APPENDIX 3

TRAFFIC IMPACT ASSESSMENT (TRANSCORE)

Proposed Structure Plan Amendment
Lot 594 Wanneroo Road, Hocking
Transport Impact Assessment

PREPARED FOR:
Catholic Archdiocese of Perth
C/- Roberts Day

September 2019

Document history and status

Author	Revision	Approved by	Date approved	Revision type
M Rasouli	r01	Behnam Bordbar	27/05/2019	Draft
M Rasouli	r01a	Behnam Bordbar	21/08/2019	Final
M Rasouli	r01b	M Rasouli	09/09/2019	Minor Revision

File name: t19.056.mr.r01b

Author: Mohammad Rasouli

Project manager: Mohammad Rasouli

Client: Catholic Archdiocese of Perth C/- Roberts Day

Project: Lot 594 Wanneroo Road, Hocking

Document revision: r01b

Project number: t19.056

TABLE OF CONTENTS

1.0 SUMMARY 1

2.0 INTRODUCTION 2

3.0 EXISTING SITUATION 3

3.1 Existing Site Use, Access and Parking 3
3.2 Surrounding Road Network and Traffic Management on Frontage Roads 3
3.3 Existing Traffic Volumes on Roads and Major Intersections 5
3.4 Heavy Vehicles 6
3.5 Public Transport Access 8
3.6 Pedestrian and Cyclist Facilities 9
3.7 Crash Data 9

4.0 AMENDMENT PROPOSAL 10

4.1 Proposed Site Use 10
4.2 Proposed Access for all Modes 10

5.0 CHANGES TO SURROUNDING TRANSPORT NETWORKS 12

6.0 INTEGRATION WITH SURROUNDING AREA 13

7.0 TRAFFIC ASSESSMENT 14

7.1 Assessment Years and Time Periods 14
7.2 Development Generation and Distribution 14
7.2.1 Proposed Development Traffic Generation 14
7.3 Traffic Flows 19
7.4 Analysis of Intersections and Development Accesses 22
7.5 Network Operation 24
7.6 Impact on Surrounding Roads 25
7.7 Impact on Neighbouring Areas 26
7.8 Traffic Noise and Vibration 26

8.0 PARKING 27

9.0 CONCLUSIONS 28

APPENDIX A: DEVELOPMENT SITE PLAN

APPENDIX B: CONCEPT DESIGN SKETCH

APPENDIX C: INTERSECTION ANALYSIS

REPORT FIGURES

Figure 1: Location of the subject site 2
Figure 2: Location of bus stops 3
Figure 3: Existing road hierarchy 4
Figure 4: Wanneroo Road Looking South, at the intersection of Kirkstall Drive (source: Nearmap) 4
Figure 5: Kirkstall Drive, Looking west at the intersection of Wanneroo Road (source: Nearmap) ..5
Figure 6: Existing AM and PM hour traffic volumes 6
Figure 7: RAV – Tandem Drive Network Map 7
Figure 8: RAV – Tri Drive Network Map 7
Figure 9: Examples of permitted prime mover – trailer combinations (Source: MRWA) 8
Figure 10: Existing Bus Routes 8
Figure 11: Bike map 9
Figure 12: Proposed amendment plan crossover system 11
Figure 13: Passing trade component - weekday AM & PM peak hour traffic 16
Figure 14: Non-passing trade component - weekday AM & PM peak hour traffic 17
Figure 15: Total peak hour traffic–AM and PM peak hours 18
Figure 16: Historical traffic counts on Wanneroo Road in the vicinity of the subject site 19
Figure 17: Total post-development traffic flows–AM and PM peak hours 20
Figure 18: Estimated 10-year total post-development traffic flows–AM and PM peak hours 21
Figure 19: SIDRA Network Model 23
Figure 20: 10-year Post-development weekday AM peak hour network analysis – queue storage ratio 24
Figure 21: 10-year post-development weekday PM peak hour network analysis – queue storage ratio 25

REPORT TABLES

Table 1: Weekday AM and PM peak hour traffic (Wanneroo Road – South bound) 5
Table 2: Weekday AM and PM peak hour traffic (Wanneroo Road – North bound) 6
Table 3: Crash history for the Wanneroo Road/ Kirkstall Drive intersection 9
Table 4: Estimated amendment plan traffic generation 15

1.0 Summary

This Transport Impact Assessment (TIA) has been prepared by Transcore on behalf of Catholic Archdiocese of Perth. The subject of this report is a proposed amendment to the adopted structure plan for Lot 594 Wanneroo Road, Hocking, in the City of Wanneroo.

A preliminary concept option plan is prepared for the proposed amendment which indicates business/commercial land uses fronting Wanneroo Road and residential land uses within the eastern part of the site.

The residential component of the proposed development entails about 89 dwellings. The proposed land uses for the commercial component presently is un-known, however, in order to provide a robust traffic assessment, the higher trip generator land uses such as service station, fast food outlet and showroom are assumed for the commercial part of the development.

In order to separate the commercial traffic from the residential traffic and improve amenity, traffic circulation and permeability a left in/ left out crossover on Wanneroo Road is proposed.

Transcore has prepared a concept design sketch for the proposed left in/ left out crossover on Wanneroo Road which is included in Appendix B of this TIA.

The traffic analysis undertaken and documented in this TIA including the SIDRA Network analysis confirms satisfactory traffic operations of the T-intersection of Wanneroo Road/Kirkstall Drive and the proposed commercial development crossover on Kirkstall Drive for the post-development and 10 years post-development scenarios.

2.0 Introduction

This Transport Impact Assessment has been prepared by Transcore on behalf of Catholic Archdiocese of Perth. The subject of this report is a proposed amendment to the adopted structure plan for Lot 594 Wanneroo Road, Hocking, in the City of Wanneroo.

The subject site is currently vacant and is located at the north-east corner of the T-intersection of Wanneroo Road and Kirkstall Drive. The subject site is bounded by Wanneroo Road to the west, Kirkstall Drive to the south, residential dwellings to the north and St Elizabeth Primary School to the east.

Access and egress to/from the proposed development would be from three full-movement crossover on Kirkstall Drive and a left-in/left-out crossover on Wanneroo Road.

Key issues that will be addressed in this report include the traffic generation and distribution of proposed development, capacity assessment for the existing intersection of Wanneroo Road/ Kirkstall Drive and commercial development crossover on Kirkstall Drive.

Figure 1 illustrates the location of the subject site.

Figure 1: Location of the subject site

3.0 Existing Situation

3.1 Existing Site Use, Access and Parking

Currently the site is vacant and does not generate any traffic. There is an existing left-in/left out crossover on Wanneroo Road within the existing left turn slip lane at Kirkstall Drive/ Wanneroo Road intersection as shown in **Figure 2**. This figure also shows the existing bus stops and pedestrian crossing on Wanneroo Road in the vicinity of the subject site.

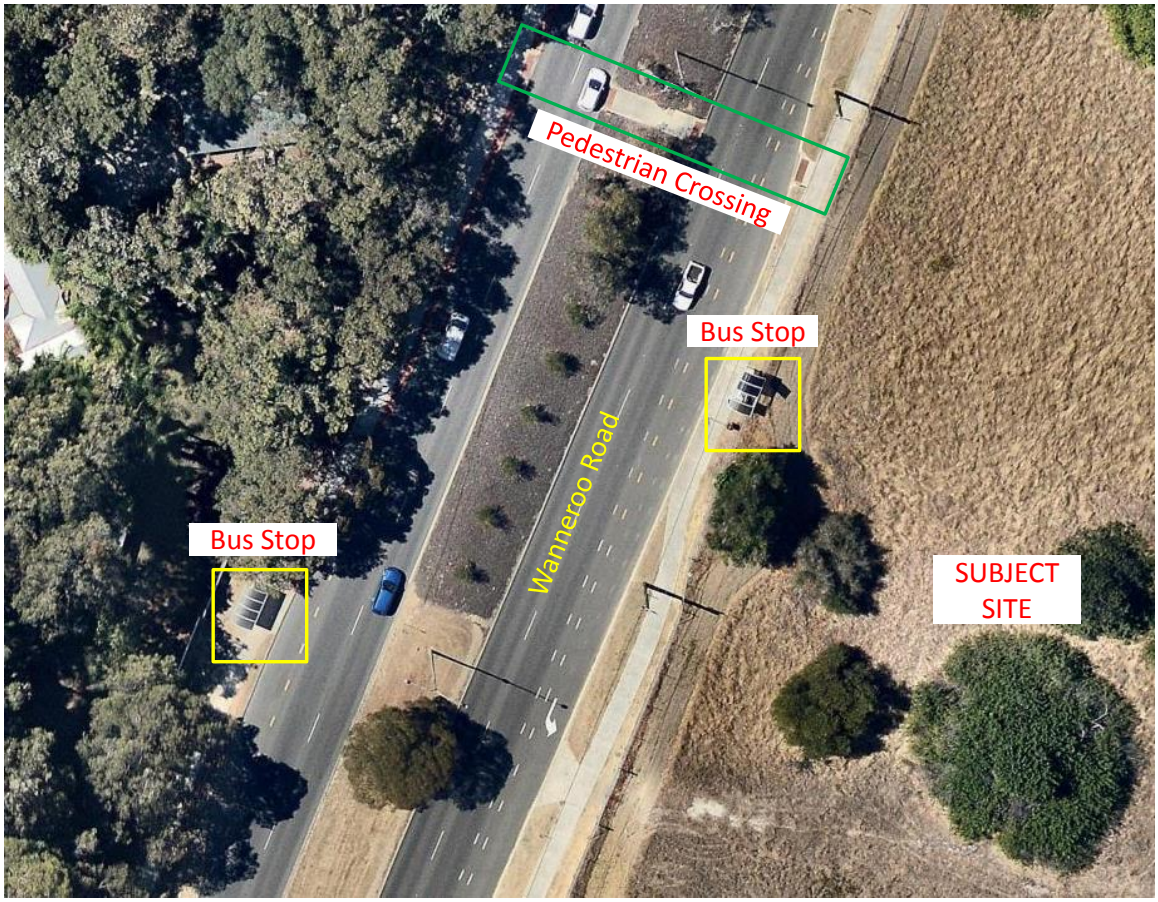


Figure 2: Location of bus stops

3.2 Surrounding Road Network and Traffic Management on Frontage Roads

The existing road network and its classification in the Main Roads WA *Functional Road Hierarchy* are illustrated in **Figure 3**.

