

APPENDIX F

TRAFFIC IMPACT ASSESSMENT

Local Structure Plan - Transport Impact Assessment

Prepared for
Stockland

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1 Introduction

1.1 Background

Cardno has been commissioned by Stockland to prepare a Transport Impact Assessment (TIA) for the proposed redevelopment of Lot 1665 (1040) Wanneroo Road, located in the suburb of Sinagra, *City of Wanneroo*.

Specifically, this report aims to assess the impacts of the proposed development upon the adjacent road network, with a focus on access requirements to/from Wanneroo Road and the surrounding local road network.

This report has been prepared in accordance with the *Western Australian Planning Commission (WAPC) Transport Impact Assessment Guidelines Volume 2 – Planning Schemes, Structure Plans & Activity Centre Plans (2016)*. The checklist form, included in these guidelines is enclosed in **Appendix A**.

2 Existing Situation

2.1 Existing Site Context and Land Use

The proposed development site (the Site) is located on the eastern side of Wanneroo Road, north of Wanneroo Town Centre. The Site currently operates as an Ingham chicken farm, with access via a full movement priority-controlled intersection on Wanneroo Road.

The Site is bounded by Wanneroo Road to the west, vacant bushland to the south, vacant lots and residential dwellings to the north and a nursery to the east.

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

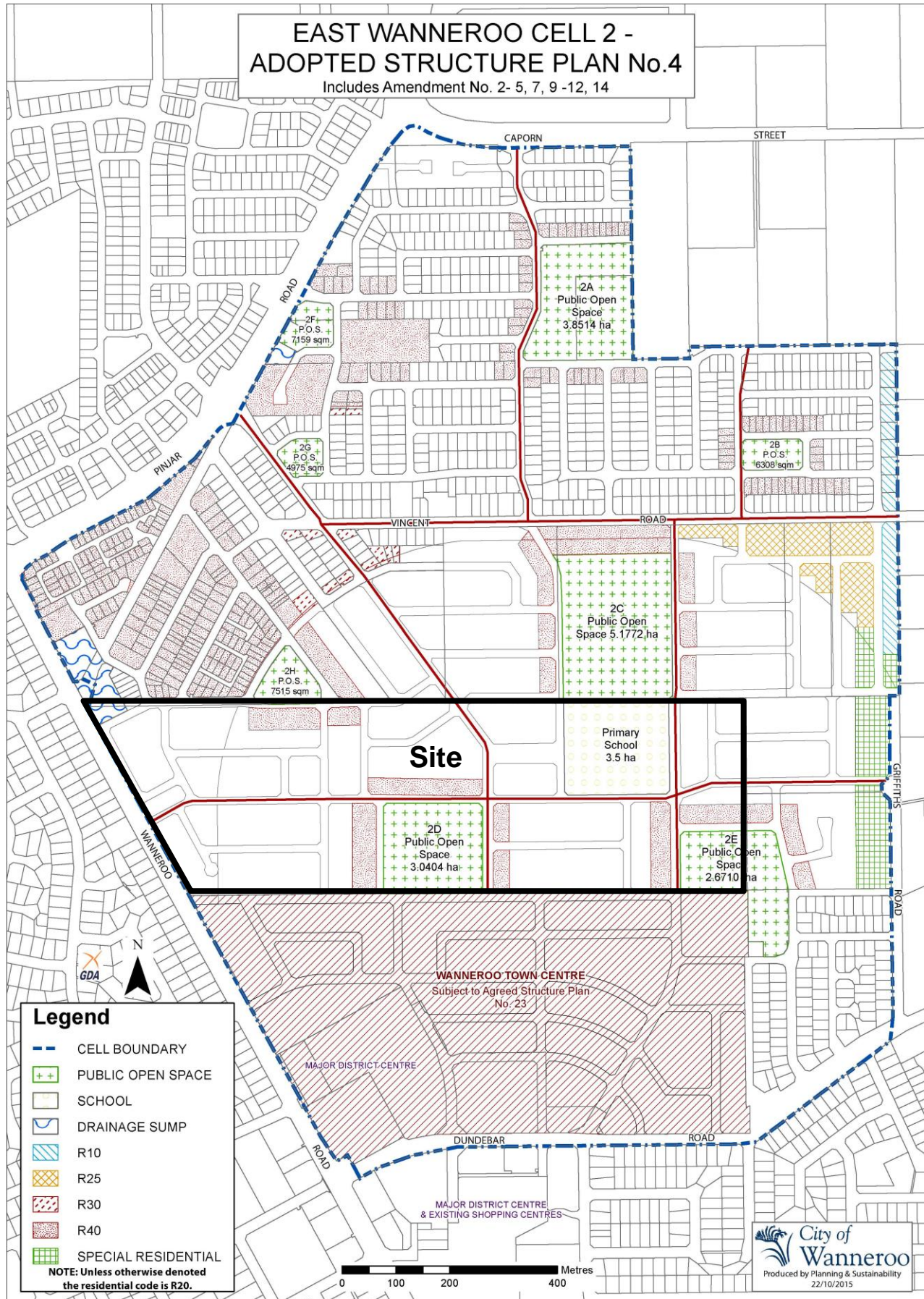
Figure 2-1 Site Location



Source: Nearmap (2019)

As shown in **Figure 2-2** below, the Site sits within the East Wanneroo Cell 2 Structure Plan area, on the northern boundary of Wanneroo Town Centre.

Figure 2-2 East Wanneroo Cell 2 Structure Plan No. 4



Source: East Wanneroo Cell 2 (Sinagra) Structure Plan No. 4 (2017)

2.2 Existing Road Network

Figure 2-3 shows the layout and classification of the roads surrounding the Site.

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.

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.

Figure 2-3 Existing Road Network Surrounding the Site



Source: Main Roads Mapping Information Centre (2019)

The characteristics of the surrounding road network are further described in **Table 2-1**.

Table 2-1 Road Network Description

Road Name	Road Hierarchy	Jurisdiction	No. of Lanes	No. of Footpaths	Pavement Width (m)	Posted Speed Limit (km/h)
Wanneroo Road	Primary Distributor	MRWA	4	2	2 x 7.4	60
Dundobar Road	Local Distributor	Local govt.	2	2	2 x 4	50
Pinjar Road	Distributor B	Local govt.	2	1	2 x 7	60

2.3 Existing Key Intersections

The following key intersections are located within 1km of the site.

- > **Wanneroo Road/Pinjar Road** – Located north of the Site. This intersection is a 3-way signal-controlled intersection. At the intersection, the northern approach provides an 80m left turn pocket (give way controlled) and the southern approach provides a 135m right turn pocket (signal controlled). **Figure 2-4** shows the existing geometry of the intersection.

Figure 2-4 Existing Intersection of Wanneroo Road/Pinjar Road



Source: Nearmap (2019)

- > **Wanneroo Road/Dundebar Road** – located south of the Site. This intersection is a 3-way signal-controlled intersection. At the intersection, the northern approach provides a 115m left turn pocket (give way controlled), the southern approach provides a 66m right turn pocket (signal controlled) and the eastern approach provides an 81m left turn pocket (give way controlled). **Figure 2-5** shows the existing geometry of the intersection.

Figure 2-5 Existing Intersection of Wanneroo Road/Dundebar Road



Source: Nearmap (2019)

2.4 Existing Traffic Volumes

Existing traffic volumes and movement data was sourced from Main Roads WA Traffic Data and the City of Wanneroo traffic counts and is presented in **Table 2-2** below.

