Wanneroo Planning Scheme also has provisions for secondary school parking requirements which are shown in **Table 6-1**.

Table 6-1 City of Wanneroo Parking Policy Requirements

Secondary School AMD 52 GG 16/6/06	A minimum of 60 car bays for staff and visitor parking for the first 600 students and then ten (10) car bays for every 100 students or part thereof afterwards plus seven (7) pick up/set down bays for every 100 students or part thereof which may be provided in the road reserve.
---------------------------------------	---

**Table 6-2** provides a summary of the parking requirements for a total of 2000 students and the proposed provision. With the proposed new car park area, it is estimated that a total of 343 bays (including ACROD bays and on-street bays) will be provided. Hence, it would appear that the number of bays provided is adequate however some of the bays or parking area may need to be reassigned to satisfy the pickup and drop off bay requirements.

Table 6-2 Car Parking Requirements and Provision

Land Use	Secondary School Planning Guide Requirements	City of Wanneroo Requirements	Proposed Parking Bays Provision
Secondary School 2000 students total	<ul style="list-style-type: none"> <li>▪ 200 staff bays for 2000 students</li> <li>▪ 140 general bays for 2000 students</li> </ul> <p><b>Total: 340 bays</b></p>	<ul style="list-style-type: none"> <li>▪ 60 bays for staff and visitors for first 600 students</li> <li>▪ 140 bays for the next 1400 students</li> <li>▪ 140 pick-up/set down bays for 2000 students</li> </ul> <p><b>Total: 340 bays</b></p>	<ul style="list-style-type: none"> <li>▪ Existing Parking: 248 Bays</li> <li>▪ Existing On-street parking: 20 bays (reduced by 1 bay to allow left turn lane to Access 2)</li> <li>▪ New Bays: 75 Bays</li> </ul> <p><b>Total: 343 bays</b></p>

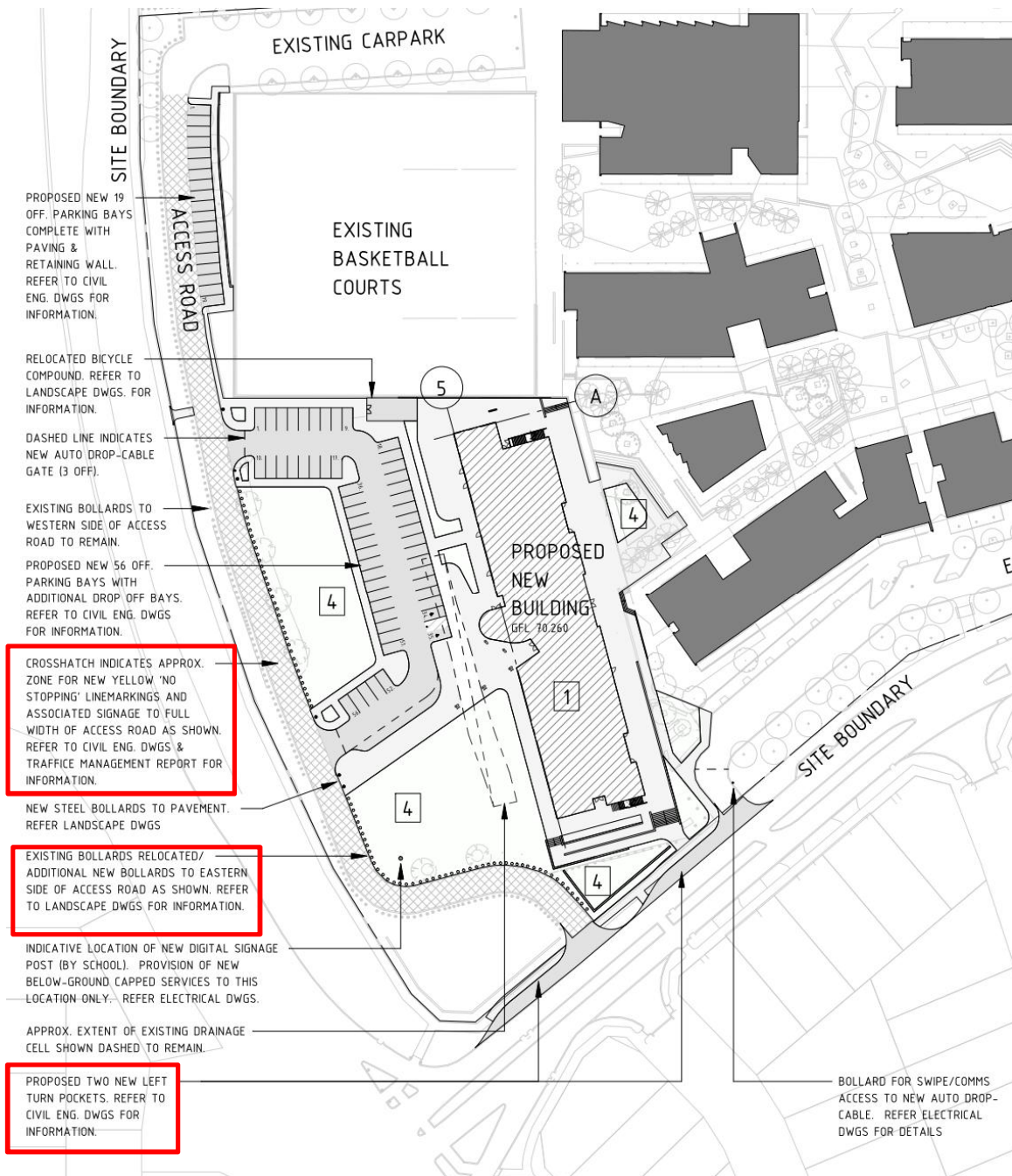


### 6.3.2 Traffic Management

To ensure efficient traffic movement to and from the new car park, the following traffic management measures are proposed as illustrated in the site plan shown in **Figure 6-3**.

- > Bollards on the eastern side of the Access Road is recommended to be relocated closer to the edge of the existing Access Road to discourage parking on the verge which potentially could impact traffic operations.
- > Yellow 'No stopping' edge line marking and corresponding signage along the length of the Access Road
- > New left-turn pockets from Splendens Avenue into Access 1 and Access 2.

Figure 6-3 Proposed Traffic Management (highlighted in red)



It should be noted that a Traffic Management Plan has also been prepared to manage peak time school traffic, particularly at the existing off-street pick up and drop off area adjacent to Splendens Avenue. A stand-alone operational traffic management report has been prepared under a separate cover and should be read in conjunction with this report.

## 6.4 Bicycle Parking Requirements

The bicycle parking requirements are set out in the *Secondary School Planning Guide Section 6.6 – Traffic Management*. The bicycle parking rates are as follows:

- > 1 bay for every 15-20 children
- > 1 bay for every 25 to 35 staff

Based on 500 additional students and 41 additional staff, an additional 2 staff bicycle bays and 25-33 general cycling bays are required. For a total of 2000 students the total bicycle bays required is 100-133 bays. Additional bike parking facility can be provided as bike cages similar to the existing facility shown in **Figure 6-4**.

Figure 6-4 Existing Bike Bays



## 6.5 Service/Delivery Vehicles

Waste and delivery vehicles will continue to utilise the existing loading area located near the arts building, shown in **Figure 6-5**.

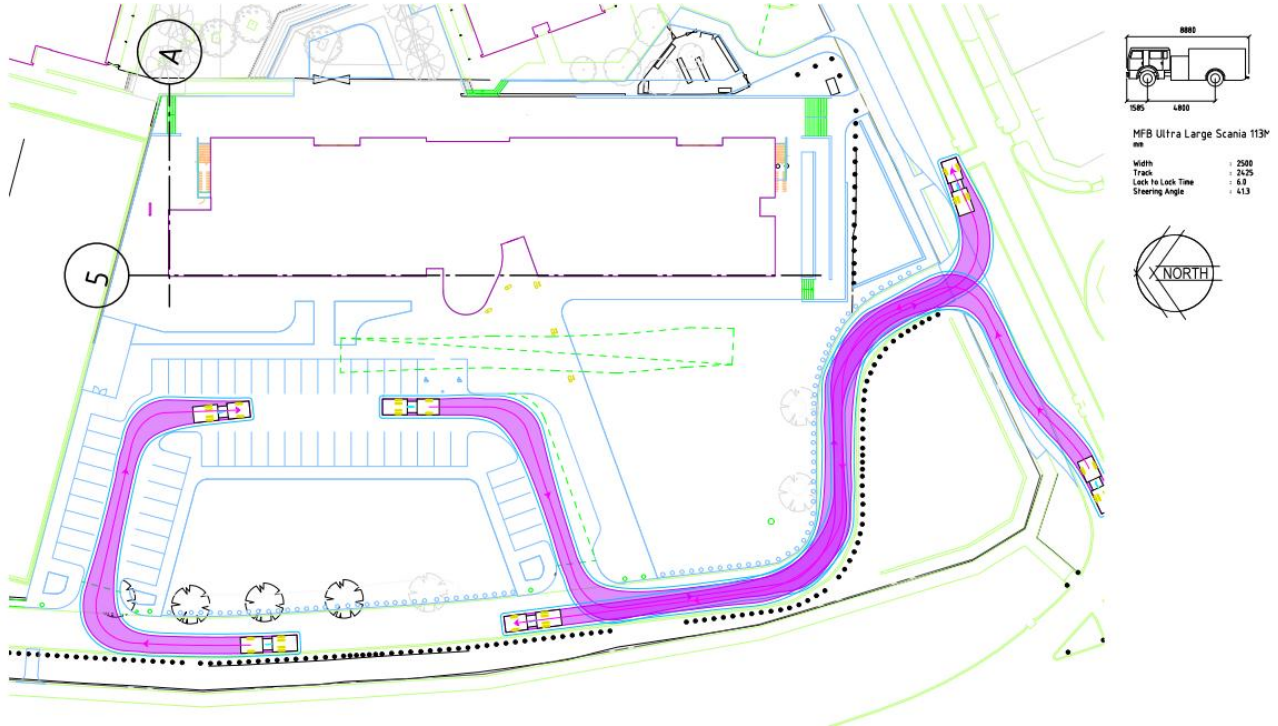
Figure 6-5 Existing Loading Area



### 6.5.1 Fire Truck Access

A swept path analysis was undertaken for an 8.8m fire truck. The swept path for the 8.8m fire truck is illustrated in **Figure 6-6**. The swept path analysis indicated that an 8.8m fire truck would appear to be able to adequately enter, exit and manoeuvre through the proposed development site with the proposed parking configuration. A larger version of the drawing is provided in **Appendix B**.