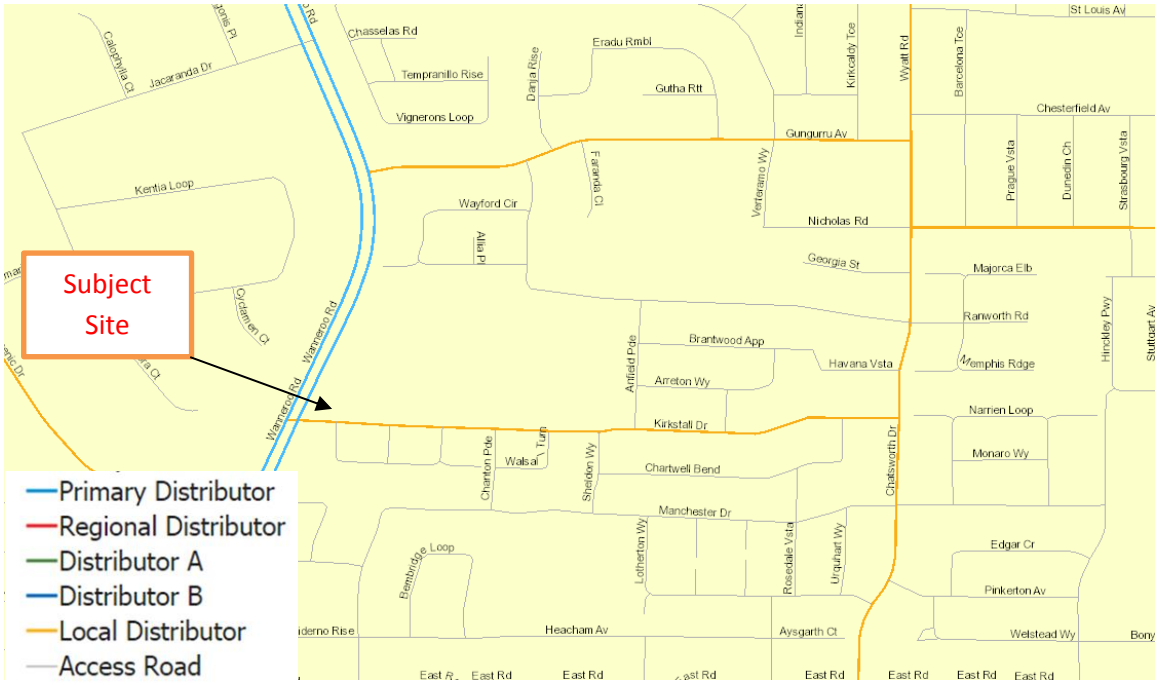


Figure 3: Existing road hierarchy

Wanneroo Road

Wanneroo Road is a dual divided carriageway with landscaped central median and pedestrian paths along both sides of the road. It is reserved as a *Primary Regional Road* in the *Metropolitan Region Scheme* and operates under the speed limit of 70km/h in the vicinity of the subject site. It is classified as a *Primary Distributor Road* in the Main Roads WA *Metropolitan Functional Road Hierarchy*.

Figure 4 shows Wanneroo Road at its intersection with Kirkstall Drive. The intersection of Kirkstall Drive and Wanneroo Road is an un-signalised T-intersection with left and right turn pockets on Wanneroo Road.

Figure 4: Wanneroo Road Looking South, at the intersection of Kirkstall Drive (source: Nearmap)

Kirkstall Drive

Kirkstall Drive is a single undivided carriageway with a shared path along northern side of the road as shown in **Figure 5**. It is classified as a *Local Distributor* in Main Roads WA *Metropolitan Functional Road Hierarchy* and operates under the speed limit of 50km/h in the vicinity of the subject site.

Figure 5: Kirkstall Drive, Looking west at the intersection of Wanneroo Road (source: Nearmap)

3.3 Existing Traffic Volumes on Roads and Major Intersections

Wanneroo Road

The classified intersection count information sourced from Main Roads WA website at the intersection of Scenic Drive/ Wanneroo Road indicates Wanneroo Road (north of Scenic Drive) carried approximately 37,167 vehicles per day in March 2018.

The weekday AM peak hour on Wanneroo Road occurred between 8:00am to 9:00am and the PM peak hour occurred between 16:30pm to 17:30pm with total of 1,023vph during AM peak hour and 2,024vph during PM peak hour for Wanneroo Road southbound and 1604vph during AM peak hour and 1152vph during PM peak hour for Wanneroo Road northbound (refer **Table 1** and **Table 2**).

Approach	Wanneroo RD - South approach										
Time Period	On-road Cyclists	Class 1 (cars)	Class 1 (motorcycles)	Class 2	Class 3-5	Class 6-9	Class 10 (B-Double)	Class 10 (Floats)	Class 11	Class 12	Total
8:00AM to 9:00AM	0	940	3	13	53	9	0	0	5	0	**1,023**
4:30PM to 5:30PM	1	1,950	15	31	18	5	0	2	2	0	**2,024**

Table 1: Weekday AM and PM peak hour traffic (Wanneroo Road – South bound)

Approach	Wanneroo RD - North approach										
Time Period	On-road Cyclists	Class 1 (cars)	Class 1 (motorcycles)	Class 2	Class 3-5	Class 6-9	Class 10 (B-Double)	Class 10 (Floats)	Class 11	Class 12	Total
8:00AM to 9:00AM	0	1,520	7	16	43	11	0	4	3	0	**1,604**
4:30PM to 5:30PM	0	1,107	3	13	21	6	0	0	2	0	**1,152**

Table 2: Weekday AM and PM peak hour traffic (Wanneroo Road – North bound)

Transcore undertook manual traffic counts on Friday 5th April 2019 at the intersection of Wanneroo Road and Kirkstall Drive during the AM and PM peak hours. According to the manual turn counts undertaken by Transcore, Kirkstall Drive carried about 203 and 158 vehicles during AM and PM peak hours respectively.

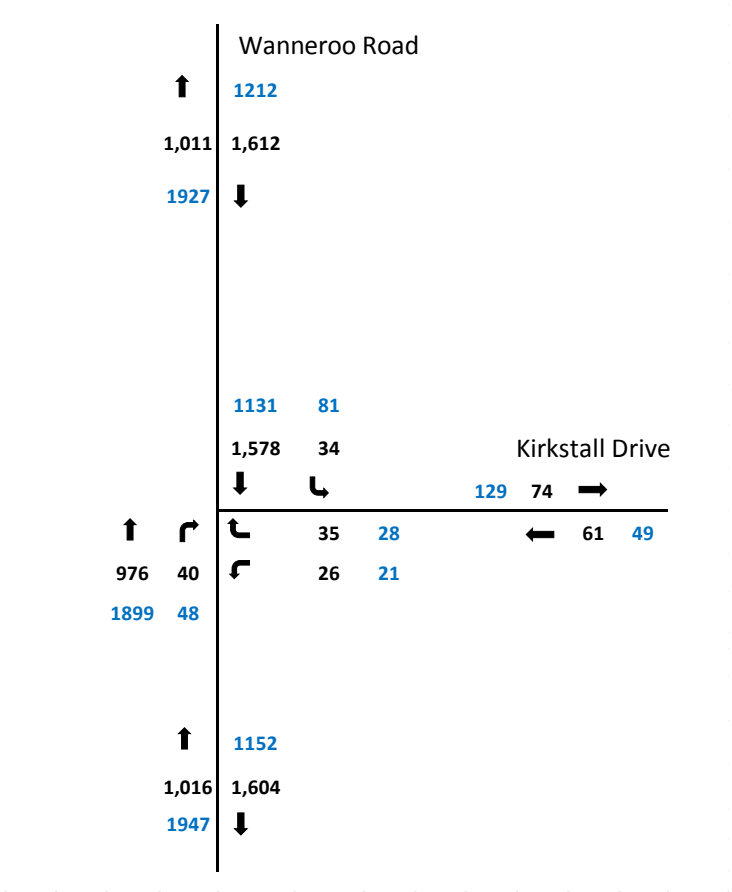


Figure 6: Existing AM and PM hour traffic volumes

3.4 Heavy Vehicles

Wanneroo Road adjacent to the subject site forms part of RAV Tandem Drive Network 4 as shown in **Figure 7** and Tri-Drive Network 3 as shown in **Figure 8**. The RAV 4 Network classification permits a variety of prime mover and trailer combinations, up to a maximum length of 27.5m as detailed in **Figure 9** .