Table 2-2 Existing Mid-block Traffic Volumes (Two-way)

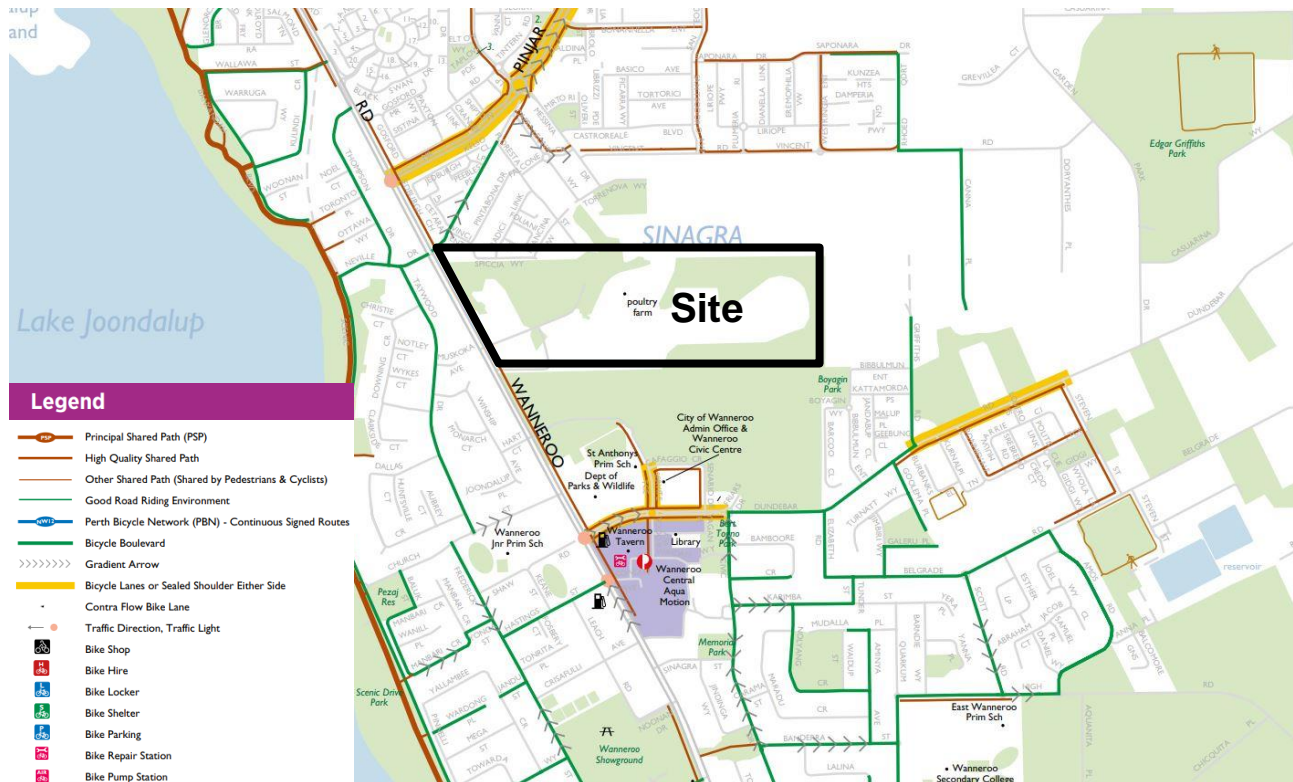
Road Name	Year of Data	AM Peak Volumes	PM Peak Volumes	Average Daily Volumes
Wanneroo Road (north of Dundebar Road)	2018	2,401	2,458	35,286
Wanneroo Road (north of Pinjar Road)	2018	1,706	1,754	20,537
Dundebar Road (east of Wanneroo Road)	2018	1,047	875	9,672
Pinjar Road (east of Wanneroo Road)	2018	1,486	1,330	17,240

Source: MRWA SCATS data

2.5 Existing Pedestrian/Cycle Networks

Existing pedestrian/cycle networks are illustrated in **Figure 2-6**. Wanneroo Road has a shared path along the eastern side of the road and a pedestrian footpath along the western edge of the road. Similarly, shared paths are also present along Pinjar Road and Dundee Road.

Figure 2-6 Pedestrian/Cyclist Facilities in the Area Surrounding the Site



Source: WA Department of Transport (2019)

2.6 Existing Public Transport Facilities

The existing bus routes within close vicinity of the Site are Route 467 which runs from Whitfords Station to Joondalup Station, via Pearsall, Hocking & Ashby, Route 468 which also runs from Whitfords Station to Joondalup Station, via Wanneroo Road, and Route 389 which runs from Perth Busport to Belgrade Road / Esther Loop. The frequency of the bus services is summarised in **Table 2-3**.

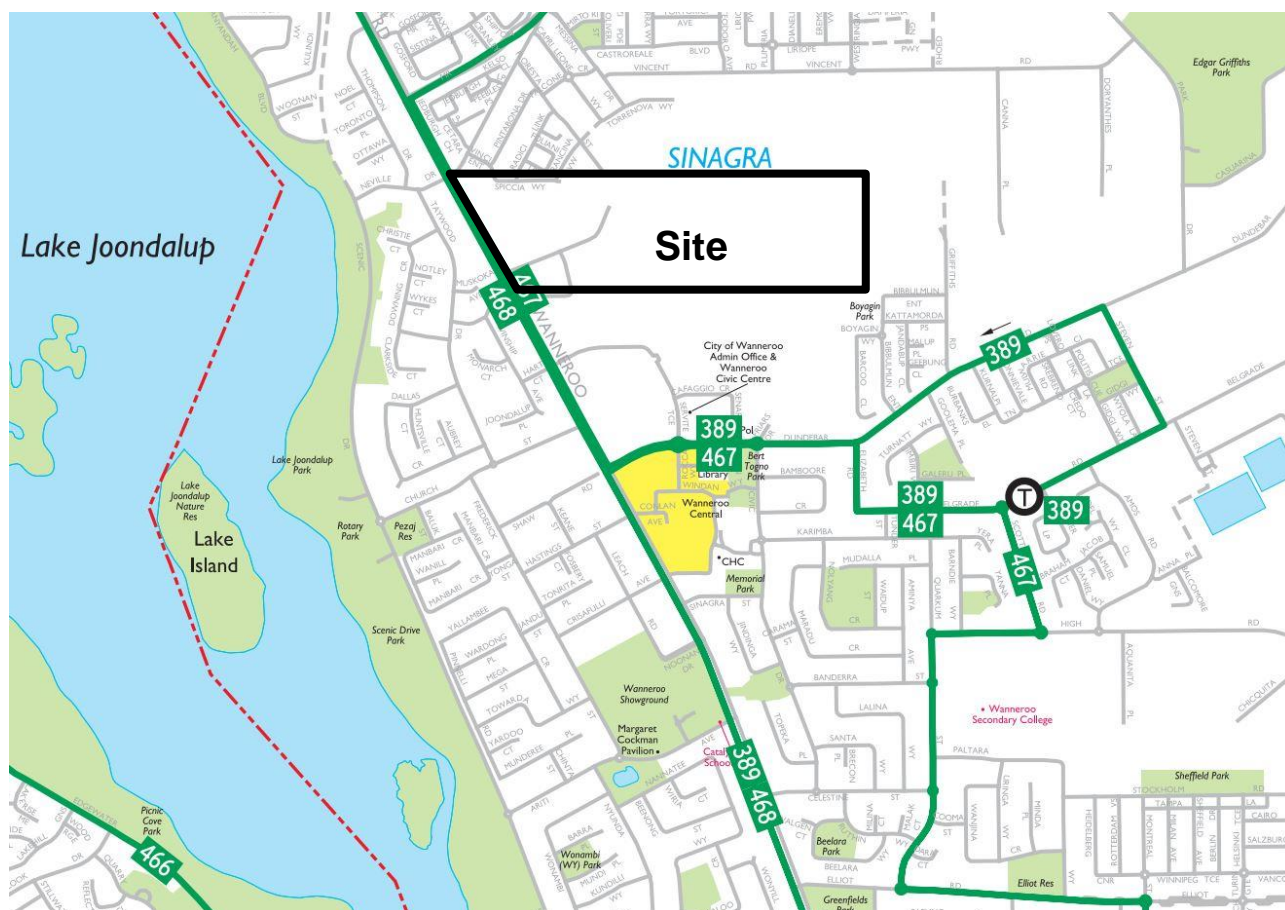
Table 2-3 Bus Services within the Vicinity of the Site

Route Number	Route name	Weekday Peak Frequency	Weekend Peak Frequency
389	Perth Busport - Belgrade Road / Esther Loop	10 mins	60 mins
467	Whitfords Station – Joondalup Station, via Pearsall, Hocking & Ashby.	10 mins	60 mins
468	Whitfords Station – Joondalup Station, via Wanneroo Road	10-15 mins	60 mins

Existing bus services can be identified in the network map as shown in **Figure 2-7**.