Figure 6-6 Fire Truck Swept Path



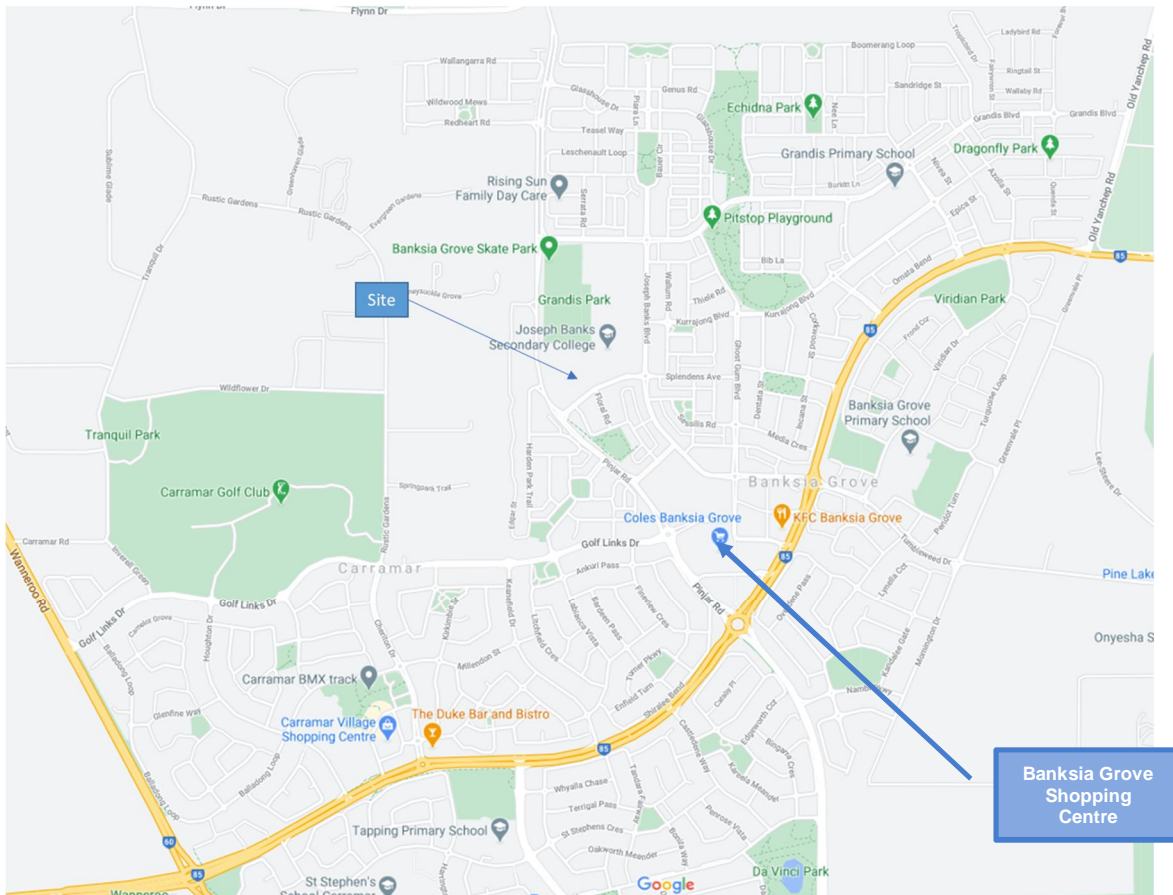
## 7 Integration with Surrounding Area

### 7.1 Surrounding Major Attractors/Generators

The major attractors/generators surrounding the development are shown in **Figure 7-1** Key attractors/generators include:

- > Banksia Grove Shopping Centre;
- > Surrounding residential area where students may potentially live; and
- > Various parks and reserves

Figure 7-1 Major Attractors/Generators



Source: Google Maps

### 7.2 Proposed Changes to Surrounding Land Uses

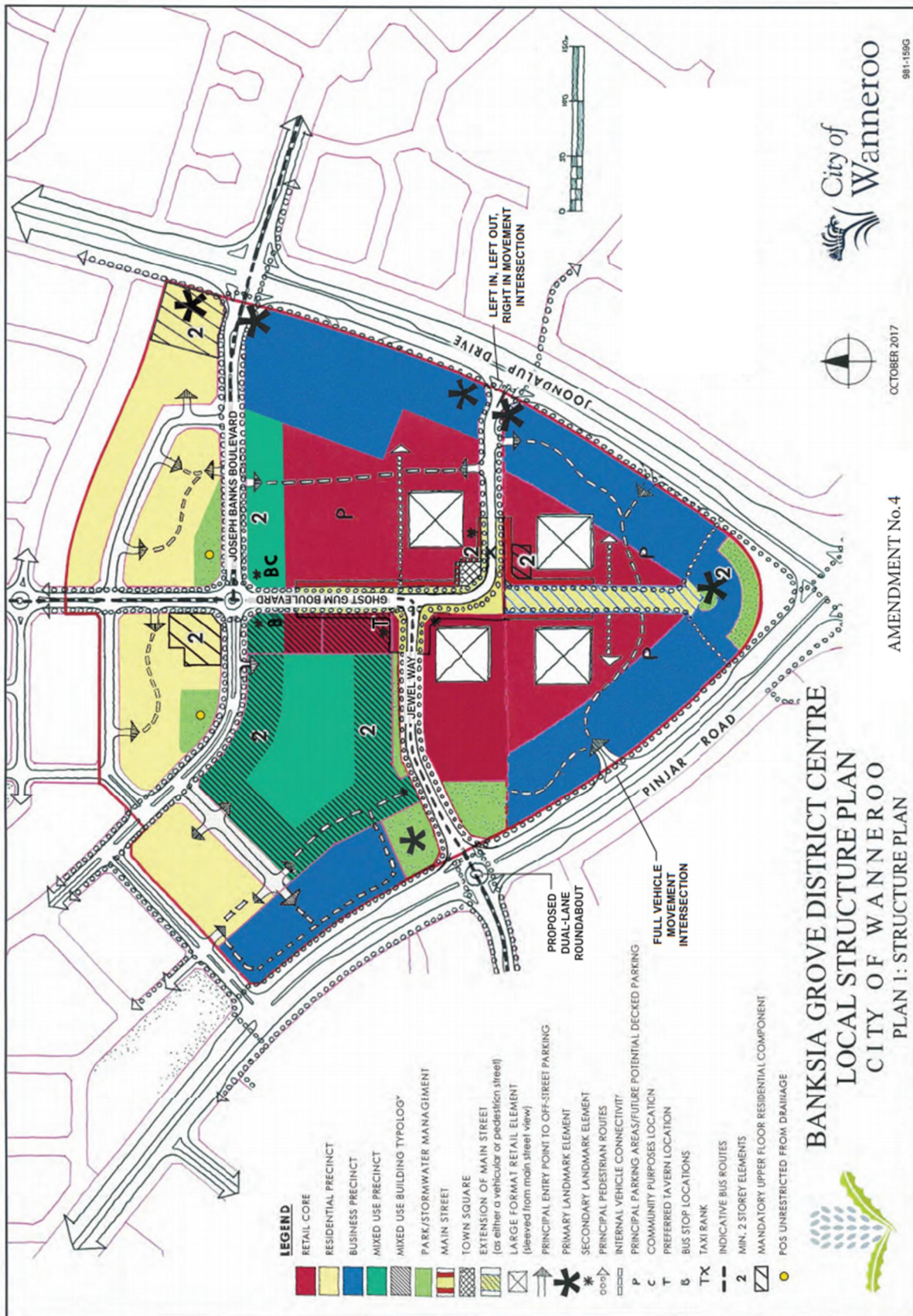
The school is located within the approved Banksia Grove Local Structure Plan shown in **Figure 7-2**. Most of the residential component of the structure plan has been completed, with only the area on the north east corner and western edge of the structure plan still developing.

The commercial area to the south, is also part of the Banksia Grove District Centre Local Structure Plan as shown in **Figure 7-3**. Based on the structure plan, the remaining vacant lots could be developed as either residential or mixed use.

Further to the north, on the north side of Flynn Drive, further industrial developments are proposed as per Neerabup Industrial Area Local Structure Plan shown in **Figure 7-4**.