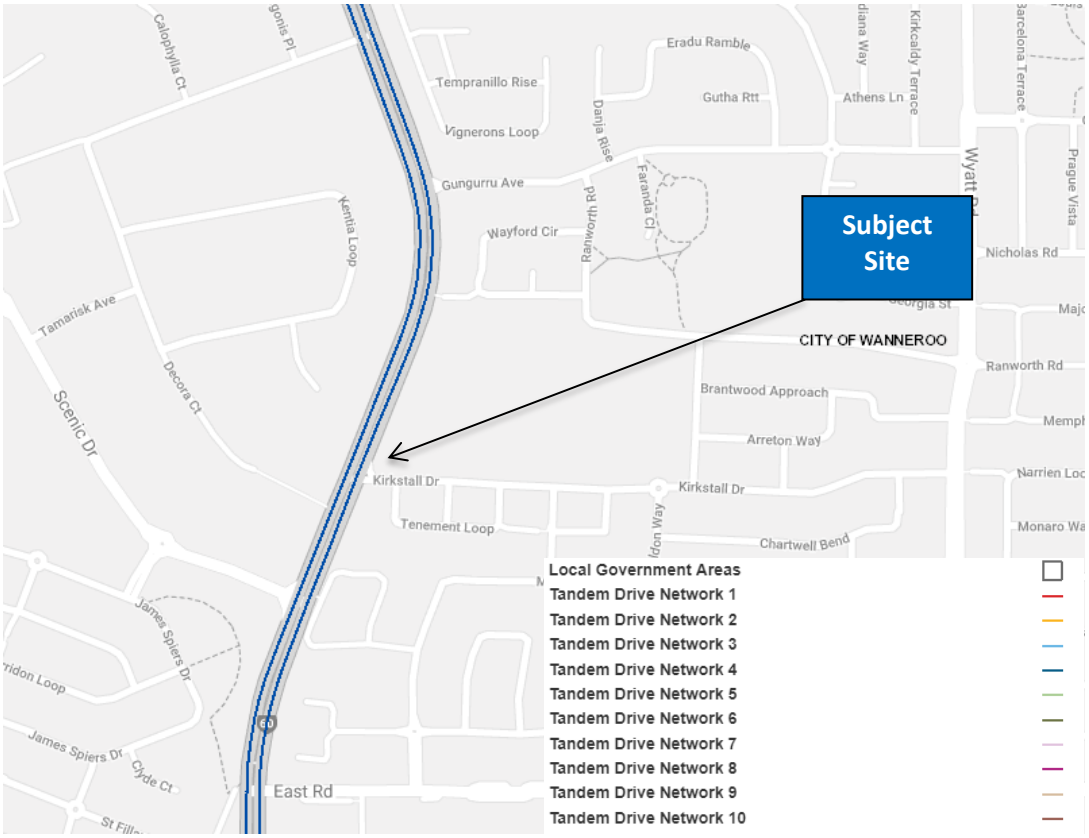


Figure 7: RAV – Tandem Drive Network Map

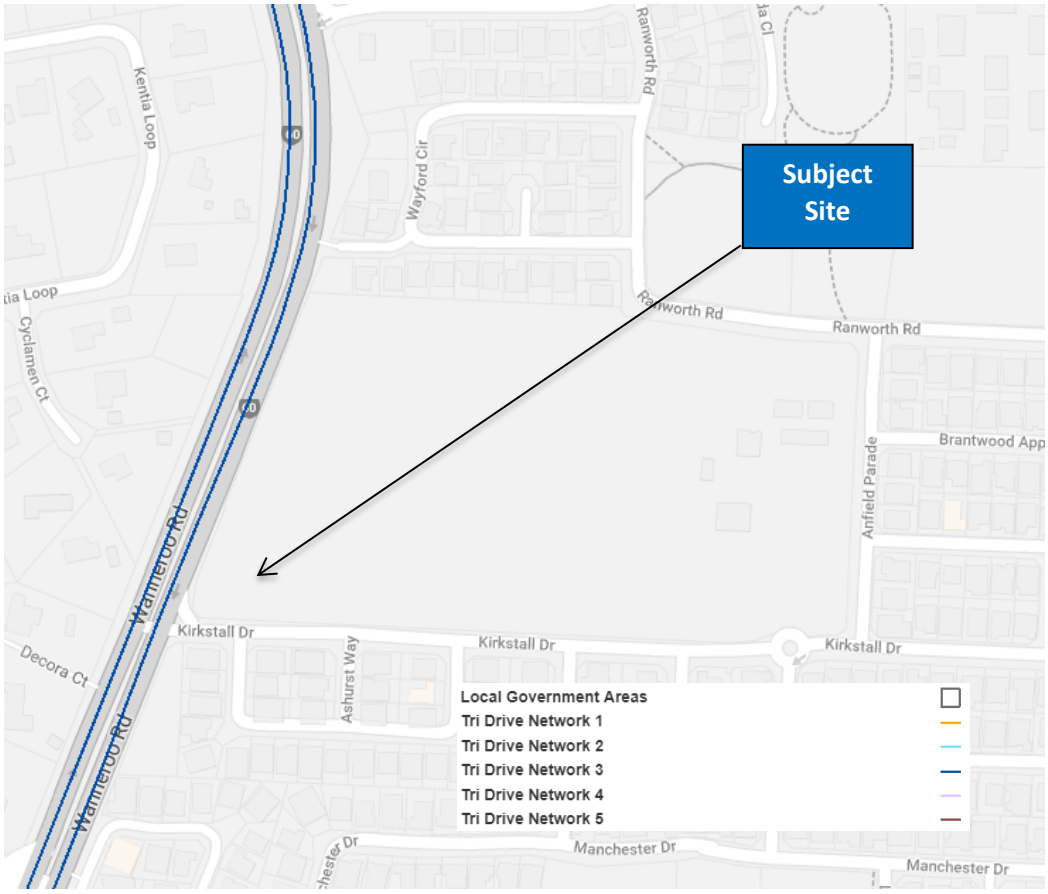


Figure 8: RAV – Tri Drive Network Map

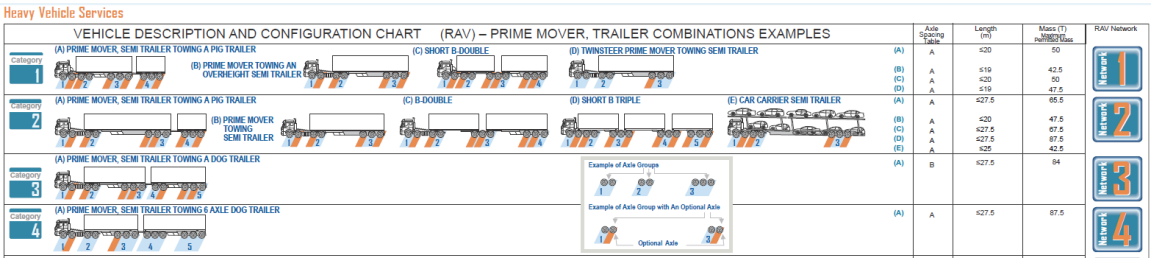


Figure 9: Examples of permitted prime mover – trailer combinations (Source: MRWA)

3.5 Public Transport Access

As shown in **Figure 10** , the subject site has access to bus services 389 and 468 along Wanneroo Road. Bus route 468 provides the connectivity to Joondalup Train Station and bus route 389 provides the connectivity to Perth Bus Station that provides opportunities to transfer to other connecting bus services.

Two nearest bus stops are located on both sides of Wanneroo road in the vicinity of the subject site. Both bus stops are accessible via existing pedestrian paths and the existing pedestrian crossing along Wanneroo Road in this vicinity (refer **Figure 2**).