Overall the public transport services within the vicinity of the Site is acceptable with a high frequency service operating during the network's peak periods.

Figure 2-7 Public Transport Routes Vicinity of the Site



Source: WA Department of Transport (2018)

2.7 Crash Assessment

A search of the Main Roads WA Reporting Centre for crash data was made. This search covered all recorded traffic accidents between 1 January 2013 and 31 December 2017 for the following roads:

- > Wanneroo Road between Pinjar Road and Dundebur Road (excluding intersections)
- > Pinjar Road between Wanneroo Road and Carosa Road (excluding intersections)
- > Dundebur Road between Wanneroo Road and Civic Drive (excluding intersections)
- > Wanneroo Road/Pinjar Road Intersection
- > Wanneroo Road/Dundebur Road Intersection

The results are summarised below in **Table 2-4** to **Table 2-8**.

Table 2-4 Crash Data of Wanneroo Road between Pinjar Road and Dundebur Road (Midblock Section)

Type of Crash	Fatal	Hospital	Medical	Major Property Damage	Minor Property Damage	Total
Rear End	-	2	3	8	8	21
Sideswipe	-	-	-	4	5	9
Hit Object	-	-	1	1	1	3
Head On	-	-	-	1	-	1
Right Angle	-	-	-	1	1	2
Other	-	-	-	1	1	2
Total	0	2	4	16	16	38

Source: Main Roads WA

Table 2-5 Pinjar Road between Wanneroo Road and Carosa Road (Midblock Section)

Type of Crash	Fatal	Hospital	Medical	Major Property Damage	Minor Property Damage	Total
Rear End	-	-	-	-	-	0
Sideswipe	-	-	-	-	-	0
Hit Object	-	-	-	-	-	0
Head On	-	-	-	-	-	0
Other	-	-	-	-	1	1
Total	0	0	0	0	1	1

Source: Main Roads WA

Table 2-6 Dundebur Road between Wanneroo Road and Civic Drive (Midblock Section)

Type of Crash	Fatal	Hospital	Medical	Major Property Damage	Minor Property Damage	Total
Rear End	-	-	-	2	1	3
Sideswipe	-	-	-	1	-	1
Hit Object	-	-	-	-	-	0
Head On	-	-	-	1	-	1
Other	-	-	-	-	-	0
Total	0	0	0	4	1	5

Source: Main Roads WA

Table 2-7 Wanneroo Road/Pinjar Road Intersection

Type of Crash	Fatal	Hospital	Medical	Major Property Damage	Minor Property Damage	Total
Rear End	-	1	3	28	18	50
Sideswipe	-	-		2	-	2
Right Angle	-	-	3			3
Hit Object	-	-	1	1	-	2
Right Turn Thru	-	1	1	-	-	2
Head On	-	-	-	-	-	0
Other	1	-	-	-	-	1
Total	1	2	8	31	18	60

Source: Main Roads WA

Table 2-8 Wanneroo Road/Dundebar Road Intersection

Type of Crash	Fatal	Hospital	Medical	Major Property Damage	Minor Property Damage	Total
Rear End	-	-	2	16	8	26
Right Angle	-	-	-	-	1	1
Hit Object	-	-	-	2	-	2
Head On	-	-	-	-	-	0
Other	-	-	-	-	1	1
Total	0	0	2	18	10	30

Source: Main Roads WA

A summary of the crash data are as follows:

- > One fatality was recorded at the Wanneroo Road/Pinjar Road intersection
- > Rear end crashes are the most common type of crash along these road sections and intersections.
- > The majority of crashes within the area occur along the midblock sections of Wanneroo Road and the two signalised intersections (Wanneroo Road/Pinjar intersection and Wanneroo Road/Dundebar Road intersection).

3.3 Pedestrian / Cycle Networks

The *City of Wanneroo Cycle Plan 2018/19 – 2021/22* provides a strategic outline of the City's future cycling network. The bike plan proposes upgrades to the cycling network surrounding the structure plan area which includes:

- > Construction of a shared facility on Pinjar Road between Joondalup Drive and Blackberry Drive.
- > Construction of a red asphalt shared path along Dundebur Road between Civic Drive and Griffiths Road.
- > Construction of a red asphalt shared path along Wanneroo Road starting at Santa Rosalia Vista and ending at Dundebur Road.

It is anticipated that new roads constructed as part of the development of surrounding land will include cycling facilities generally in accordance with the requirements of Liveable Neighbourhoods. These links will provide convenient walking and cycling connections to Wanneroo Town Centre.

3.4 Public Transport Services

Cardno contacted the Public Transport Authority and was advised that there were changes likely in the area, however it is subject to the road network being completed. Route 467 is likely to be removed from Wanneroo Road and moved further east performing a north south route (potentially) through the subject site still maintaining community access to the Wanneroo Town Centre. Route 468 is on its long-term alignment.