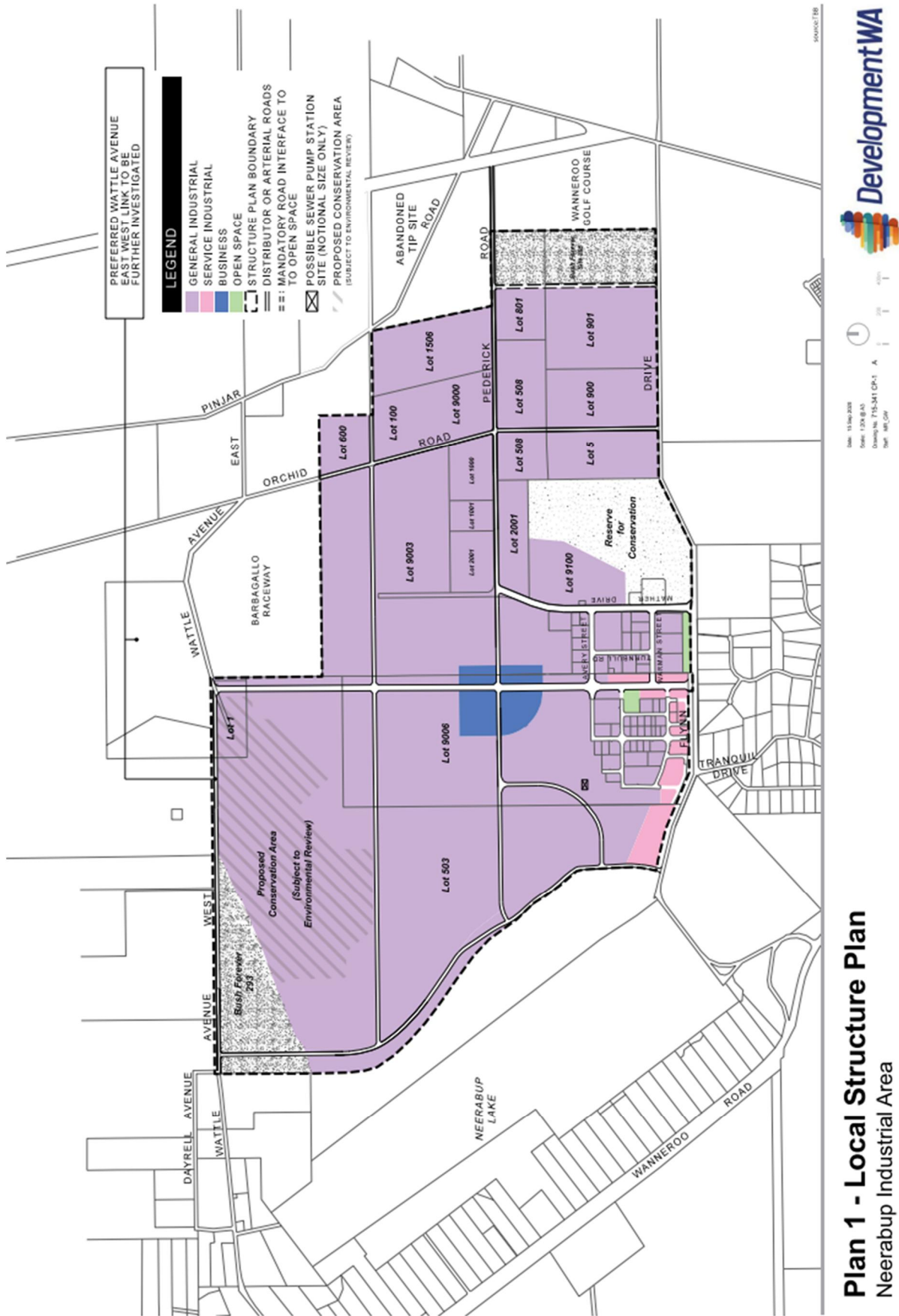


Figure 7-3 Banksia Grove District Centre



(Source: City of Wanneroo)

Figure 7-4 Neerabup Industrial Area Structure Plan



(Source: City of Wanneroo)

## 8 Analysis of Transport Network

### 8.1 Assessment Years and Time Period

Peak times selected are 8:00am-9:00am and 2:45pm-3:45 pm respectively for the morning and afternoon school peak periods, which are the peak times identified from the supplied traffic counts.

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

- > Scenario 1 – 2020 traffic without the expansion development
- > Scenario 2 – 2023 background traffic with proposed redevelopment (estimated completion of the redevelopment)
- > Scenario 3 – 2033 background traffic with proposed redevelopment

To obtain the estimated 2023 and 2033 traffic volumes, a conservative growth rate of 2% per annum has been applied to the background traffic volumes through to 2023 for Scenario 2 and 2033 for Scenario 3. This rate is considered conservative as developments in the area have mostly been completed.

### 8.2 Traffic Generation

Approximate trip generation rates for the high school are set out by the Western Australian Planning Commission (WAPC) *Transport Assessment Guidelines – Volumes 5 – Technical Guidance*.

1513 students are currently enrolled in the school and the associated vehicular trips generated is obtained through the traffic survey conducted during the Site visits. The projected enrolment is expected to increase up to 500 students by 2023.

**Table 8-1** shows the trip rates and **Table 8-2** presents the total potential trip generation of the school for the existing and future scenarios.

Table 8-1 Adopted Trip Generation Rates

Land Use	Source	AM Peak		PM Peak	
		Arrivals	Departures	Arrivals	Departures
High School	WAPC	0.5 trips per student	0.5 trips per student	0.5 trips per student	0.5 trips per student

Table 8-2 Total Trip Generation

Land Use	AM Peak		PM Peak	
	In	Out	In	Out
High School (Additional 500 students)	250	250	250	250

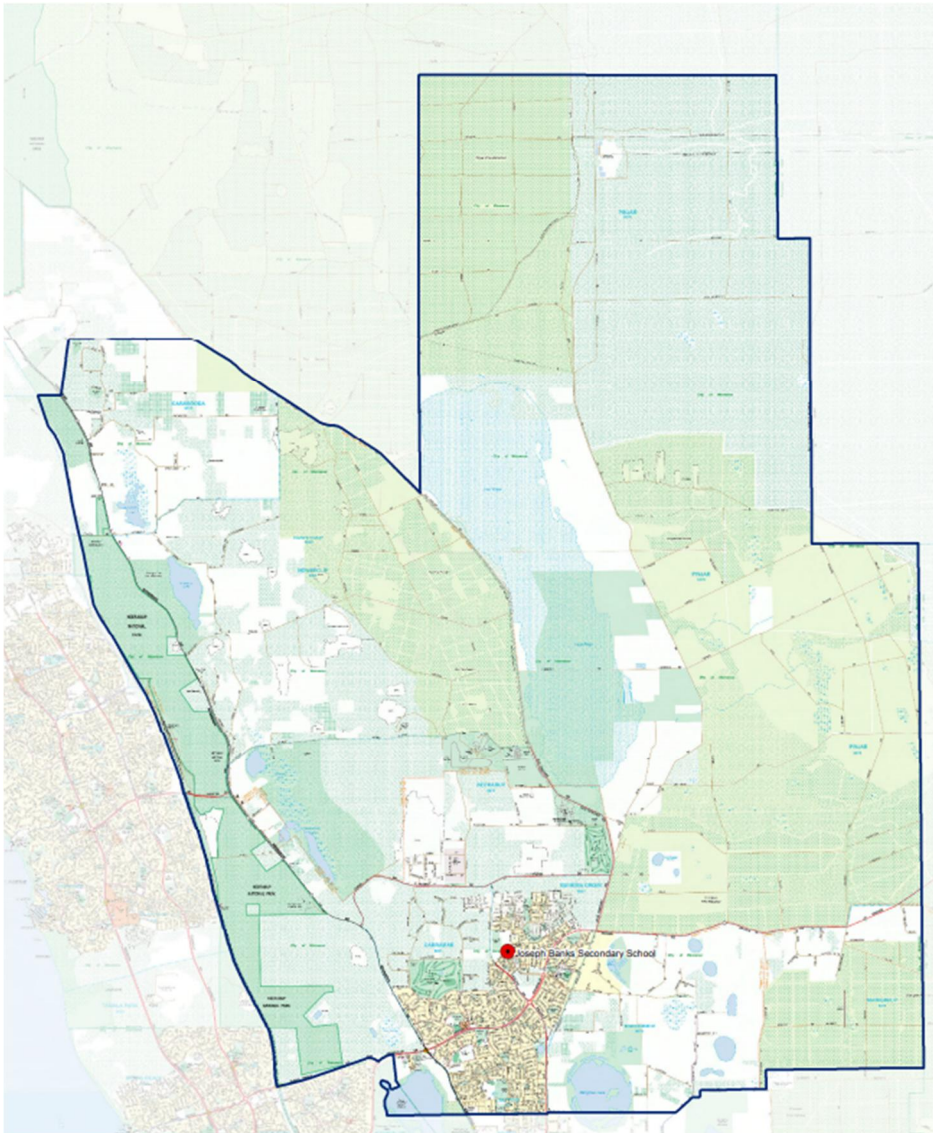
The additional of 500 students is estimated to generate 500 two-way trips in the AM and PM peak on top of the existing school traffic.



### 8.3 Development Traffic Distribution and Assignment

The distribution of traffic will be based on the local intake area as indicated by **Figure 8-1** and traffic counts undertaken in December 2020. The school catchment area covers Banksia Grove and sparsely populated suburbs to the north. As a result, most of the development traffic would be expected to arrive from the area south of the school which is confirmed by the traffic counts.

Figure 8-1 Joseph Banks Secondary College Local Intake Area



Source: Department of Education

### 8.4 Transport Analysis Assumptions

A list of the assumptions is summarised below:

- > A 2% growth rate has been calculated and applied to all existing traffic volumes to estimate the background traffic for 2023 and 2033 design years.
- > Heavy vehicle volumes are based on traffic counts undertaken in December 2020.
- > It is assumed that construction works will be completed by 2023.
- > It is assumed that 60% of the additional traffic would utilise the new drop-off/pick-up area and the remaining trips would be distributed to existing drop-off/pick-up areas.

### 8.5 Traffic Volume

The total background and development traffic for the assessment are shown in **Figure 8-2 to Figure 8-4**.