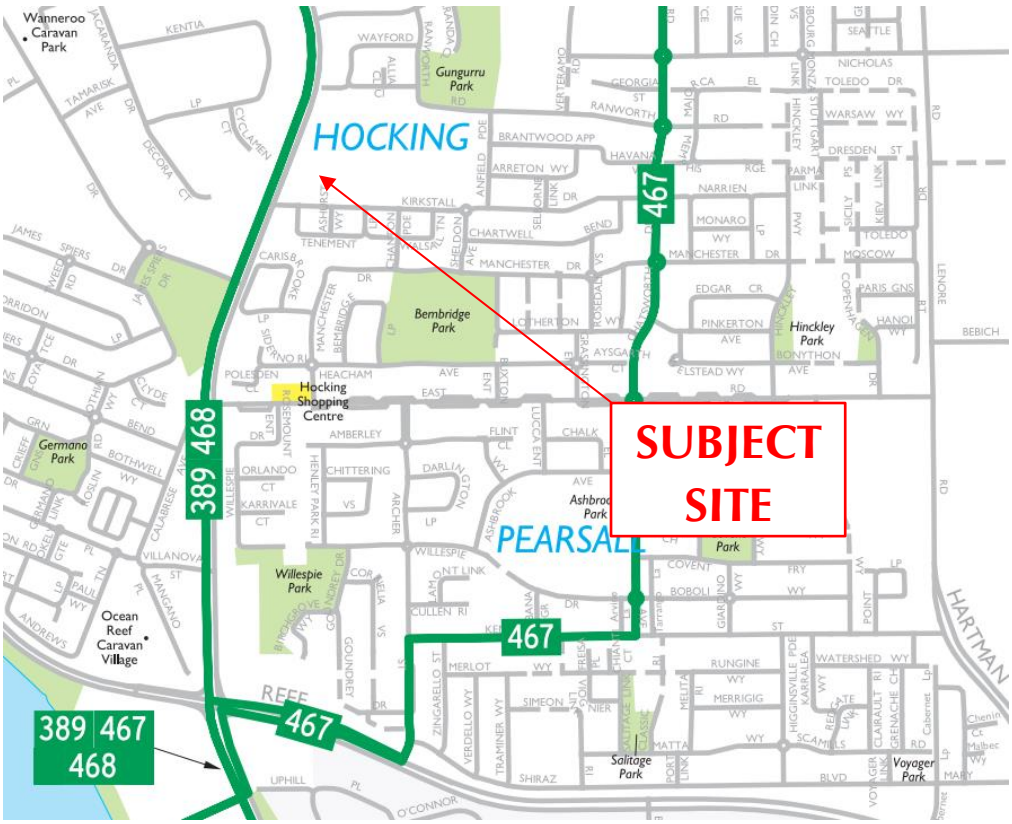


Figure 10: Existing Bus Routes

3.6 *Pedestrian and Cyclist Facilities*

The Department of Transport's Perth Bike Map series (refer **Figure 11**) show the existing shared paths along Wanneroo Road and northern side of Kirkstall Drive fronting the subject site. Kirkstall Drive is identified as good road riding environment.

Pedestrian access to the subject site is available via existing footpaths which are in place along Wanneroo Road and Kirkstall Drive. Pedestrian crossing opportunities are available at the intersection of Wanneroo Road and Kirkstall Drive, abutting the subject site and pedestrian crossing on Wanneroo road to the north of the intersection.

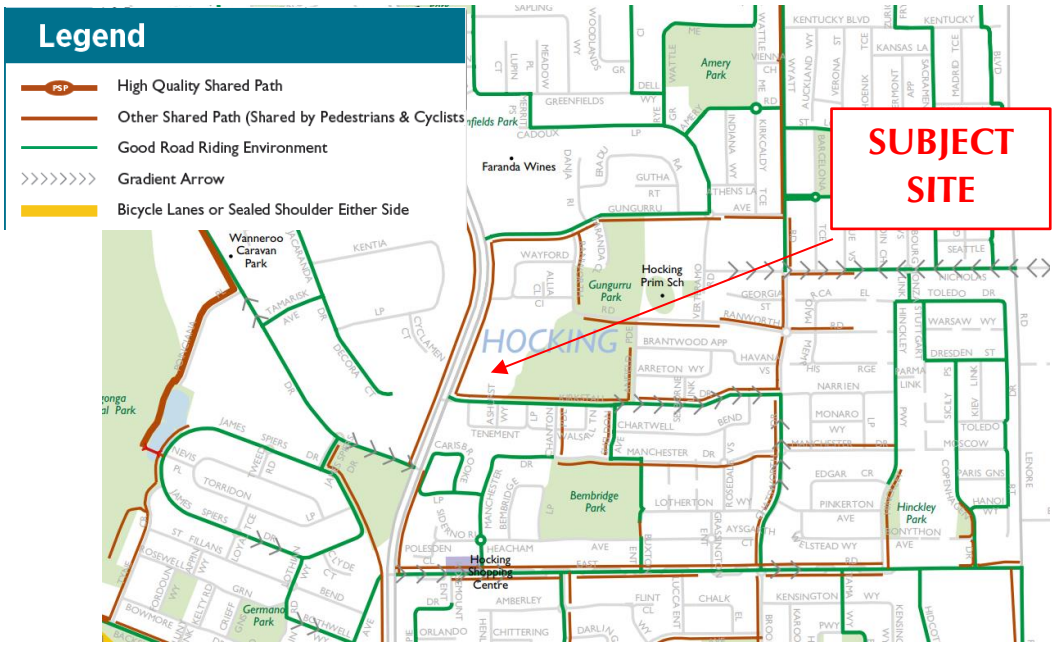


Figure 11: Bike map

3.7 *Crash Data*

Main Roads WA Intersection *Crash Ranking Report* provides detailed crash data for the Wanneroo Road/Kirkstall Drive intersection over the 5-year period ending 31 December 2018. Crash report information for this intersection is presented in **Table 3**. The crash history data for the intersection indicates that the majority of the crashes were rear end and right-angle crashes.

Table 3: Crash history for the Wanneroo Road/ Kirkstall Drive intersection

Intersection				Total Crashes	Casualty
Wanneroo Road/ Kirkstall Drive				6	1
Right Angle	**Rear End**	**Right turn Thru**	**Pedestrian**	**Wet**	**Night**
2	2	2	0	1	2

4.0 Amendment Proposal

4.1 Proposed Site Use

The Preliminary Concept Option1.d plan shown in **Appendix A** illustrates business/commercial land uses fronting Wanneroo Road and the balance of the site developed for residential land uses. The residential component of the proposed development is expected to entail 89 dwellings. Currently the proposed land uses for the commercial component of the development is un-known however in order to undertake a robust traffic assessment the higher trip generator land uses such as service station, fast food outlet and showroom are assumed for the commercial part of the development.

4.2 Proposed Access for all Modes

Figure 12 shows the proposed development crossovers on surrounding roads. The main entry to the residential component of the development is proposed through a a crosover immediately west of the existing Public Opean Space (POS) area. This crossover will be located opposit Tenement Loop forming a 4-way intersection. This intersection is recommended to be constructed as a priority-controlled four-way intersection with Give Way controls on the Tenement Loop and subject site approaches as suggested in Liveable Neighbourhoods guidelines. Details of this intersection will need to be finalised through liaison with City of Wanneroo during the detailed design stage of the project.

The developent plan also provides another minor vehicular access to the residential area through the proposed 6.0m laneway to the west of the proposed main entry.

In order to separate the commercial traffic from the residential traffic and improve amenity, traffic circulation and permeability it is proposed to provide a left in/ left out crossover on Wanneroo Road and a full movement crossover on Kirkstall Drive to service the commercial component of the development. Both of crossovers are proposed to be located with maximum separation from the existing Kirkstall Drive/ Wanneroo Road intersection. Transcore has prepared a concept design sketch for the proposed left in/ left out crossover on Wanneroo Road with a copy provide in **Appendix B**. The concept includes a left turn lane on Wanneroo Road of about 100m based on the existing posted speed limit of 70km/h to improve traffic safety and to minimise impact on Wanneroo Road southbound traffic. The proposed crossover would provide a separation distance of about 50m to the existing left turn slip lane of Kirkstall Drive/ Wanneroo Road intersection.

The commercial full movement crossover on Kirkstall Drive is planned to be located about 80m to the east of the of Kirkstall Drive/ Wanneroo Road intersection.

The concept plan also shows a secondary emergency access at the north-east corner of the site which provides an access/ egress for emergency vehicles at Raworth Road.

Figure 12: Proposed amendment plan crossover system

5.0 Changes to Surrounding Transport Networks

The local changes to the surrounding road network include three proposed full-movement crossovers on Kirkstall Drive and a left-in/left out crossover on Wanneroo Road as part of the proposed amendment plan.

6.0 Integration with Surrounding Area

The proposed land uses assumed for the amendment plan are in line with existing and future surrounding land uses in the locality. The proposal provides good connectivity to surrounding local and regional road network and aims to separate commercial and residential traffic to improve amenity and permeability.

7.0 Traffic Assessment

7.1 Assessment Years and Time Periods

The assessment years that have been adopted for this analysis are immediately post-development for the interim scenario (assumed as 2019 for the purpose of the analysis) and 2029 for the 10-year post development scenario.

7.2 Development Generation and Distribution

7.2.1 Proposed Development Traffic Generation

The traffic volume that would be generated by the assumed land uses for the amendment plan has been estimated using trip generation rates derived from the RTA NSW – Guide to Traffic Generating Developments. The trip rates which were used to estimate the proposed land uses traffic generation are detailed in **Table 4**. Accordingly, it is estimated that the proposal would generate approximately 4,300 trips per day (both inbound and outbound) with approximately 285vph and 300vph trips during AM and PM peak hours.

The directional split of inbound and outbound trips for the proposed residential component is estimated to be about 20%/80% and 80%/ 20% during the AM and PM peak hours respectively. The directional split of 50% /50% was assumed for the commercial component for both AM and PM peak hours.

Two traffic distributions were modelled for the weekday AM and PM peak hours:

- Passing trade traffic as detailed in **Figure 13**.
- Non-passing trade traffic as detailed in **Figure 14**.