4 Integration with Surrounding Area

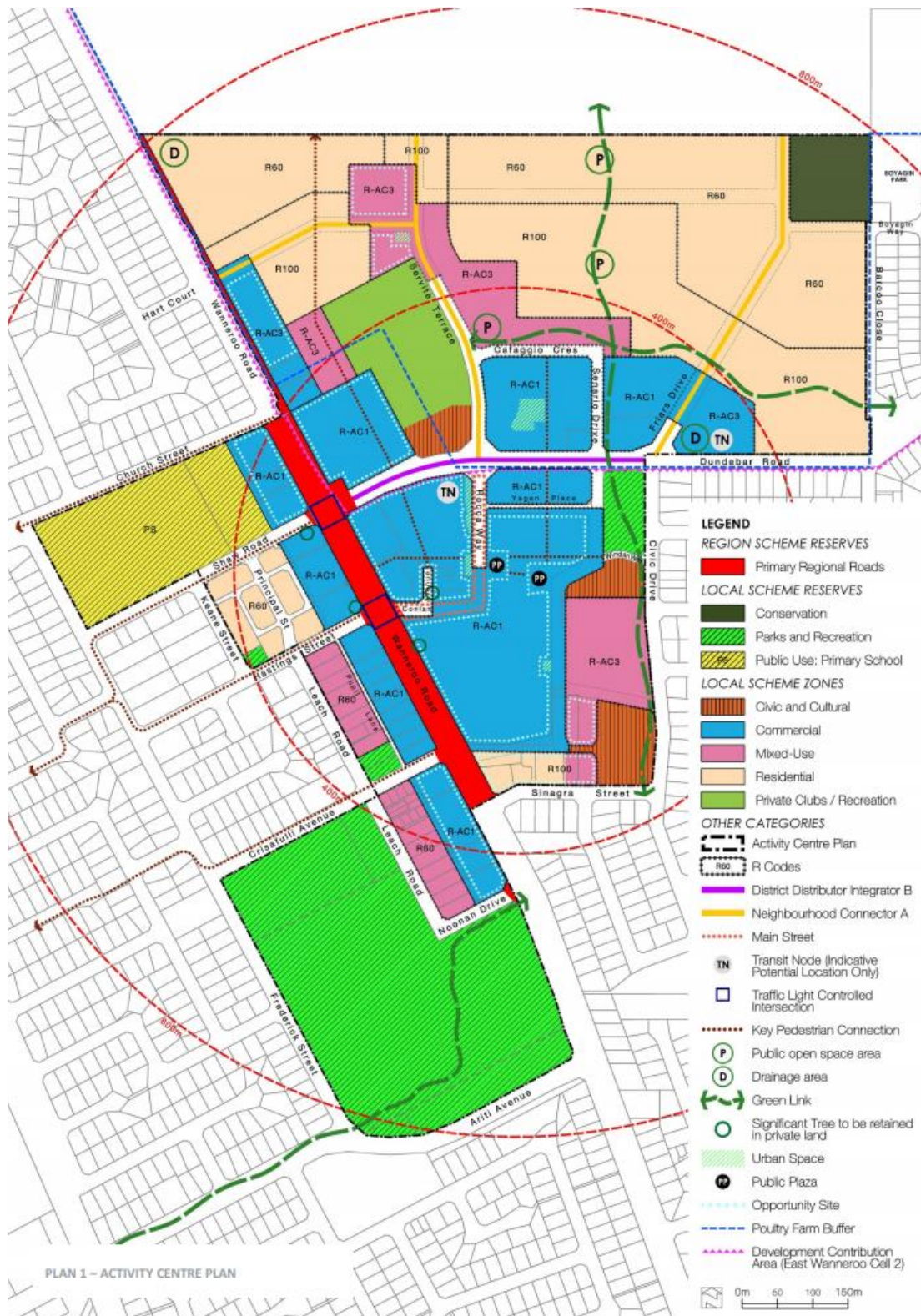
4.1 Surrounding Attractors/Generators

To the south of the Site is the major district centre (Wanneroo Town Centre), comprising of Wanneroo Central Shopping Centre and a variety of retail, food and beverage, recreational and civic land uses. Wanneroo Primary School and St Anthony's School are also located within this area.

4.2 Proposed Changes to Surrounding Land Uses

The *Wanneroo Town Centre Activity Centre Plan No.90* details the proposed land used within the area south of the Site. The proposed land uses consist primarily of residential dwellings with some proposed mixed-use developments. **Figure 4-1** shows the proposed land uses.

Figure 4-1 Wanneroo Town Centre Activity Centre Plan No.90



Source: City of Wanneroo (2019)

4.3 Level of Accessibility

When the surrounding land is fully developed, the Site will form part of a wholly integrated suburban area with appropriate connections to the regional road network, including Wanneroo Road (direct), Dundobar Road and Pinjar Road, providing vehicular access to and from the Site. **Section 5.2** further discusses the different access options.

5 Development Proposal

5.1 Proposed Development

The proposed structure plan is shown in **Appendix B**. A summary of the expected development land use yield based on the proposed structure plan is summarised in **Table 5-1**.

Table 5-1 Proposed Development Summary

Land use	Yield
Residential Dwelling	650 – 800 dwellings (710 dwelling used for traffic assessment)
Primary School	450 students

For the purpose of this assessment, it is assumed that the number of students of the primary school will be 450 students based on the standard education department footprint.

5.2 Vehicular Access Arrangements

5.2.1 Wanneroo Road access

The Site currently has full movement, priority-control access to/from Wanneroo Road at the location shown in **Figure 5-1**. It is proposed that this access will be located further north and upgraded to accommodate the traffic generated by the proposed development.

Figure 5-1 Site Access Location

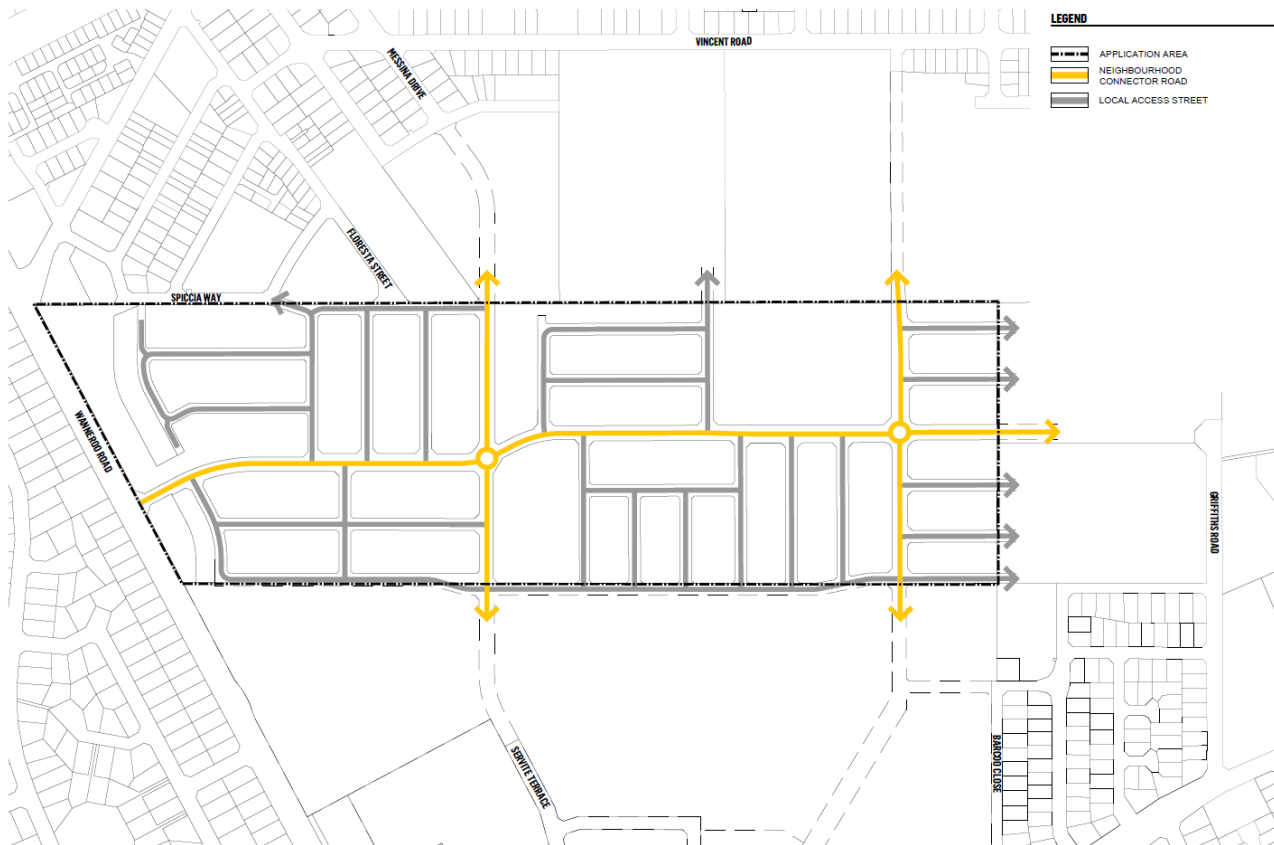


Source: Nearmap (2019)

5.2.2 Access to Surrounding Road Network

As outlined in **Figure 5-2**, the proposed structure plan sets out an indicative road network for the Site and surrounding area. The road cross section drawings are attached in **Appendix C**. The plan indicates access to the surrounding road network could be implemented, subject to agreement with the City of Wanneroo and adjacent land owners.

Figure 5-2 Future Connecting Roads



Source: Urbis (2019)

5.3 Pedestrian and Cyclist Access

Pedestrian and cyclist access has not yet been defined, however it should be provided generally in accordance with the requirements of *Liveable Neighbourhoods*.