Figure 8-2 Background Traffic 2020

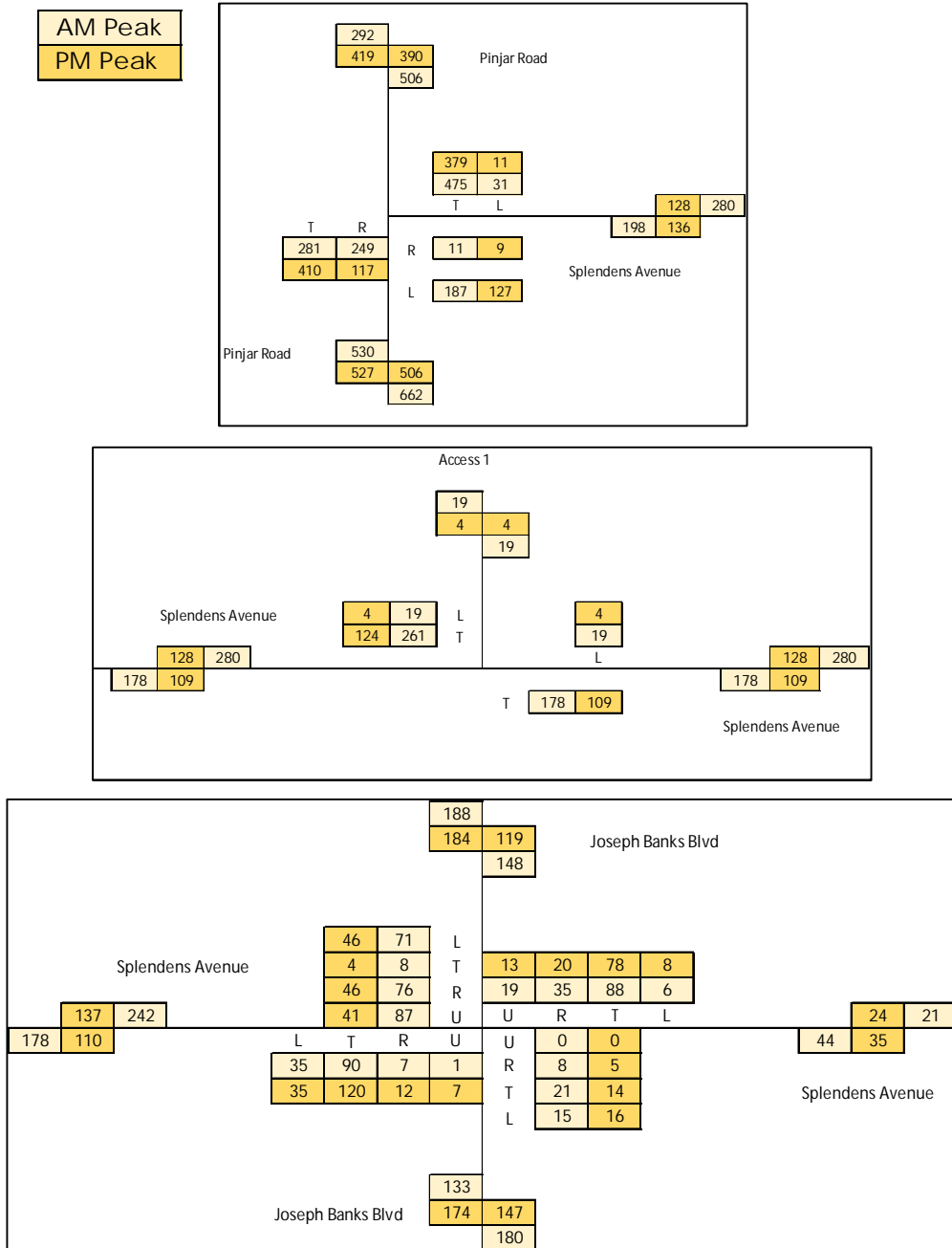


Figure 8-3 Background + Development Traffic 2023

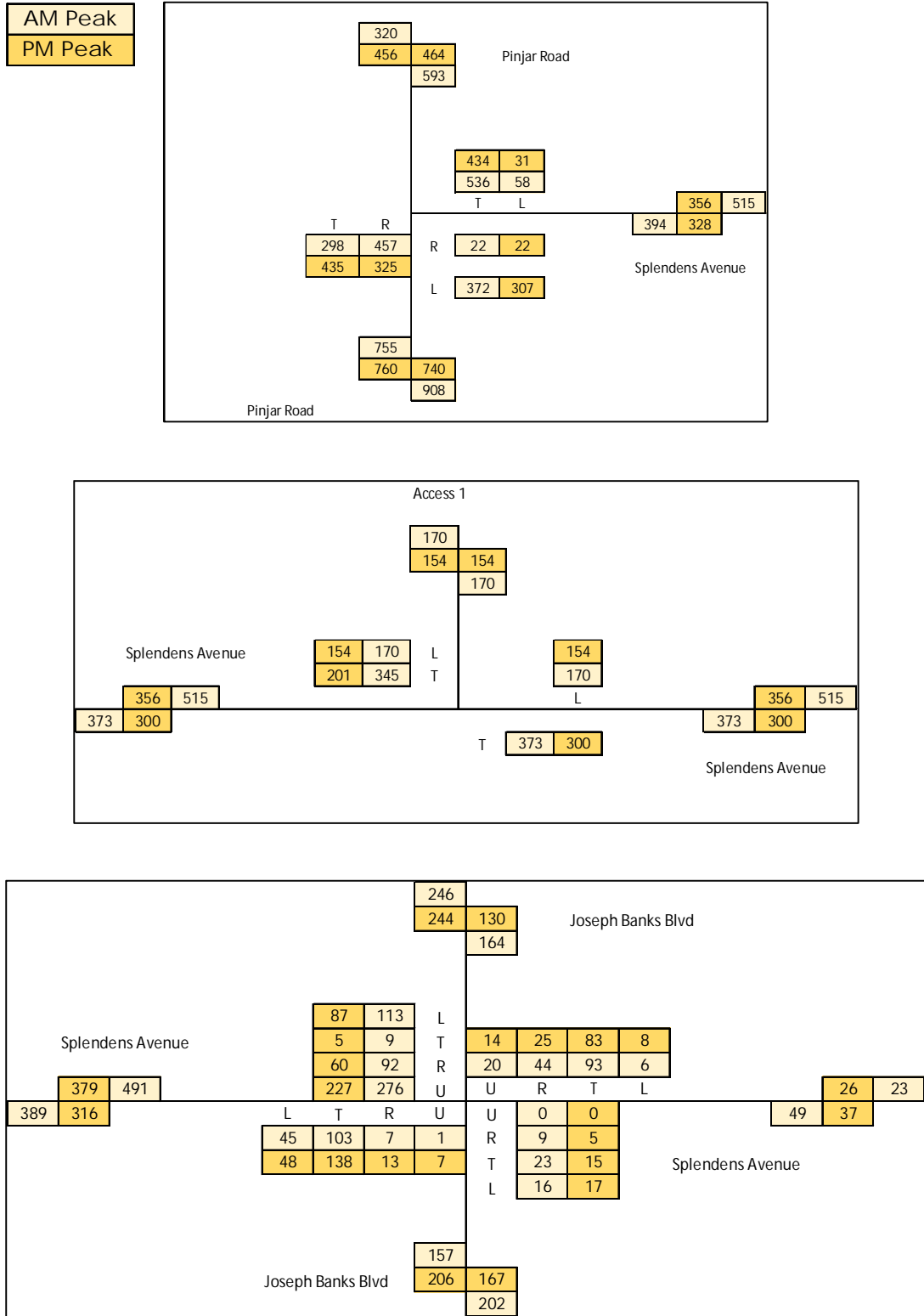
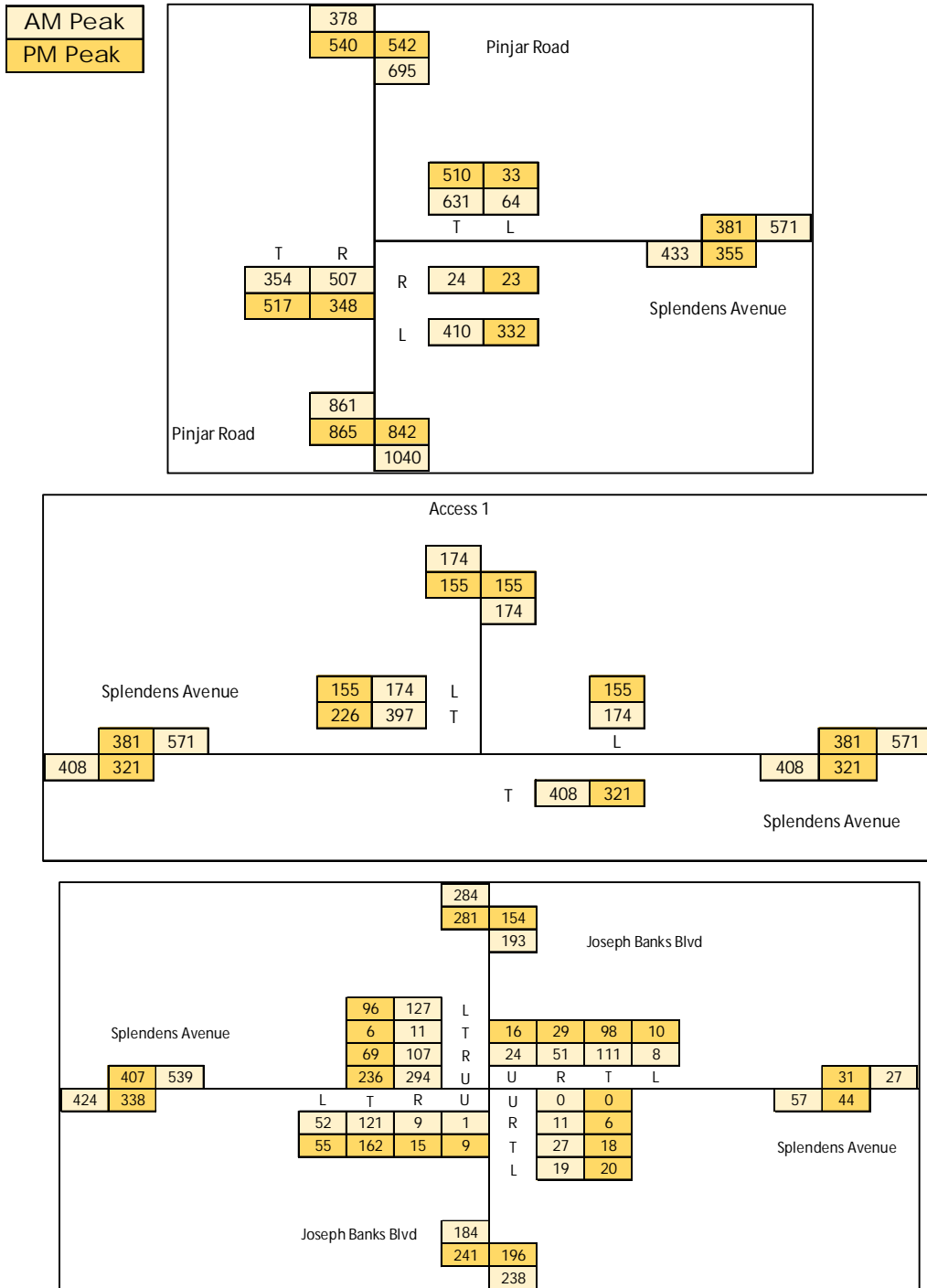