The total traffic is detailed in **Figure 15**. The development traffic distribution modelled in this report has been evaluated by considering the catchment area, existing traffic patterns and the identified key traffic routes.

Table 4: Estimated amendment plan traffic generation

Land use	Quantity	Daily Rate	Weekd-AM Peak	Weekd-PM Peak	Cross Trade	Daily Trips	Weekd-AM trips	Weekd-PM trips	AM		PM	
									IN	OUT	IN	OUT
Residential	89	8.00	0.800	0.800	0.00	712	71	71	14	57	57	14
Petrol station	8	205.36	12.470	13.990	0.10	1479	100	101	50	50	50	50
Fast food outlet with drive through	310	6.35	0.351	0.351	0.10	1772	109	98	54	54	49	49
Showroom	1140	0.30	0.003	0.030	0.10	308	3	31	2	2	15	15
TOTAL TRAFFIC						**4270**	**283**	**301**	**120**	**163**	**172**	**129**

Passing Trade Component

		AM		PM	
	Daily Trips	IN	OUT	IN	OUT
	0	0	0	0	0
65%	961	32	32	33	33
50%	886	27	27	24	24
10%	31	0	0	2	2
	1878	**59**	**59**	**59**	**59**

Primary Trips Component

	AM		PM	
Daily Trips	IN	OUT	IN	OUT
712	14	57	57	14
518	18	18	17	17
886	27	27	25	25
277	2	2	13	13
2392	**61**	**104**	**113**	**70**