6 Analysis of Transport Network

6.1 Assessment Years and Time Period

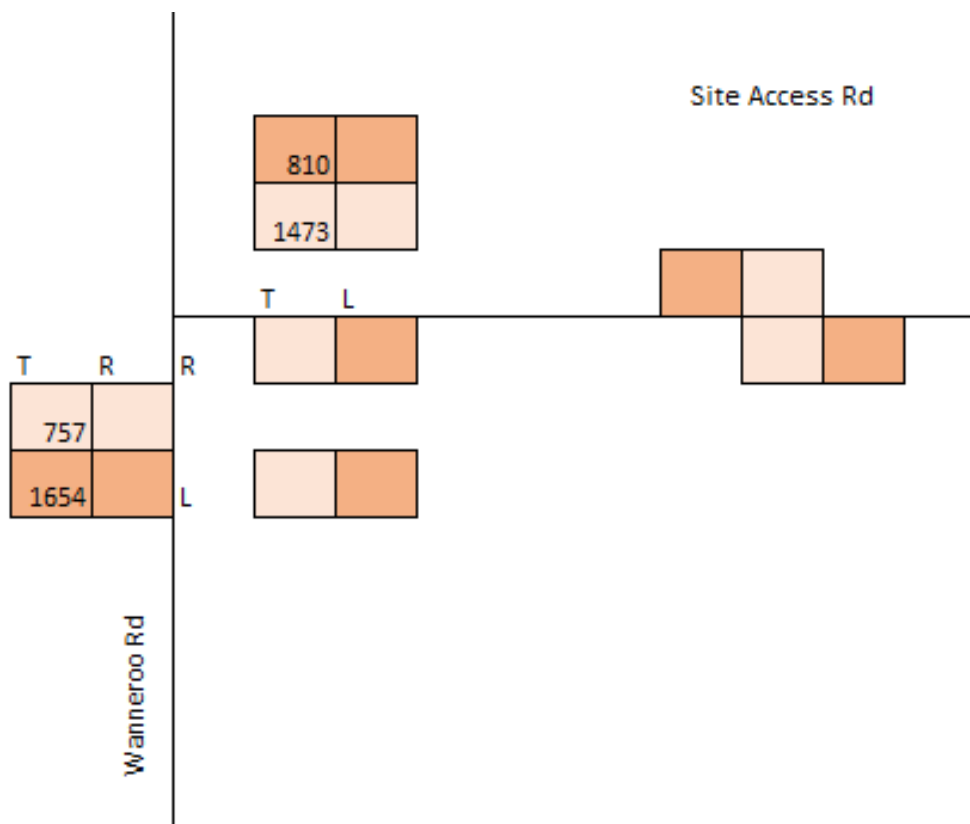
In order to test the adequacy of the road network, particularly the intersection at Wanneroo Road, the following two scenarios have been assessed:

- > **Scenario 1** – Opening year assuming one third of the residential development is completed.
- > **Scenario 2** – 10-year growth with full build out of the residential development and the primary school.

6.2 Background Traffic

The background traffic for this assessment has been derived from the latest SCATS data available on the MRWA Traffic Map. The adopted background traffic in year 2019 along Wanneroo Road adjacent to the Site is shown in **Figure 6-1**.

Figure 6-1 Background Traffic 2019



6.3 Traffic Generation

The traffic generation rates in **Table 6-1**, sourced from the WAPC Transport Assessment Guidelines, have been used to calculate an estimate of the traffic generated in the AM and PM peak periods by the proposed development. **Table 6-2** summarises the trip volumes derived from the adopted generation rates.

Table 6-1 WAPC Trip Generation Rates

Land Use	AM Peak Hour		PM Peak Hour	
	IN	Out	IN	OUT
Residential	0.2 trips per Dwelling	0.6 trips per Dwelling	0.5 trips per Dwelling	0.3 trips per Dwelling
School	0.5 trips per Student	0.5 trips per Student	0.5 trips per Student	0.5 trips per Student

Table 6-2 Summary of Estimated Trip Generations

Land Use	AM Peak Hour		PM Peak Hour	
	In	Out	In	Out
Residential	142	426	354	213
School	225	225	225	225
TOTAL	367	651	579	438

The Site is expected to generate a total of 1,018 vehicles in the AM peak hour and 1,017 vehicles in the PM peak hour.

Due to the nature of residential development within the Site, 50% of the trips generated by the school are expected to be internal trips within the Site. Hence, a 50% reduction rate has been applied for trip distribution onto the surrounding road network.

For a robust assessment, no reduction rate has been applied to the trips generated by the residential development. The modified trip generation is shown in **Table 6-3**.

Table 6-3 Summary of Estimated Trip Generations

Land Use	AM Peak Hour		PM Peak Hour	
	In	Out	In	Out
Residential	142	426	355	213
School	225	225	225	225
TOTAL	367	651	580	438

6.4 Future Year Traffic Growth

According to the *MRWA Road Traffic Map*, the traffic volume along Wanneroo Road has been experiencing a negative growth rate for the past 5 years. However, for a robust assessment, 0.2% growth rate per annum has been applied for the background traffic along Wanneroo Road.

6.5 Traffic Distribution and Assignment

The distribution of trips to and from the Site via Wanneroo Road has been estimated based on the potential destination of trips generated. It is expected that a greater proportion of trips generated by the Site will travel south into the Perth CBD or Edgewater Train Station. The estimated distribution is presented in **Figure 6-2** with the AM distribution shown in red and the PM distribution shown in blue.

Figure 6-2 Development Traffic Distribution



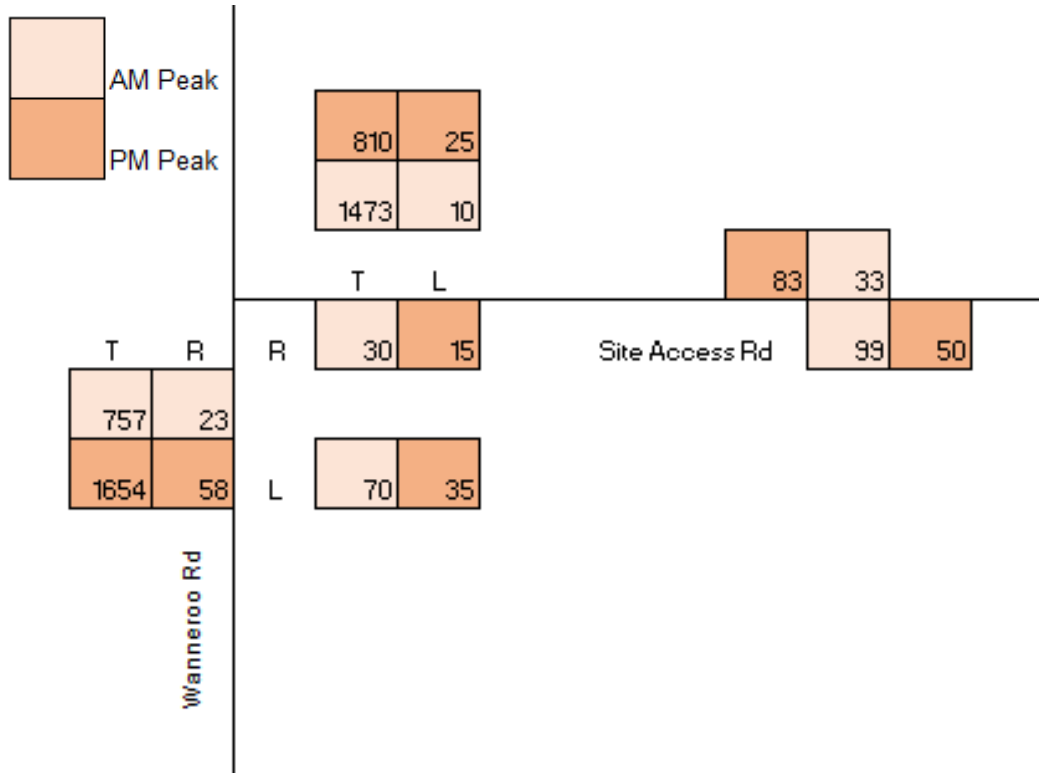
Source: Nearmap (2019)

6.5.2 Scenario 1

Analysis of the Wanneroo Road / Site Access intersection for 33% of the residential development was undertaken. It assumed that the Wanneroo Road site access road and another internal access road heading north is completed at this stage. It further assumes that the primary school has not yet been constructed.