Figure 8-4 Background + Development Traffic 2033



## 8.6 Intersection Performance

SIDRA analysis for a 30-minute school peak was undertaken at the following intersections in order to quantify the impact of the school generated traffic on the surrounding road transport network:

- > Pinjar Road / Splendens Avenue Intersection;
- > Splendens Avenue / Access 1 Intersection; and
- > Joseph Banks Boulevard / Splendens Avenue Intersection

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  $DOS > 0.80$ ;
- > 95<sup>th</sup> 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

### 8.6.2 Pinjar Road / Splendens Avenue

The following presents the results of the analysis of Pinjar Road and Splendens Avenue intersection for all scenarios.

**Figure 8-5** is a SIDRA layout representation of the intersection. **Table 8-4** to **Table 8-6** shows the results of the analysis.

Figure 8-5 SIDRA Layout for Pinjar Road / Splendens Avenue

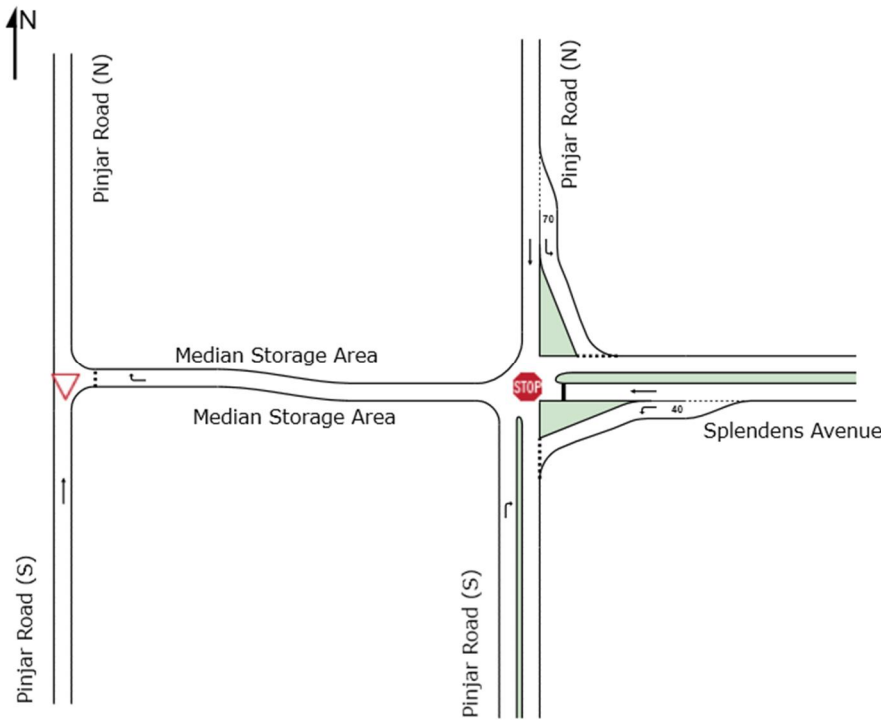


Table 8-4 Pinjar Road / Splendens Avenue Scenario 1 Results – 2020 without Development

Intersection Approach	Background 2020 without Development (AM)				Background 2020 without Development (PM)				
	DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)	
South: Pinjar Road	T	0.162	0	A	0	0.231	0	A	0
	R	0.247	7.3	A	7.9	0.367	7.3	A	15.7
East: Splendens Ave	L	0.204	6.2	A	5.9	0.124	5.5	A	3.5
	R	0.022	13.8	B	0.5	0.019	14.7	B	0.4
North: Pinjar Road	T	0.025	6.4	A	0.7	0.011	7.1	A	0.3
	R	0.266	0	A	0	0.214	0	A	0

Table 8-5 Pinjar Road / Splendens Avenue Scenario 2 Results - 2023 without Development

Intersection Approach	Background 2023 with Development (AM)				Background 2023 with Development (PM)				
	DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)	
South: Pinjar Road	T	0.171	0	A	0	0.246	0	A	0
	R	0.494	9.5	A	24.7	0.313	7.4	A	11.7
East: Splendens Ave	L	0.442	8.1	A	18.5	0.321	6.4	A	11.2
	R	0.065	17.5	C	1.4	0.046	14.9	B	1
North: Pinjar Road	T	0.06	7.5	A	1.6	0.027	6.8	A	0.7
	R	0.301	0	A	0	0.245	0	A	0

Table 8-6 Pinjar Road / Splendens Avenue Scenario 3 Results - 2033 without Development

Intersection Approach	Background 2033 with Development (AM)				Background 2033 with Development (PM)				
	DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)	
South: Pinjar Road	T	0.204	0	A	0	0.292	0	A	0
	R	0.635	12.3	B	36.8	0.373	8.5	A	15.6
East: Splendens Ave	L	0.564	10.3	B	26.3	0.385	7.5	A	14.9
	R	0.091	20.9	C	1.9	0.056	16.6	C	1.2
North: Pinjar Road	T	0.07	7.8	A	1.8	0.03	6.9	A	0.8
	R	0.354	0	A	0	0.288	0	A	0

The results show that the intersection would continue to operate satisfactorily during the opening year (2023) of the redevelopment and 10-years in the future (2033 design year). The estimated length of the worst queue is anticipated to be experienced by traffic undertaking the right turn in and right turn out from Splendens Avenue at this intersection. However, the delay would appear to be still acceptable and the anticipated vehicular queues are able to be accommodated within the existing turn pocket lanes and hence would have no impact on the through movements.

### 8.6.3 Splendens Avenue / Access 1

The following presents the results of the analysis of Splendens Avenue and Access 1 intersection for all scenarios.

**Figure 8-6** and **Figure 8-7** illustrates the SIDRA layout representation of the intersection for the existing and future scenario. **Table 8-7** to **Table 8-9** summarises the results of the analysis.

Figure 8-6 SIDRA Layout for Splendens Avenue / Access 1 (Existing Layout)

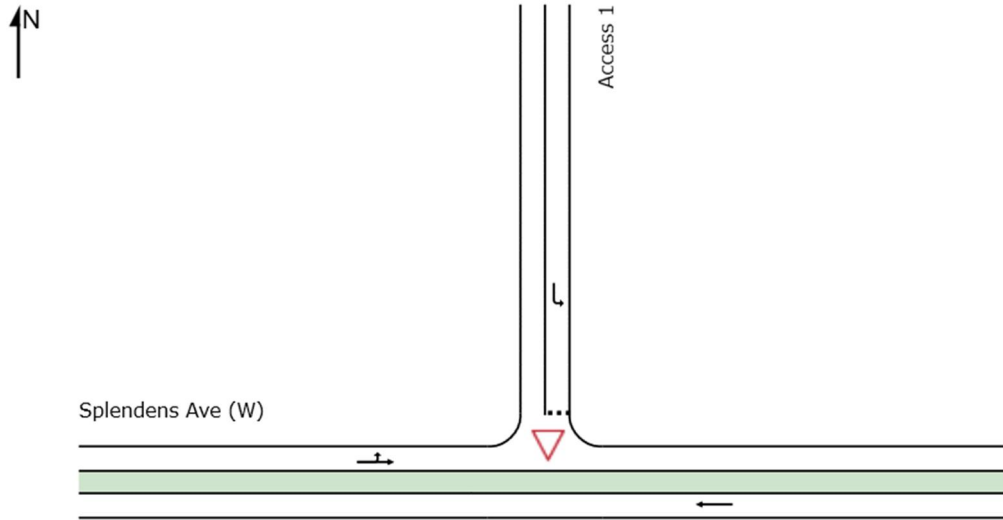


Figure 8-7 SIDRA Layout for Splendens Avenue / Access 1 (Proposed Future Layout)

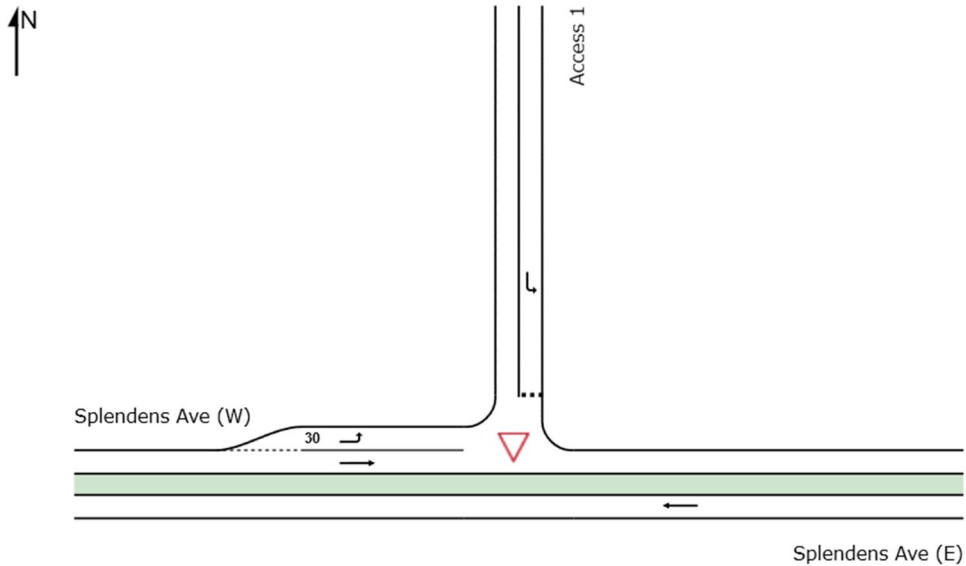




Table 8-7 Splendens Avenue / Access 1 Scenario 1 Results – 2020 without Development (Existing Intersection Layout)