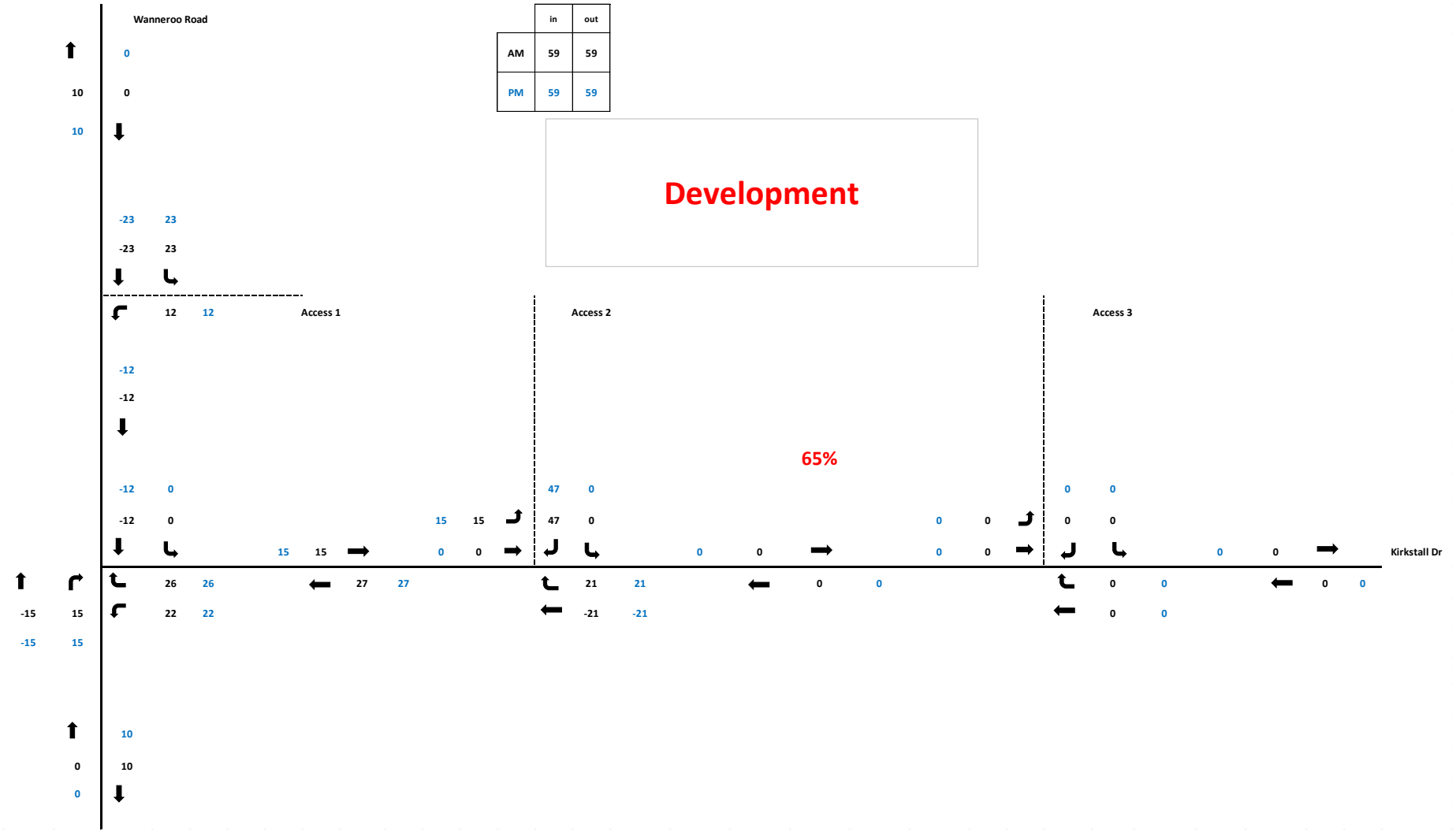


Figure 13: Passing trade component - weekday AM & PM peak hour traffic

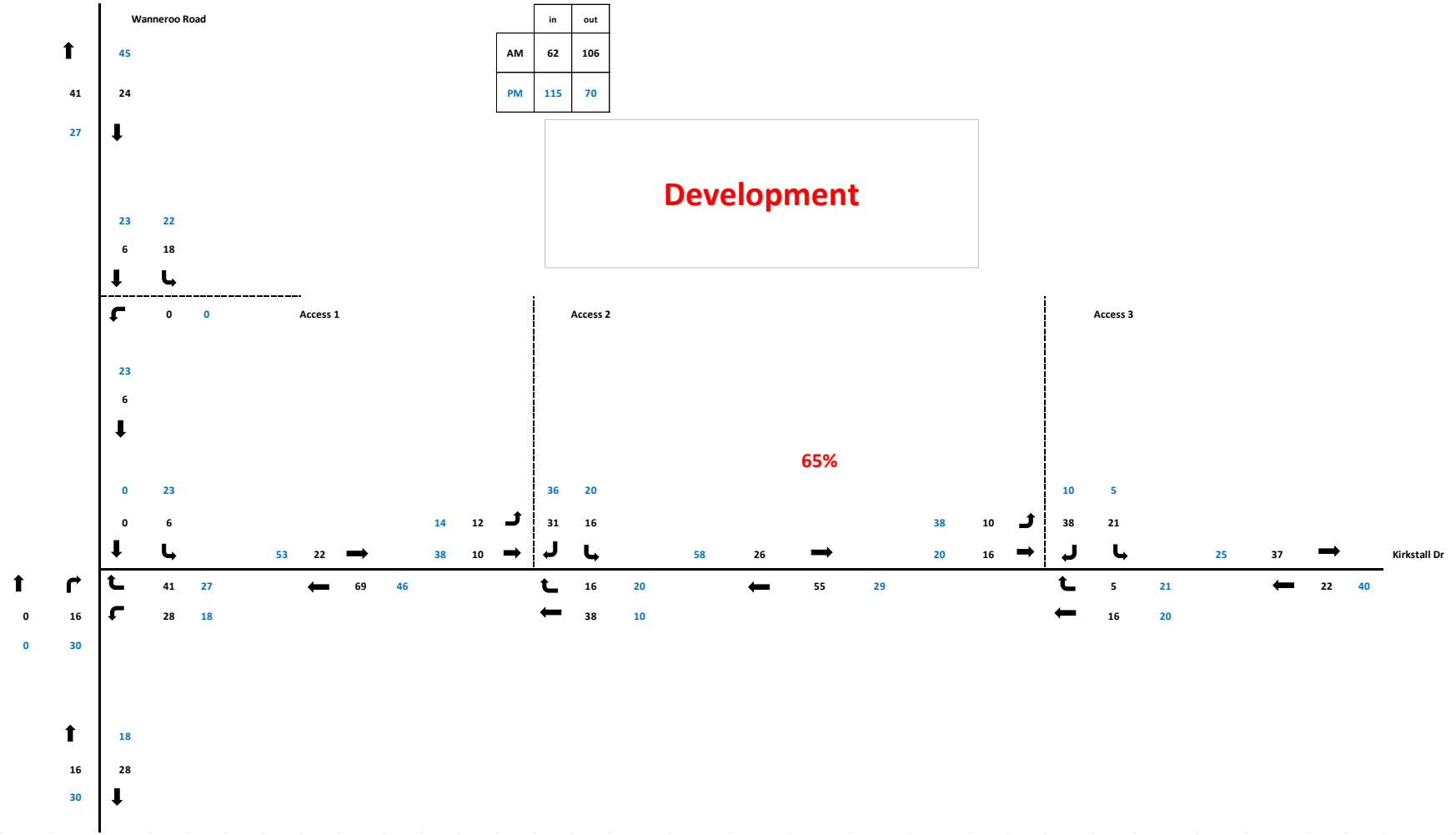


Figure 14: Non-passing trade component - weekday AM & PM peak hour traffic

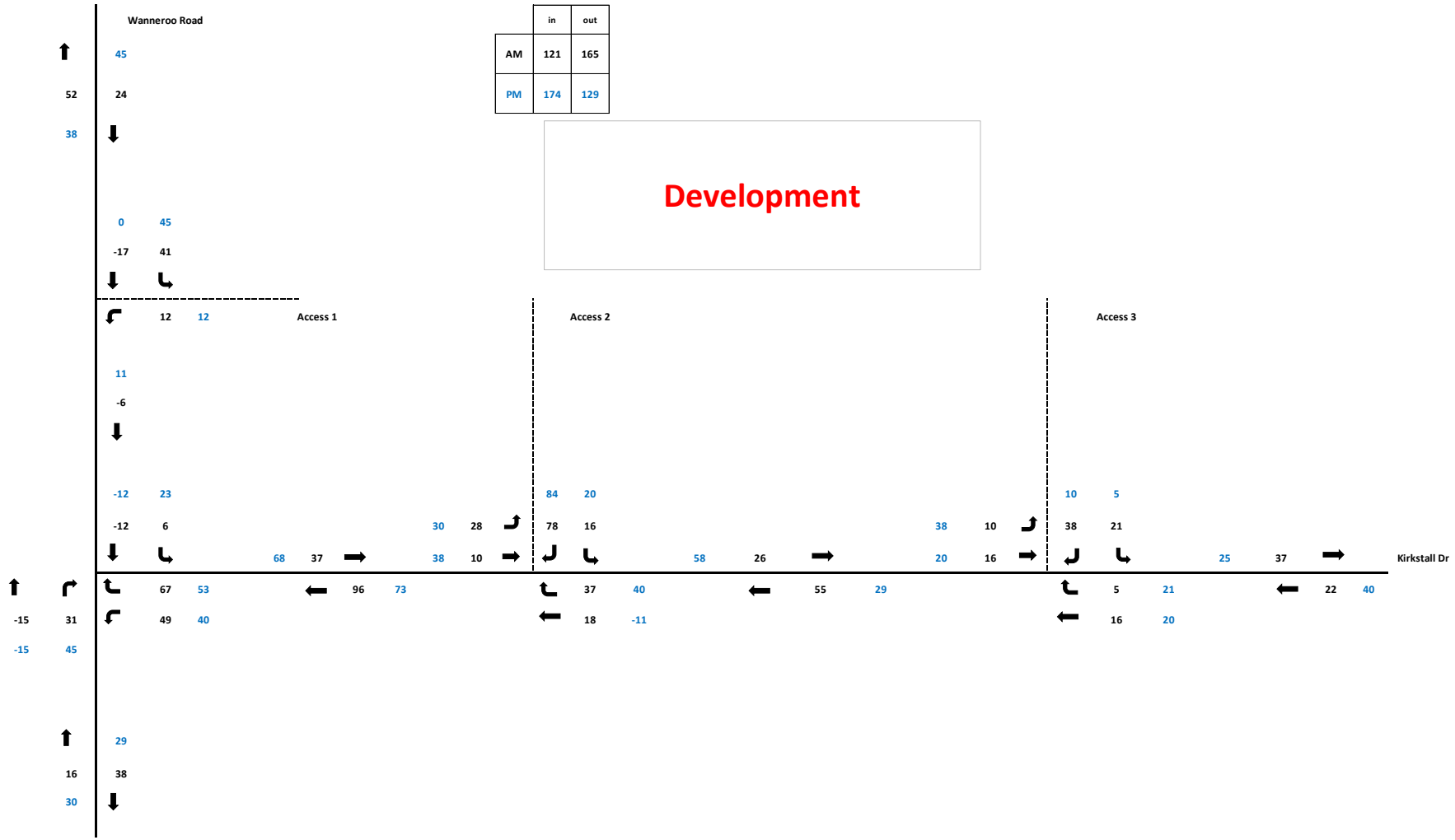


Figure 15: Total peak hour traffic–AM and PM peak hours

7.3 Traffic Flows

The existing traffic counts for Kirkstall Drive was established by manual traffic counts undertaken by Transcore in Friday 5th April 2019 (refer **Figure 6**). The total post development traffic for the assessment year of 2019 is detailed in **Figure 17**.

To approximate the 10-year post development traffic, a conservative traffic growth of 20% and 10% was applied to the tuning movements and through traffic of the intersection of Wanneroo Road/ Kirkstall Drive respectively. Review of the historical traffic counts on Wanneroo Road indicates reduction of traffic volumes along this section of Wanneroo Road since 2015/16 (refer **Figure 16**). Therefore, conservatively 10% traffic increase was adopted for year 2029 for through traffic of Wanneroo Road.

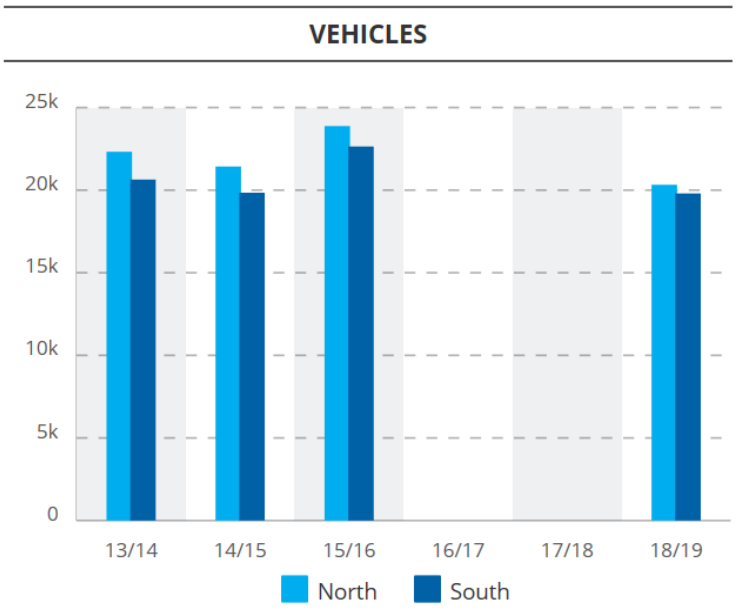


Figure 16: Historical traffic counts on Wanneroo Road in the vicinity of the subject site

The total ten-year post-development traffic volumes are presented in **Figure 18**.