This scenario assumes that 70% of the traffic generated would use the Site Access Road onto Wanneroo Road and 30% would use the northern access road. Residents using the north access road will be travelling to Pinjar Road north therefore this will not have an impact on the southbound traffic at the Wanneroo Road and Site Access Road intersection. **Figure 6-3** shows the expected traffic distribution at the Wanneroo Road / Site Access intersection for the AM and PM peak periods.

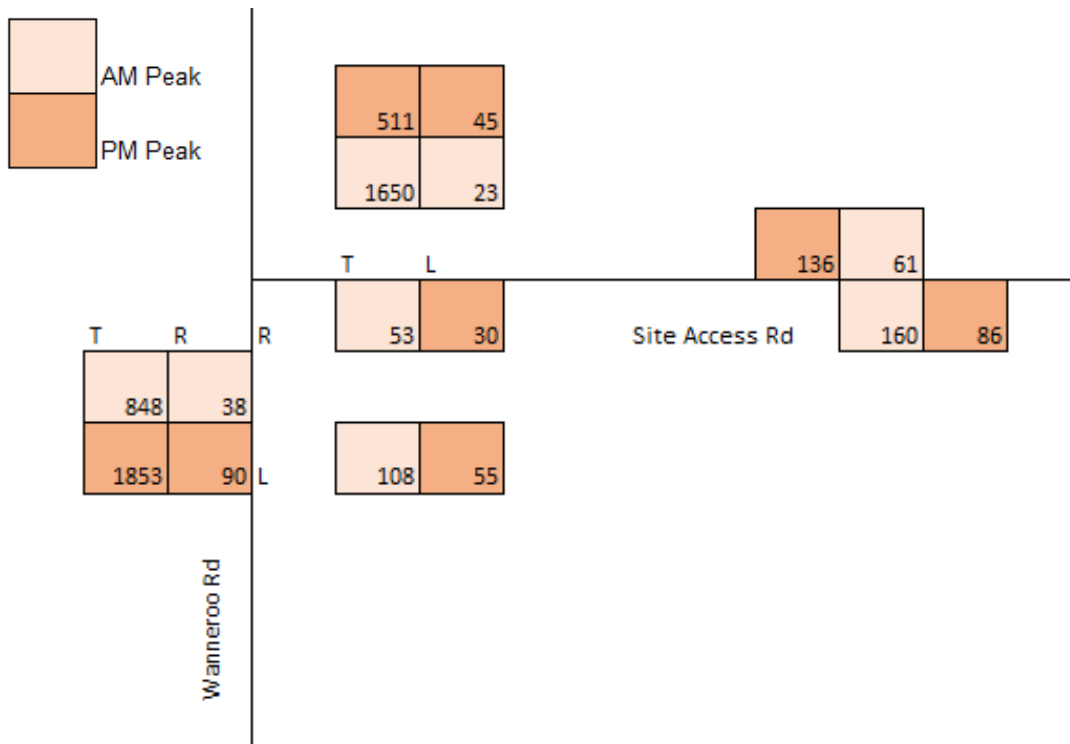
Figure 6-3 Existing Traffic with 33% of Residential Development



6.5.3 Scenario 2

A 10-year future scenario was considered for a comprehensive assessment. As shown in **Figure 6-4** Scenario 2 analyses the intersection with 100% completion of the residential development with all internal access roads completed. These internal access road will provide access to both the north and south of the development. This scenario assumes that the primary school is built and operating.

Figure 6-4 Future Traffic with 100% Completion



6.6 Intersection Performance

SIDRA analysis was undertaken at the following intersections to estimate the impact of the development generated traffic on the surrounding transport network:

- > Wanneroo Road/Site Access Road

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 theoretical intersection capacity is exceeded for an un-signalized intersection where $DOS > 0.80$;
- > **95% 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. An unsignalised intersection can be considered to be operated at capacity where the average delay exceeds 40 seconds for any movement; 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 6-4**.

Table 6-4 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	5-35 sec
E	Operations at capacity	55-80 sec	35-50 sec
F	A breakdown in vehicular flow (worst condition)	≥80 sec	≥50 sec

6.6.2 Scenario 1

The following presents the analysis of the Wanneroo Road and Site Access Road intersection. **Figure 6-5** is a SIDRA layout representation of the proposed intersection and **Table 6-5** shows the SIDRA result of the analysis.

Figure 6-5 SIDRA Layout - Wanneroo Road and Site Access Road Intersection

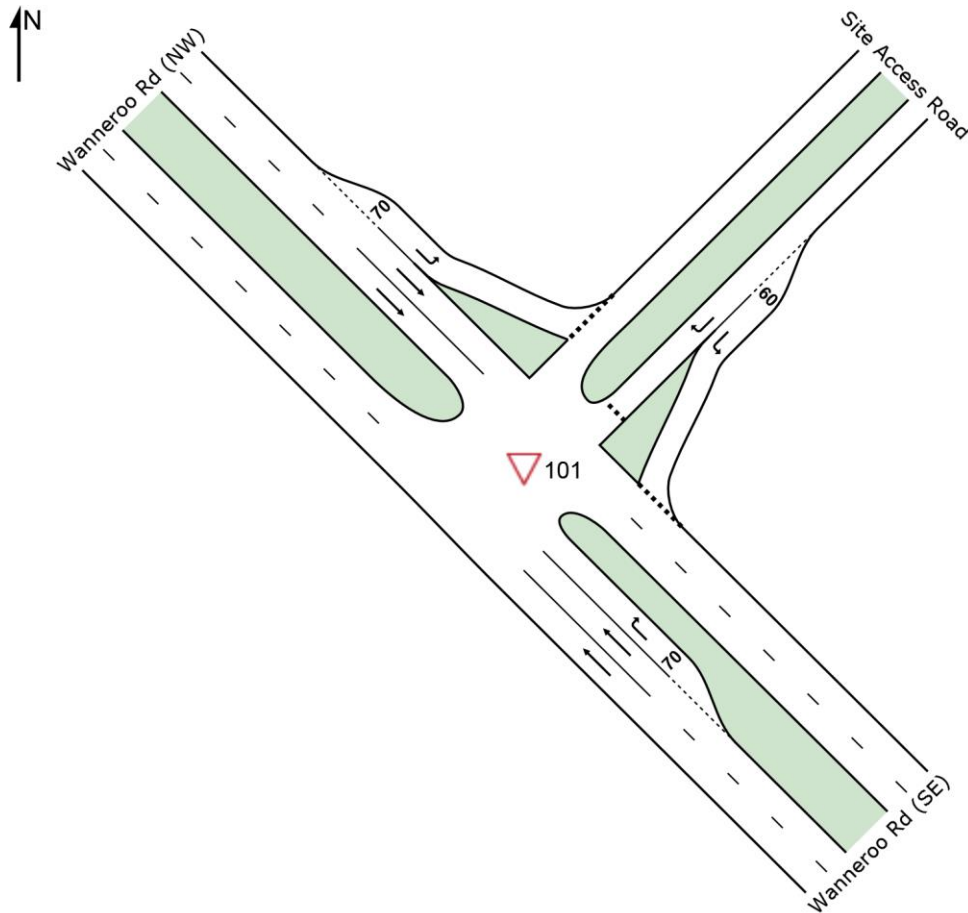


Table 6-5 Scenario 1 - SIDRA Results – Wanneroo Road and Site Access Road Intersection

Intersection Approach		AM peak				PM Peak			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
SouthEast: Wanneroo Rd (SE)	R	0.17	33.1	D	1.5	0.138	14	B	1.3
	T	0.205	0	A	0	0.449	0.1	A	0
NorthEast: Site Access Rd	L	0.1	9.8	A	1.1	0.032	7.2	A	0.4
	R	0.153	32.6	D	1.4	0.14	46.4	E	1.1
NorthWest: Wanneroo Rd (NW)	L	0.006	5.7	A	0.1	0.016	5.8	A	0.2
	T	0.4	0.1	A	0	0.22	0	A	0

The SIDRA results for Scenario 1 show that the intersection will operate at an acceptable level of service during the AM Peak and PM Peak Period. The critical movement is expected to be right turn out from the Site, with LoS D during the AM peak and LoS E during the PM Peak.