Intersection Approach	Background 2020 without Development (AM)				Background 2020 without Development (PM)				
	DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)	
East: Splendens Ave	T	0.097	0	A	0	0.06	0	A	0
North: Access 1	L	0.016	5.4	A	0.4	0.003	4.9	A	0.1
West: Splendens Ave	L	0.152	3.9	A	0	0.071	3.9	A	0
	T	0.152	0	A	0	0.071	0	A	0

Table 8-8 Splendens Avenue / Access 1 Scenario 2 Results - 2023 with Development (Future Intersection Layout)

Intersection Approach	Background 2023 with Development (AM)				Background 2023 with Development (PM)				
	DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)	
East: Splendens Ave	T	0.204	0	A	0	0.165	0	A	0
North: Access 1	L	0.153	6	A	4.4	0.12	5.3	A	3.5
West: Splendens Ave	L	0.096	3.9	A	0	0.087	3.9	A	0
	T	0.186	0	A	0	0.111	0	A	0

Table 8-9 Splendens Avenue / Access 1 Scenario 3 Results – 2023 with Development (Future Intersection Layout)

Intersection Approach	Background 2023 with Development (AM)				Background 2023 with Development (PM)				
	DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)	
East: Splendens Ave	T	0.223	0	A	0	0.177	0	A	0
North: Access 1	L	0.167	6.3	A	4.8	0.123	5.4	A	3.6
West: Splendens Ave	L	0.099	3.9	A	0	0.088	3.9	A	0
	T	0.214	0	A	0	0.124	0	A	0

Access 1 is expected to continue to operate satisfactorily at the opening year of the redevelopment as well as for the 10-year future horizon. No queue spillback is expected to occur from the proposed new car park as the internal access road would provide adequate storage length for vehicles to queue without impacting on the traffic operations on Splendens Avenue.

### 8.6.4 Joseph Banks Boulevard / Splendens Avenue

The following presents the results of the analysis of Joseph Banks Boulevard and Splendens Avenue intersection for all scenarios.

**Figure 8-8** is a SIDRA layout representation of the intersection. **Table 8-10** to **Table 8-12** summarises the results of the analysis.

Figure 8-8 SIDRA Layout for Joseph Banks Boulevard / Splendens Avenue

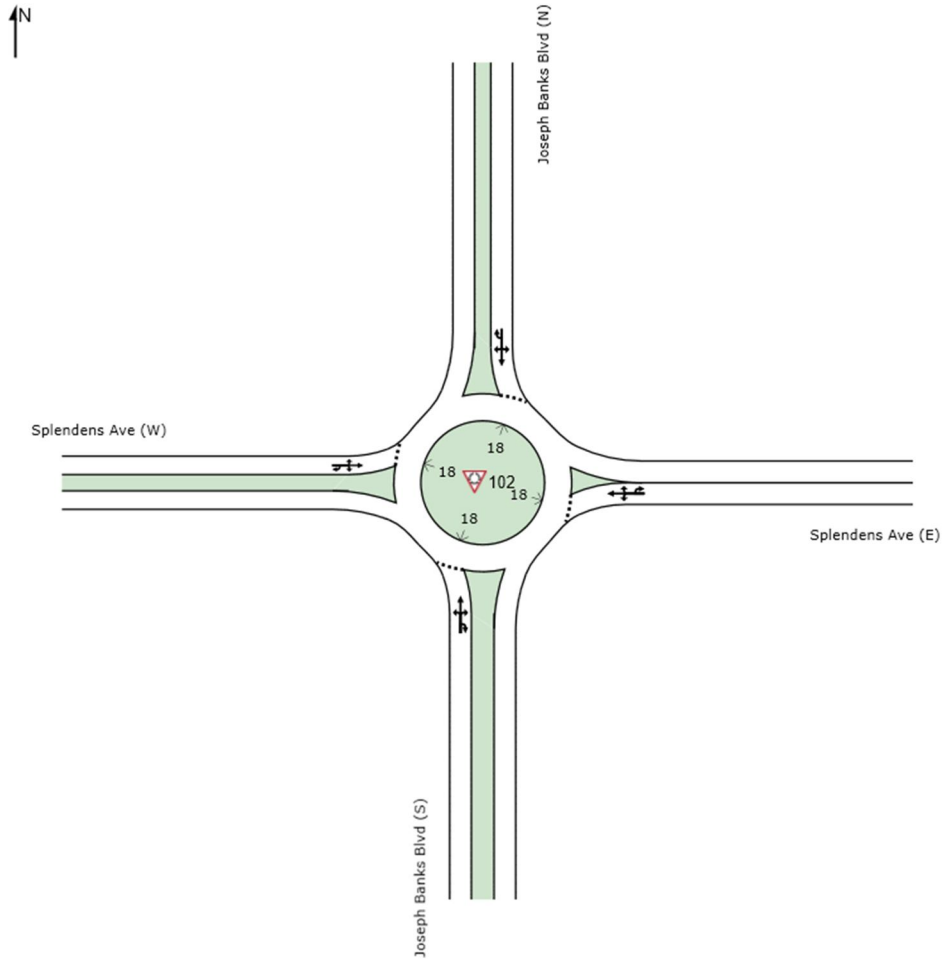


Table 8-10 Joseph Banks Boulevard / Splendens Avenue Scenario 1 Results - 2020 without Development

Intersection Approach	Background 2020 without Development (AM)				Background 2020 without Development (PM)				
	DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)	
South: Joseph Banks Blvd	L	0.118	3.9	A	4.3	0.144	3.4	A	5.4
	T	0.118	3.8	A	4.3	0.144	3.4	A	5.4
	R	0.118	8.1	A	4.3	0.144	7.7	A	5.4
	U	0.118	9.9	A	4.3	0.144	9.6	A	5.4
East: Splendens Ave	L	0.046	3.5	A	1.6	0.034	3	A	1.2
	T	0.046	3.7	A	1.6	0.034	3.2	A	1.2
	R	0.046	7.6	A	1.6	0.034	7.1	A	1.2
	U	0.046	9.4	A	1.6	0.034	8.8	A	1.2
North: Joseph Banks Blvd	L	0.136	3.9	A	5.2	0.103	3.5	A	3.8
	T	0.136	3.9	A	5.2	0.103	3.5	A	3.8
	R	0.136	8.2	A	5.2	0.103	7.8	A	3.8
	U	0.136	9.9	A	5.2	0.103	9.6	A	3.8
West: Splendens Ave	L	0.208	3.8	A	9.3	0.126	4	A	5.2
	T	0.208	3.8	A	9.3	0.126	3.9	A	5.2
	R	0.208	8.1	A	9.3	0.126	8.2	A	5.2
	U	0.208	9.8	A	9.3	0.126	10.1	B	5.2

Table 8-11 Joseph Banks Boulevard / Splendens Avenue Scenario 2 Results - 2023 with Development

Intersection Approach	Background 2023 with Development (AM)				Background 2023 with Development (PM)				
	DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)	
South: Joseph Banks Blvd	L	0.17	5.1	A	6.9	0.212	4.7	A	8.8
	T	0.17	5.1	A	6.9	0.212	4.7	A	8.8
	R	0.17	9.3	A	6.9	0.212	9	A	8.8
	U	0.17	11.1	B	6.9	0.212	11	B	8.8
East: Splendens Ave	L	0.061	4.9	A	2.4	0.056	4.2	A	2.1
	T	0.061	5.2	A	2.4	0.056	4.5	A	2.1
	R	0.061	9	A	2.4	0.056	8.3	A	2.1
	U	0.061	10.8	B	2.4	0.056	10.1	B	2.1
North: Joseph Banks Blvd	L	0.181	5.2	A	7.5	0.137	4.7	A	5.5
	T	0.181	5.2	A	7.5	0.137	4.7	A	5.5
	R	0.181	9.4	A	7.5	0.137	8.9	A	5.5
	U	0.181	11.2	B	7.5	0.137	10.7	B	5.5
West: Splendens Ave	L	0.417	4.1	A	23.8	0.353	4.4	A	18.8
	T	0.417	4.1	A	23.8	0.353	4.4	A	18.8
	R	0.417	8.4	A	23.8	0.353	8.6	A	18.8
	U	0.417	10.2	B	23.8	0.353	10.5	B	18.8

Table 8-12 Joseph Banks Boulevard / Splendens Avenue Scenario 3 Results - 2033 with Development