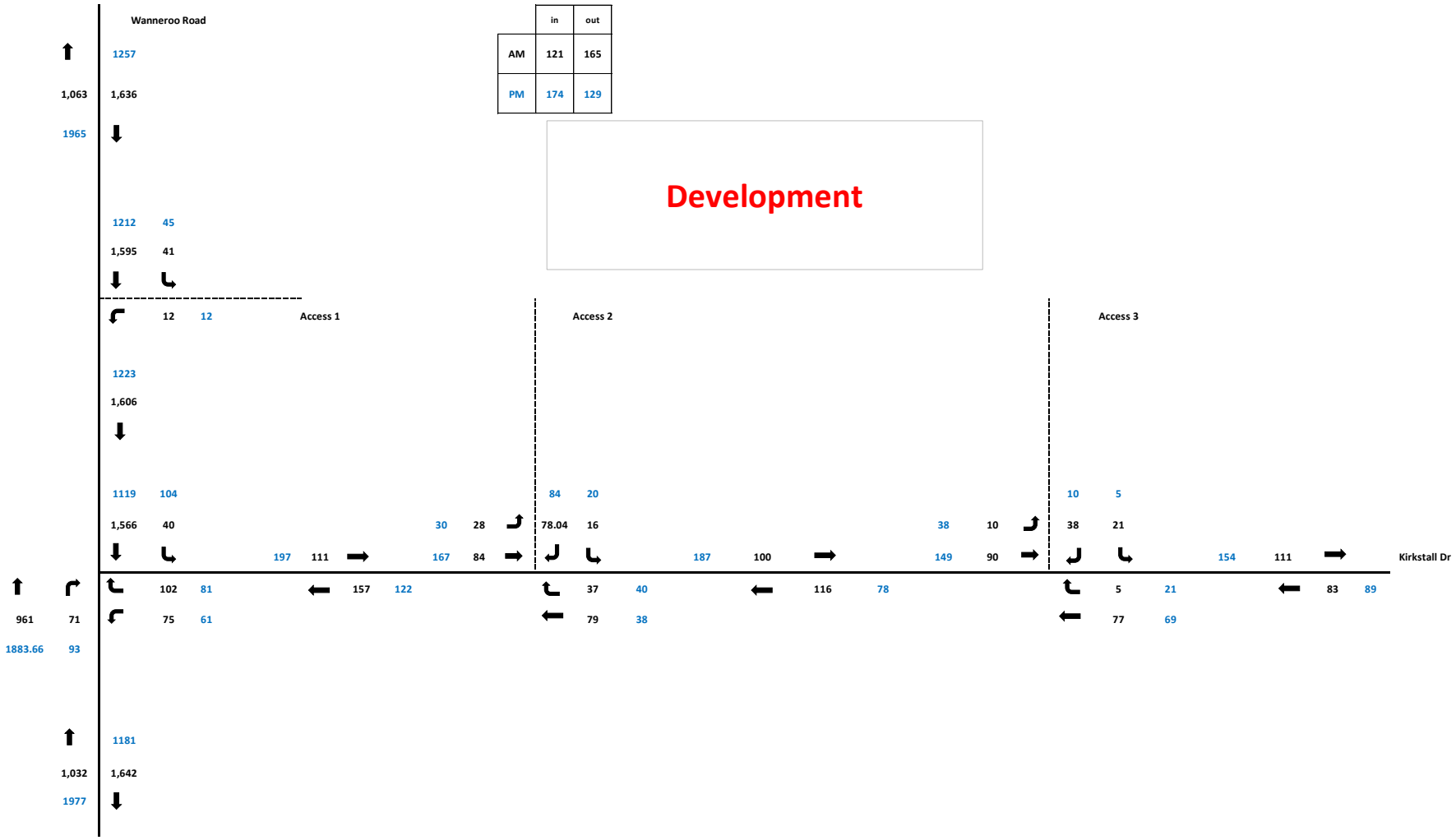


Figure 17: Total post-development traffic flows–AM and PM peak hours

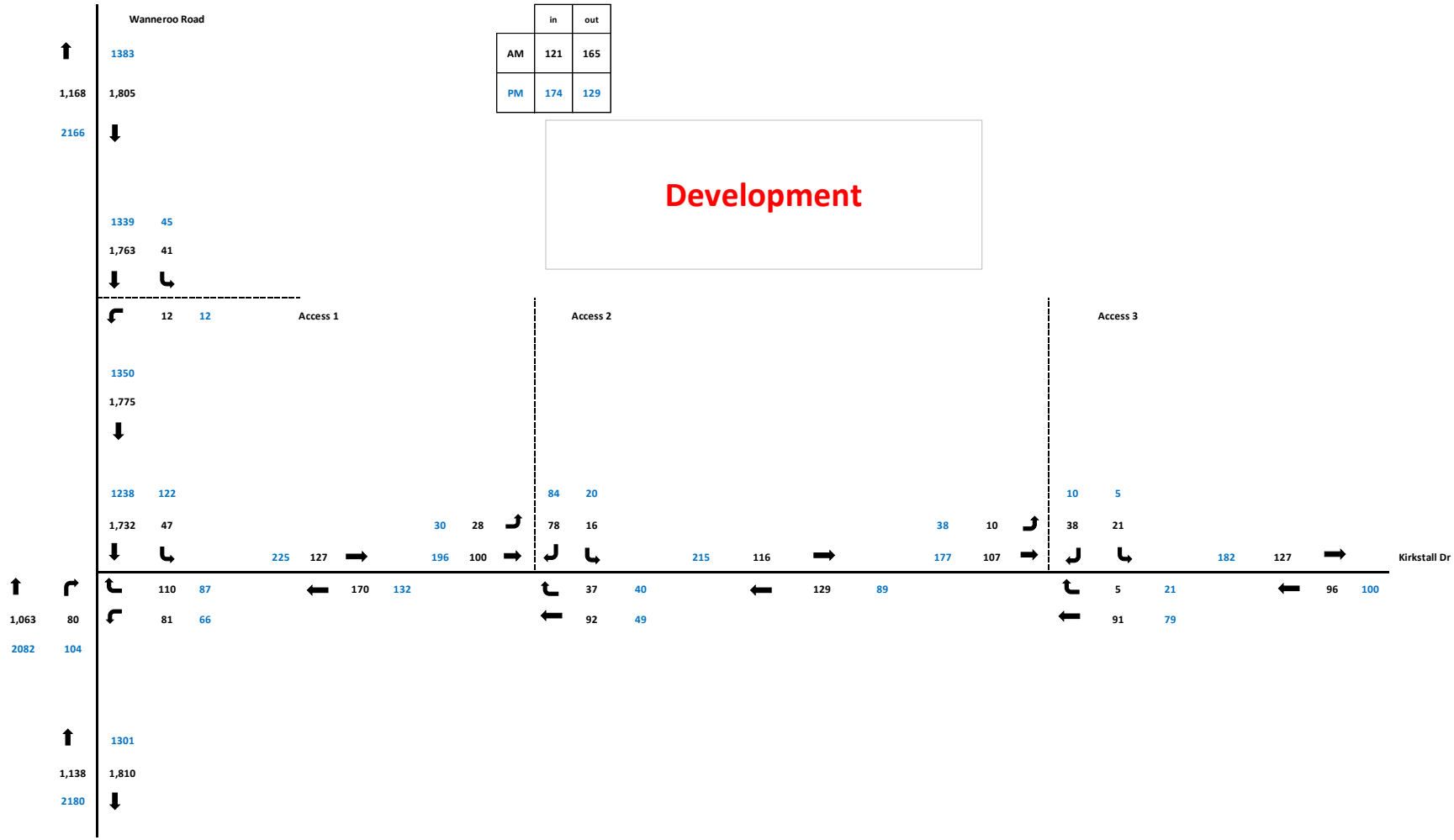


Figure 18: Estimated 10-year total post-development traffic flows–AM and PM peak hours

7.4 Analysis of Intersections and Development Accesses

The operation of unsignalized T-intersection of Wanneroo Road/Kirkstall Drive and the commercial development crossover on Kirkstall Dr has been analysed for the post-development and 10-year post development scenarios for the weekday AM and PM peak hours.

Capacity analysis was undertaken using the SIDRA Network computer software package. SIDRA is an intersection modelling tool commonly used by traffic engineers for all types of intersections. SIDRA outputs are presented in the form of Degree of Saturation, Level of Service, Average Delay and 95% 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 Degree of Saturation ranges from close to zero for varied traffic flow up to one for saturated flow or capacity.
- **Level of Service (LoS)**: is the qualitative measure describing operational conditions within a traffic stream and the perception by motorists and/or passengers. In general, there are 6 levels of service, designated from A to F, with Level of Service A representing the best operating condition (i.e. free flow) and Level of Service F the worst (i.e. forced or breakdown flow).
- **Average Delay**: is the average of all travel time delays for vehicles through the intersection.
- **95% Queue**: is the queue length below which 95% of all observed queue lengths fall.

The results of the SIDRA analysis are detailed in **Appendix C** and briefly explained in this section of the report.

A conceptual diagram of the SIDRA model developed for analysis is shown in **Figure 19**. In this figure the one-way link is not a physical traffic lane at this intersection. This is just a technique to represent the second stage of the Wanneroo Road right turn movement from the median to Wanneroo Road northbound.

The SIDRA model was coded with reference to the *Main Roads Operation Modelling Guidelines Version No. 1.1.* All relevant parameters such as heavy vehicle groups, PCU factors etc. were coded as per the Main Roads Guidelines.

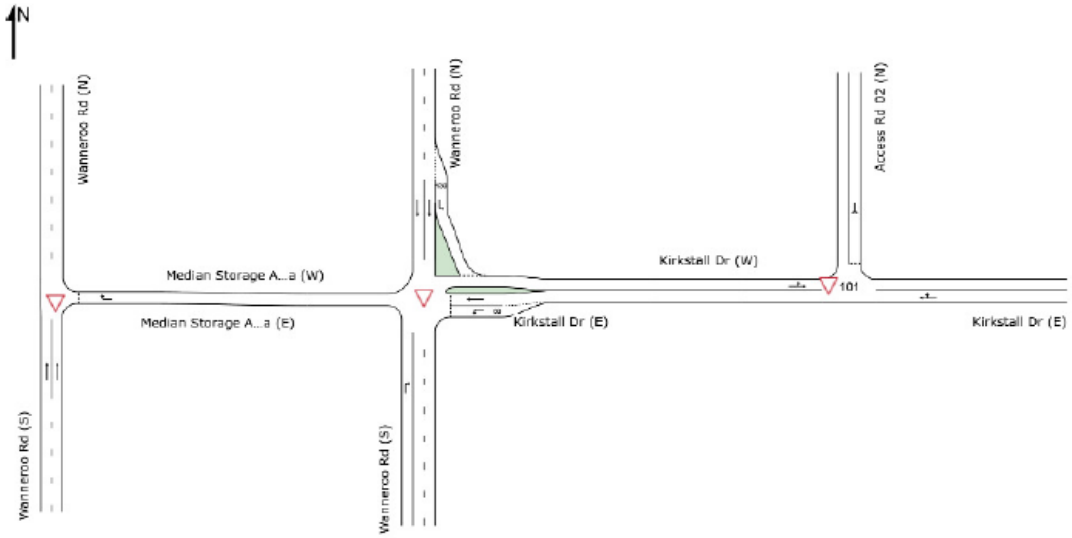


Figure 19: SIDRA Network Model

T-intersection of Wanneroo Road/Kirkstall Drive

The SIDRA analysis results indicate that the intersection of Wanneroo Road/Kirkstall Drive presently operates satisfactorily with moderate queues and delays for the right turn movements in and out of Kirkstall Drive during both weekday peak hours (refer **Appendix C** for more details).

The addition of the development-generated traffic to the intersection of Wanneroo Road/Kirkstall Drive resulted in negligible increases in overall queues and delays. No significant change in LoS for any of the turns is reported during the post-development scenario (refer **Appendix C** for more details).