6.6.3 Scenario 2

Table 6-6 shows the SIDRA results of the analysis for Scenario 2 where full build out of the residential development and the primary school generated traffic is included.

Table 6-6 Scenario 2 - SIDRA Results – Wanneroo Road and Site Access Road Intersection

Intersection Approach	AM peak					PM Peak			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
SouthEast: Wanneroo Rd (SE)	R	0.3	39.9	E	2.8	0.24	16.6	C	2.6
	T	0.21	0	A	0	0.46	0.1	A	0
NorthEast: Site Access Rd	L	0.158	10.1	B	1.8	0.054	6.4	A	0.6
	R	0.22	30	D	2	0.308	65.5	F	2.6
NorthWest: Wanneroo Rd (NW)	L	0.015	5.8	A	0.2	0.031	5.9	A	0.3
	T	0.409	0.1	A	0	0.247	0	A	0
All vehicles		0.219	2.3		2.8	0.247	2.5		2.6

The SIDRA results for Scenario 2 show that during AM Peak, the critical movement is expected to be the right turn into the Site from Wanneroo Road, with a Delay of 39.9 seconds at LoS E.

During the PM peak, the critical movement is expected to be the right turn out from the Site, onto Wanneroo Road, with a Delay of 65.5 seconds at LoS F. However, this is expected to be primarily due to the high through traffic movements along Wanneroo Road in both directions in the future. Although the delay is significant, it is likely that northbound traffic generated within the Site will try and avoid the delay by redistributing internally and instead use Messina Drive to access Wanneroo Road and Pinjar Road traffic signals.

Further assessment of the intersection functionality will be undertaken at the final stage of subdivision. This assessment will determine any intersection modifications required for the 100% completion of residential development and operation of the school

7 Summary and Conclusions

This report has been prepared in accordance with the *Western Australian Planning Commission (WAPC) Transport Impact Assessment Guidelines Volume 2 – Planning Schemes, Structure Plans & Activity Centre Plans (2016)*.

The following conclusions have been made in regards to the proposed development:

- > The main access to the Site is proposed north of the existing Wanneroo Road/Site Access intersection, retaining full movements under priority control.
- > The Site has access to an excellent provision of cycling and pedestrian facilities with shared paths along Wanneroo Road.
- > The Site benefits from public transport facilities with Route 467 and Route 468 to Joondalup Station and Route 389 which runs from Perth Busport to Belgrade Road / Esther Loop.
- > The Site is expected to generate a total of 1,018 vehicles in the AM peak hour and 1,017 vehicles in the PM peak hour.
- > Trip generation and distribution has been undertaken for two development scenarios:
 - **Scenario 1** – Opening year assuming one third of the residential development is completed.
 - **Scenario 2** – 10-year horizon with full build out of the residential development and the primary school.
- > SIDRA analysis of Scenario 1 has shown that the intersection would generally perform satisfactorily during the AM and PM peak period.
- > SIDRA analysis of Scenario 2 has shown that the intersection would experience a delay of approximately 65 seconds and LoS F for northbound traffic, turning right out of the Site at the subject intersection. It is expected that during periods of increased traffic and delay times the vehicles will use alternative routes to exit the Site.

APPENDIX

A

WAPC TRANSPORT IMPACT ASSESSMENT CHECKLIST

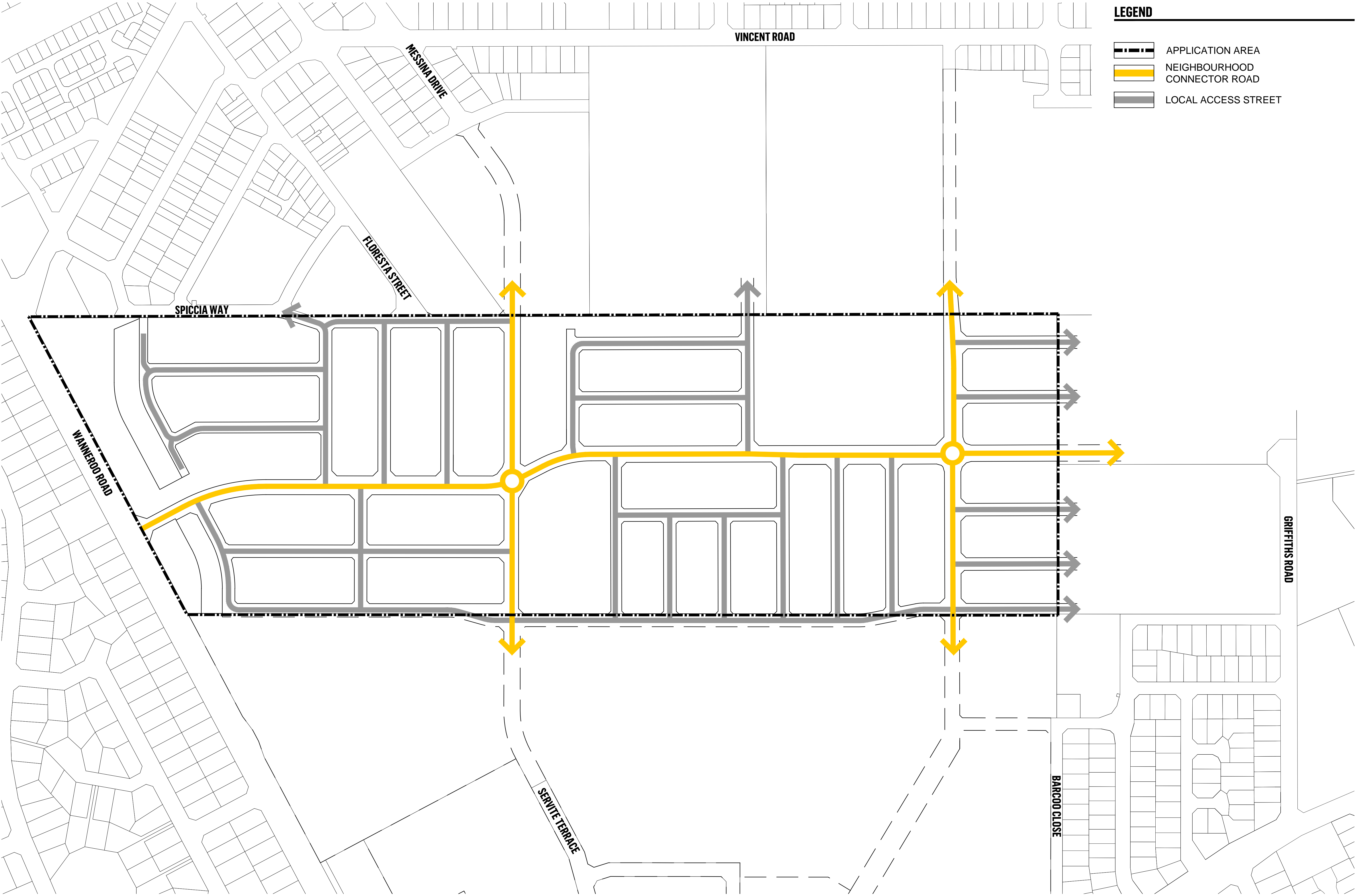
Item	Provided	Comments/Proposals
Summary		
Introduction/Background	Included in Section 1	
Structure plan proposal	Included in Section 4	
▪ regional context	Included in Section 1	
▪ proposed land uses	Included in Section 1	
▪ table of land uses and quantities	N/A	
▪ major attractors/generators	Included in Section 3	
▪ specific issues	N/A	
Existing situation		
▪ existing land uses within structure plan	Included in Section 1	
▪ existing land uses within 800 metres of structure plan area	Included in Section 1	
▪ existing road network within structure plan area	Included in Section 1	
▪ existing pedestrian/cycle networks within structure plan area	Included in Section 1	
▪ existing public transport services within structure plan area	Included in Section 1	
▪ existing road network within 2 (or 5) km of structure plan area	Included in Section 1	
▪ traffic flows on roads within structure plan area (PM and/or AM peak hours)	N/A	
▪ traffic flows on roads within 2 (or 5) km of structure plan area (AM and/or PM peak hours)	Included in Section 1	
▪ existing pedestrian/cycle networks within 800m of structure plan area	Included in Section 1	
▪ existing public transport services within 800m of structure plan area	Included in Section 1	
Proposed internal transport networks		
▪ changes/additions to existing road network or proposed new road network	Included in Section 3	
▪ road reservation widths	N/A	
▪ road cross-sections & speed limits	N/A	
▪ intersection controls	Included in Section 2	
▪ pedestrian/cycle networks and crossing facilities	Included in Section 2	
▪ public transport routes	Included in Section 2	
Changes to external transport networks		
▪ road network	Included in Section 3	
▪ intersection controls	Included in Section 3	
▪ pedestrian/cycle networks and crossing facilities	Included in Section 3	
▪ public transport services	Included in Section 3	
Integration with surrounding area		
▪ trip attractors/generators within 800 metres	Included in Section 3	
▪ proposed changes to land uses within 800 metres	Included in Section 3	
▪ travel desire lines from structure plan to these attractors/generators	N/A	
▪ adequacy of external transport networks	N/A	
▪ deficiencies in external transport networks	N/A	