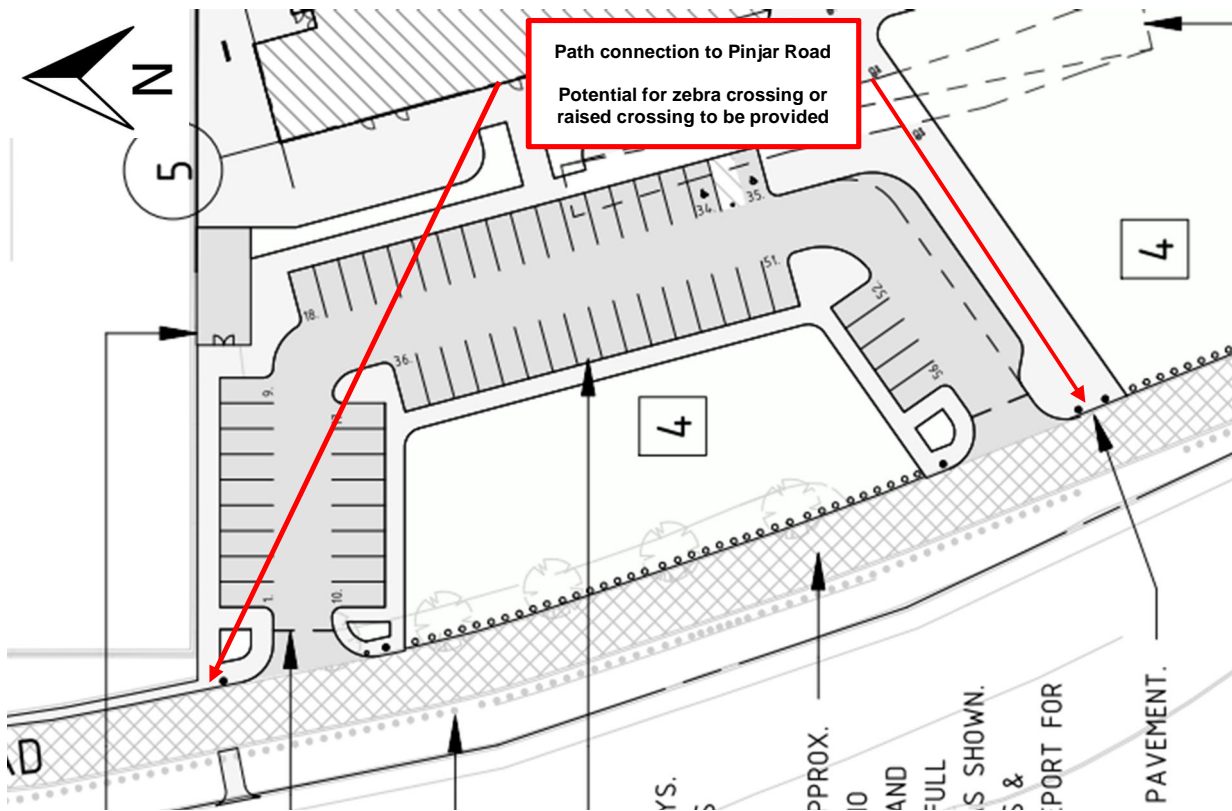
Intersection Approach	Background 2033 with Development (AM)				Background 2033 with Development (PM)				
	DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)	
South: Joseph Banks Blvd	L	0.207	5.5	A	8.7	0.251	4.9	A	10.8
	T	0.207	5.4	A	8.7	0.251	4.8	A	10.8
	R	0.207	9.6	A	8.7	0.251	9.1	A	10.8
	U	0.207	11.4	B	8.7	0.251	11.1	B	10.8
East: Splendens Ave	L	0.077	5.4	A	3.1	0.053	4.5	A	2.1
	T	0.077	5.7	A	3.1	0.053	4.7	A	2.1
	R	0.077	9.5	A	3.1	0.053	8.5	A	2.1
	U	0.077	11.3	B	3.1	0.053	10.3	B	2.1
North: Joseph Banks Blvd	L	0.226	5.5	A	9.8	0.165	4.9	A	6.8
	T	0.226	5.6	A	9.8	0.165	4.9	A	6.8
	R	0.226	9.8	A	9.8	0.165	9.1	A	6.8
	U	0.226	11.5	B	9.8	0.165	10.9	B	6.8
West: Splendens Ave	L	0.475	4.4	A	28.5	0.392	4.7	A	21.5
	T	0.475	4.4	A	28.5	0.392	4.6	A	21.5
	R	0.475	8.7	A	28.5	0.392	8.9	A	21.5
	U	0.475	10.5	B	28.5	0.392	10.8	B	21.5

Based on the results above, this roundabout controlled intersection is expected to continue to operate satisfactorily at the opening year of the redevelopment and 10-year future design year. It is anticipated that no upgrade is required at this intersection.

### 8.7 Pedestrian and Cycling Amenity

Existing pedestrian and cycling facilities and stops are discussed in **Section 4**. Traffic Wardens are deployed to manage and control pedestrian crossings at the Pinjar Road/Splendens Avenue intersection during the school peak periods which provides a safe crossing facility for students walking and cycling to school. Paths are provided along all roads fronting the school providing easy access to the school. The redevelopment proposes a path connection from the Site to Pinjar Road as shown in **Figure 8-9**. It is recommended that consideration be given to providing a zebra crossing or raised pedestrian crossing across the access road in order to create a safer crossing environment for students.

Figure 8-9 Potential for Path Connection to Pinjar Road



### 8.8 Public Transport Access

Existing public transport routes and stops are discussed in **Section 5**. Bus stops are provided on Joseph Banks Boulevard directly adjacent to the school. The stops can be accessed via the existing footpath along the boundary of the school.

## 9 Road Safety Assessment

### 9.1 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 on the following midblock and intersections:

- > Pinjar Road Midblock (Grandis Boulevard to Splendens Avenue);
- > Splendens Avenue (Pinjar Road to Joseph Banks Boulevard);
- > Joseph Banks Boulevard Midblock (Grandis Boulevard to Splendens Avenue);
- > Intersection of Pinjar Road and Splendens Avenue; and
- > Intersection of Joseph Banks Boulevard and Splendens Avenue

The crash data is summarised in **Table 9-1** and **Table 9-4**.

Table 9-1 Pinjar Road Midblock (Grandis Boulevard to Splendens Avenue)

Type of Crash (RUM Code)	Fatal	Hospital	Medical	Major Property Damage	Minor Property Damage	Total Crashes
Rear End	-	-	1	-	1	2
<b>Total</b>	-	-	1	-	1	2

Table 9-2 Splendens Avenue (Pinjar Road to Joseph Banks Boulevard)

Type of Crash (RUM Code)	Fatal	Hospital	Medical	Major Property Damage	Minor Property Damage	Total Crashes
Rear End	-	-	1	-	-	1
<b>Total</b>	-	-	1	-	-	1

Table 9-3 Joseph Banks Boulevard Midblock (Grandis Boulevard to Splendens Avenue)

Type of Crash (RUM Code)	Fatal	Hospital	Medical	Major Property Damage	Minor Property Damage	Total Crashes
Unspecified	-	-	-	1	-	1
<b>Total</b>	-	-	-	1	-	1

Table 9-4 Intersection of Pinjar Road and Splendens Avenue

Type of Crash (RUM Code)	Fatal	Hospital	Medical	Major Property Damage	Minor Property Damage	Total Crashes
Hit Object	-	1	-	-	-	1
Rear End	-	-	-	-	1	1
<b>Total</b>	-	1	-	-	1	2

A summary of the crash data are as follows:

- > No crashes were recorded at the intersection of Joseph Banks Boulevard/ Splendens Avenue;
- > Rear End crashes were the most common type of crash recorded; and
- > Overall the number of crashes occurring in the vicinity of the Site is very low and does not indicate any safety issues.

## 10 Conclusions and Summary

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This TIA assesses the proposed expansion of Joseph Banks Secondary College (“the Site”) located in Banksia Grove, City of Wanneroo.

The following conclusions can be drawn from this TIA:

- > The addition of 500 student enrolments represents an additional trip generation of approximately 500 vehicle trips in the AM peak and PM peak hours (arrivals plus departures).
- > The surrounding path network provides good pedestrian and cycling access to the school.
- > The proposed parking provision satisfies the requirements from the *Secondary School Planning Guide Section 6.6 – Traffic Management*, and the City of Wanneroo Planning Scheme.
- > Traffic management measures are proposed along the length of the Access Road to the new car park in order to ensure efficient traffic flow and minimise the impact to the surrounding road network. A separate operational traffic management plan has been prepared to improve traffic operations at the school pickup and drop off areas, in particular at the existing school pickup and drop off area located adjacent to Splendens Avenue.
- > The SIDRA assessment shows that the surrounding road network and intersections will operate satisfactorily with minimal delays or queues.
- > With regards to safety, the crash data shows that there is a very low frequency of crashes for roads and intersections located near the school.

Joseph Banks Secondary College  
Redevelopment

APPENDIX

A

DEVELOPMENT PLANS



CONTRACTOR TO CHECK ALL DIMENSIONS AND LEVEL ON SITE BEFORE COMMENCING ANY WORK OR PREPARING ANY SHOP DRAWINGS. FIGURED DIMENSIONS TAKE PRECEDENCE. DO NOT SCALE FROM PDF'S OR CADD FILES.

**NOTES**

- VERIFY ALL LEVELS & DIMENSIONS SHOWN. CONTRACTOR TO REPORT ANY DISCREPANCIES TO ARCHITECT BEFORE PROCEEDING WITH WORK ON SITE. COMPLETE ACCURACY OF EXISTING SERVICES CANNOT BE GUARANTEED. ALL INFORMATION SHOULD BE FURTHER VERIFIED ON SITE PRIOR TO COMMENCEMENT OF EXCAVATION AND CONSTRUCTION.
- THIS DRAWING TO READ IN CONJUNCTION WITH SPECIFICATION & DRAWINGS.
- THIS DRAWING TO READ IN CONJUNCTION WITH ALL SERVICES DRAWINGS.
- LANDSCAPING SHOWN AS INDICATIVE EXTENT ONLY. ALL HARD & SOFT LANDSCAPING WORKS BY LANDSCAPE ARCHITECT. REFER TO LANDSCAPE DRAWINGS FOR FURTHER INFORMATION.
- CIVIL WORKS SHOWN AS INDICATIVE EXTENT ONLY. ALL CIVIL WORKS BY CIVIL ENGINEER. REFER TO CIVIL DRAWINGS FOR FURTHER INFORMATION.
- ALL WORKS WHICH REQUIRE REINSTATEMENT AND MAKING GOOD SHALL BE TO THE SATISFACTION OF THE ARCHITECT.

**SYMBOLS**

- DENOTES EXTENT OF NEW PROPOSED BUILDINGS & REFURBISHMENT WORKS. REFER TO KEY PLAN FOR FURTHER INFORMATION.
- DENOTES EXTENT OF EXISTING BUILDINGS. NO WORKS TO BE CARRIED OUT.
- DENOTES BUILDING SETOUT POINT.
- GFL 26.400 DENOTES PROPOSED NEW BUILDING FLOOR LEVEL.