▪ remedial measures to address deficiencies	N/A	
Analysis of internal transport networks		
▪ assessment year(s) and time period(s)	Included in Section 6	
▪ structure plan generated traffic	Included in Section 6	
▪ extraneous (through) traffic	Included in Section 6	
▪ design traffic flows (ie. total traffic)	Included in Section 6	
▪ road cross-sections	N/A	
▪ intersection controls	Included in Section 5	
▪ access strategy	N/A	
▪ pedestrian / cycle networks	Included in Section 2	
▪ safe routes to schools	N/A	
▪ pedestrian permeability & efficiency	Included in Section 2	
▪ access to public transport	Included in Section 2	
Analysis of external transport networks		
▪ extent of analysis	Included in Section 6	
▪ base flows for assessment year(s)	Included in Section 6	
▪ total traffic flows	Included in Section 6	
▪ road cross-sections	N/A	
▪ intersection layouts & controls	Included in Section 5	
▪ pedestrian/cycle networks	Included in Section 2	
Conclusions	Included in Section 7	

APPENDIX

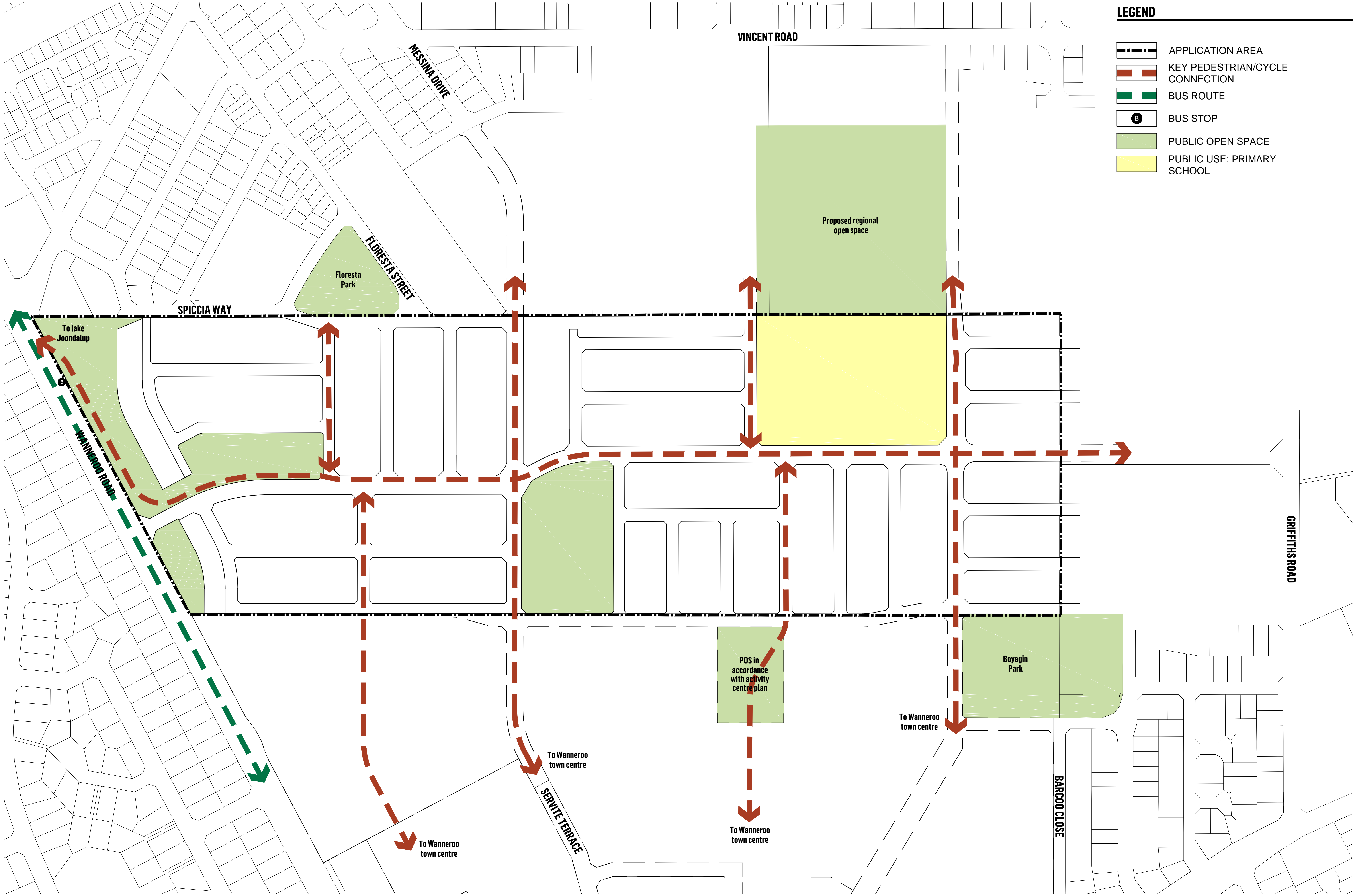
B

SITE PLAN



LEGEND

- APPLICATION AREA
- NEIGHBOURHOOD CONNECTOR ROAD
- LOCAL ACCESS STREET



LEGEND

APPLICATION AREA

KEY PEDESTRIAN/CYCLE CONNECTION

B

REVISION
-

1:2000 @ A1

1:4000 @ A3

20 40 60 80 100m

APPENDIX

C

ROAD CROSS SECTIONS