**KEY**

- NEW TWO-STORY CLASSROOM BLOCK.
- NEW ENGINEERING WORKSHOP & TEXTILE STUDIO REFURBISHMENTS. REFER TO A10 SERIES FOR INFORMATION.
- RELOCATED TRANSPORTABLE CLASSROOMS & ASSOCIATED SERVICES AND LANDSCAPE WORKS. **NOT IN CONTRACT**. ALL WORKS TO BE COMPLETE BY PRINCIPAL.
- NEW HARD/SOFT LANDSCAPING. REFER TO LANDSCAPE DWGS FOR INFORMATION.



PROPOSED NEW 19 OFF PARKING BAYS COMPLETE WITH PAVING & RETAINING WALL. REFER TO CIVIL ENG. DWGS FOR INFORMATION.

RELOCATED BICYCLE COMPOUND REFER TO LANDSCAPE DWGS. FOR INFORMATION.

DASHED LINE INDICATES NEW AUTO DROP-CABLE GATE (3 OFF).

EXISTING BOLLARDS TO WESTERN SIDE OF ACCESS ROAD TO REMAIN.

PROPOSED NEW 56 OFF PARKING BAYS WITH ADDITIONAL DROP OFF BAYS. REFER TO CIVIL ENG. DWGS FOR INFORMATION.

CROSSHATCH INDICATES APPROX. ZONE FOR NEW YELLOW 'NO STOPPING' LINEMARKINGS AND ASSOCIATED SIGNAGE TO FULL WIDTH OF ACCESS ROAD AS SHOWN. REFER TO CIVIL ENG. DWGS & TRAFFIC MANAGEMENT REPORT FOR INFORMATION.

NEW STEEL BOLLARDS TO PAVEMENT. REFER LANDSCAPE DWGS

EXISTING BOLLARDS RELOCATED/ ADDITIONAL NEW BOLLARDS TO EASTERN SIDE OF ACCESS ROAD AS SHOWN. REFER TO LANDSCAPE DWGS FOR INFORMATION.

INDICATIVE LOCATION OF NEW DIGITAL SIGNAGE POST (BY SCHOOL). PROVISION OF NEW BELOW-GROUND CAPPED SERVICES TO THIS LOCATION ONLY. REFER ELECTRICAL DWGS.

APPROX. EXTENT OF EXISTING DRAINAGE CELL SHOWN DASHED TO REMAIN.

PROPOSED TWO NEW LEFT TURN POCKETS. REFER TO CIVIL ENG. DWGS FOR INFORMATION.

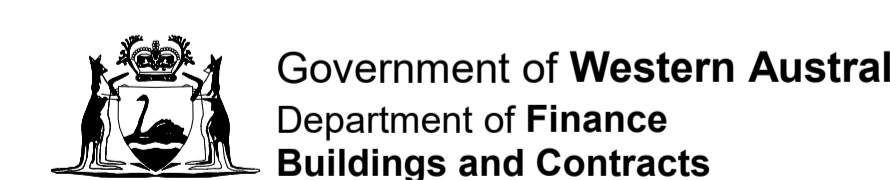
BOLLARD FOR SWIPE/COMMS ACCESS TO NEW AUTO DROP-CABLE. REFER ELECTRICAL DWGS FOR DETAILS

210316	CONSULTANT ISSUE	F
210312	CONSULTANT ISSUE	E
210311	CONSULTANT ISSUE	D
210303	ISSUE TO TRAFFIC MANAGEMENT	C
210224	CONSULTANT ISSUE	B
210208	CONSULTANT ISSUE	A
DATE	REVISION	No.

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ARCHITECTURAL  
**JOSEPH BANKS SECONDARY COLLEGE**  
STAGE 3 REDEVELOPMENT  
SITE PLAN

DRAWN	ADB	DESIGNED	DA	REDUCTION	0	25
CHECKED	MR	PRINCIPAL				
APPROVED	DA	DANIEL AISENSEN		WITH_JOB No.		2041
SCALE	1 : 1000 @ A1	DATE	210316	DRAWING No.		REV
DF PROJ No.	<PROJ No.>	DF FILE No.	<FILE No.>	<b>A1.02 - F</b>		

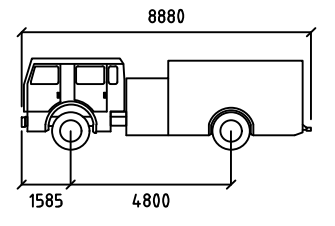
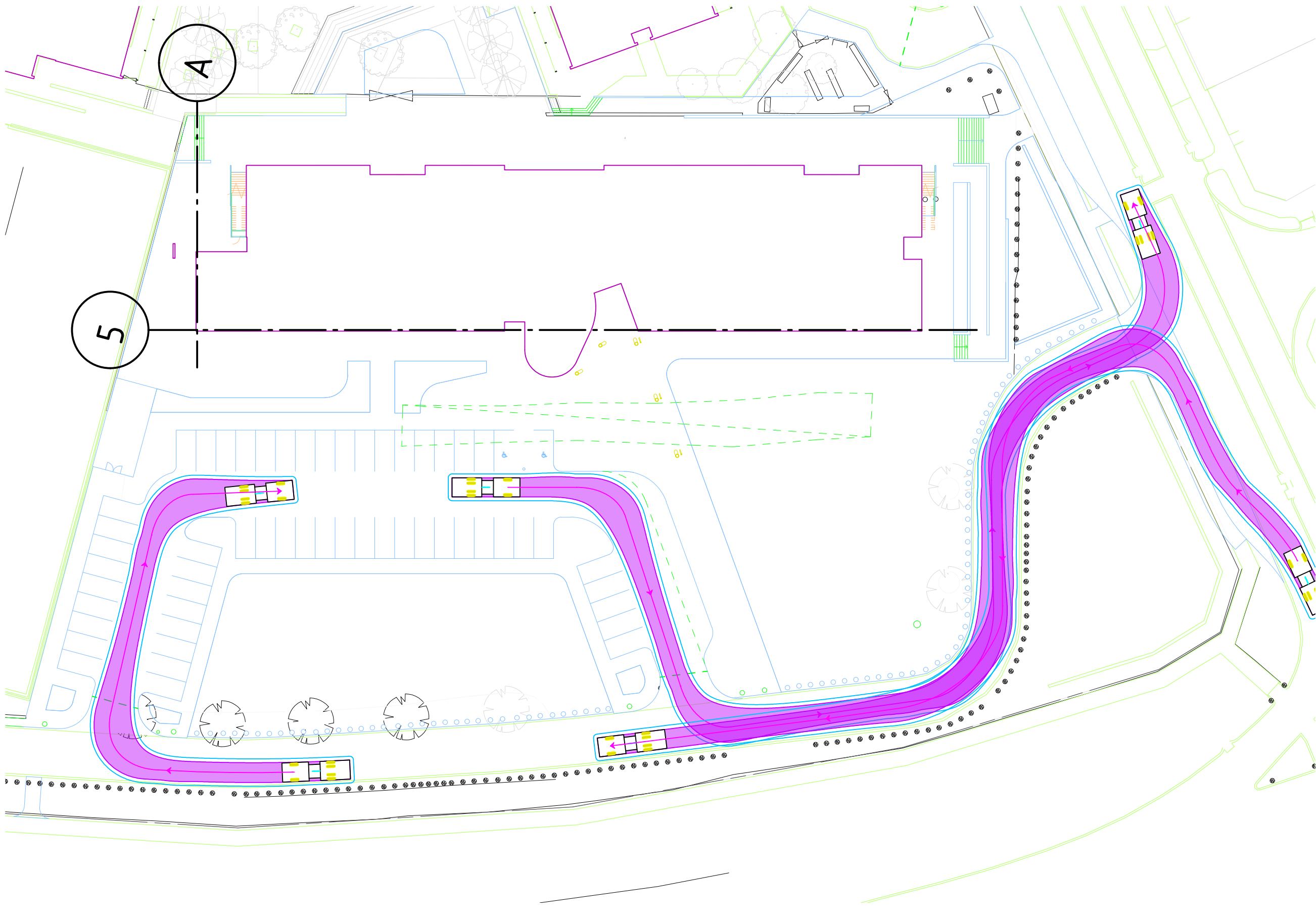
THIS IS A CADD DRAWING  
DO NOT AMEND MANUALLY

Joseph Banks Secondary College  
Redevelopment

APPENDIX

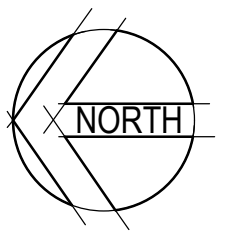
B

SWEPT PATHS



MFB Ultra Large Scania 113M  
mm

Width : 2500  
Track : 2425  
Lock to Lock Time : 6.0  
Steering Angle : 41.3



DATE PLOTTED: 17 March 2021 9:57 AM BY: RAYMOND RACHMAT  
CAD File: K:\Projects\CV1152200\_With Architecture\_Traffic Services\_Joseph Banks\_SOS\_TechnicalTrafficCADTIA Swept Paths\Joseph Banks SC TIA Fire Truck V2.dwg



Perth Tel: 08 9273 3888

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WITH\_ARCHITECTURE STUDIO  
JOSEPH BANKS SECONDARY COLLEGE REDEVELOPMENT  
8.8m FIRE TRUCK (PUMPER)  
SWEEP PATH

Date  
17.03.2021

Scale  
1:500

Size  
A3

CW1152200-TR-D001  
Drawing Number

B  
Revision

## About Cardno

Cardno is a professional infrastructure and environmental services company, with expertise in the development and improvement of physical and social infrastructure for communities around the world. Cardno's team includes leading professionals who plan, design, manage and deliver sustainable projects and community programs. Cardno is an international company listed on the Australian Securities Exchange [ASX:CDD].

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