The SIDRA assessment for the 10-year post development during PM peak hour rendered similar results to post-development scenario with again marginal increases in delays and queues and no significant changes to the Level of Service for any of the turns during the PM peak hour (refer **Appendix C** for more details). The LoS for the right turn movements in and out of Kirkstall Drive reduced to F for the AM peak hour scenario. However, the level of queues and delays are not significant and LoS F during peak hours is regular occurrence at unsignalized intersections for right turn movements in the future.

Kirkstall Dr Crossover

The SIDRA analysis results indicate that the proposed development crossover on Kirkstall Dr will operate at LoS A for all approaches during both post-development and 10-year post-development scenarios (refer **Appendix** for more details).

7.5 Network Operation

Relevant SIDRA network outputs were reviewed to assess the operation of the proposed development crossover on Kirkstall Dr and the intersection of Wanneroo Road / Kirkstall Dr as an integrated network.

As detailed in **Figure 20** and **Figure 21**, no queuing from the site crossover back to the intersection is anticipated during the 2029 AM and PM peak hours. Similarly, no queuing from intersection back to the crossover is anticipated.

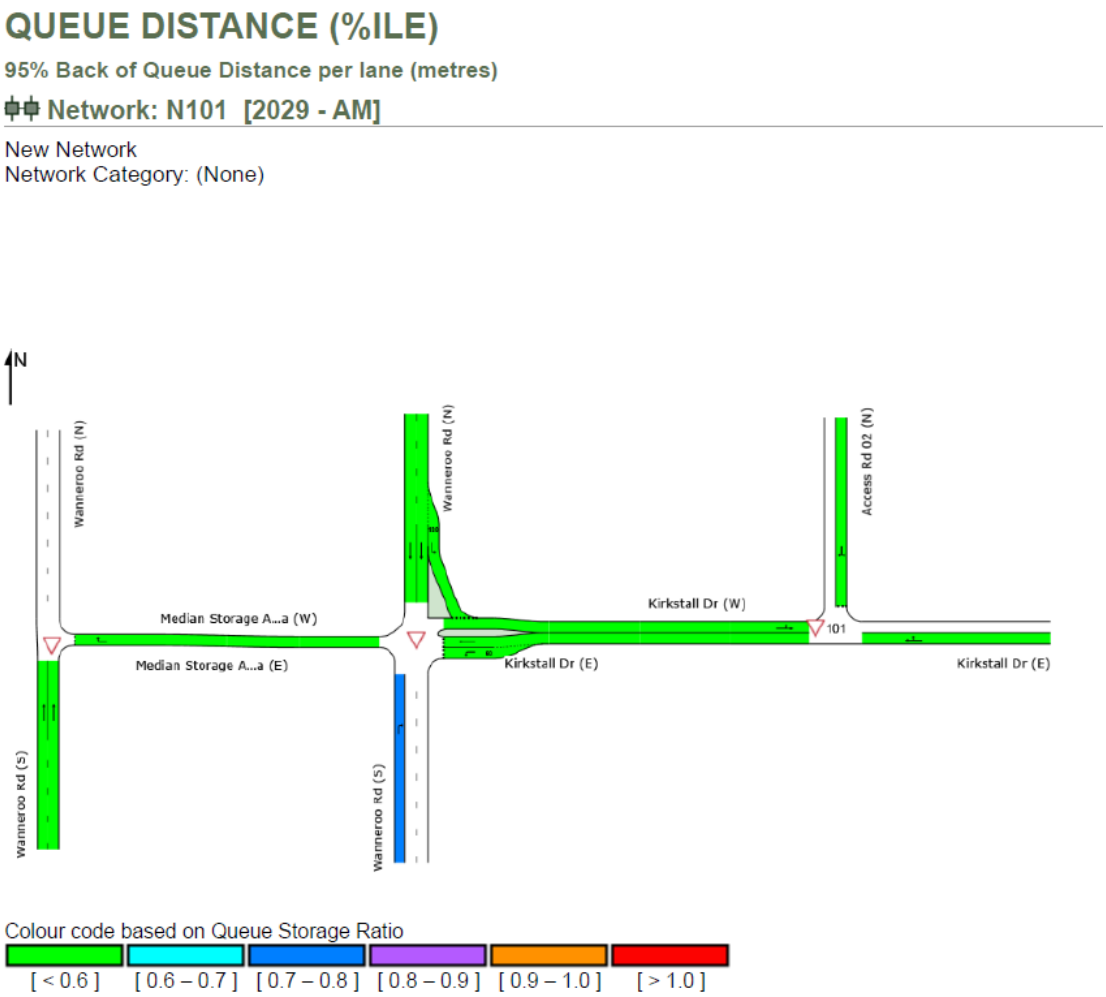


Figure 20: 10-year Post-development weekday AM peak hour network analysis – queue storage ratio

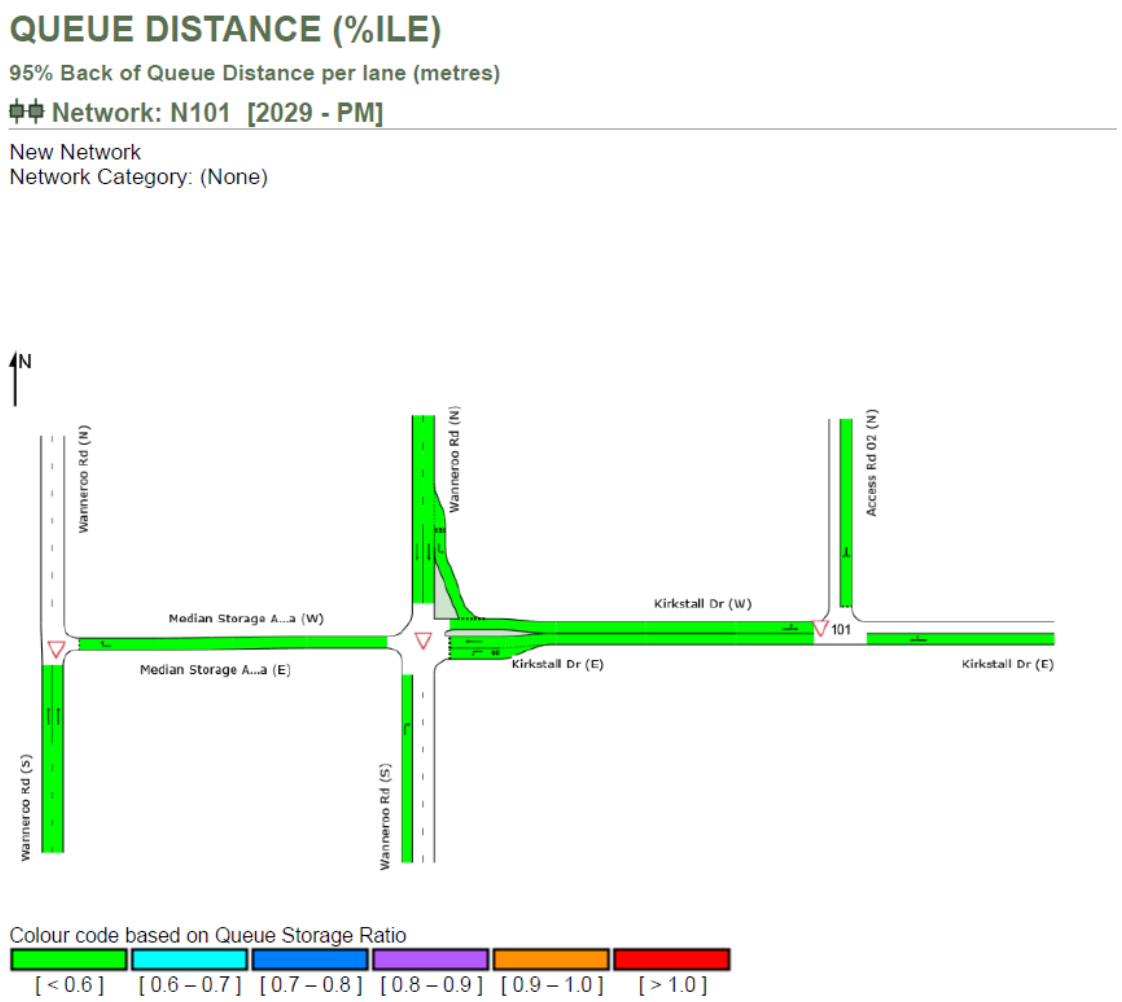


Figure 21: 10-year post-development weekday PM peak hour network analysis – queue storage ratio

7.6 Impact on Surrounding Roads

The WAPC Transport Impact Assessment Guidelines (2016) provides guidance on the assessment of traffic impacts:

"As a general guide, an increase in traffic of less than 10 per cent of capacity would not normally be likely to have a material impact on any particular section of road, but increases over 10 per cent may. All sections of road with an increase greater than 10 per cent of capacity should therefore be included in the analysis. For ease of assessment, an increase of 100 vehicles per hour for any lane can be considered as equating to around 10 per cent of capacity. Therefore, any section of road where the structure plan traffic would increase flows by more than 100 vehicles per hour for any lane should be included in the analysis."

The proposal will not increase traffic flows anywhere near the quoted WAPC threshold to warrant further detailed analysis. Accordingly, the impact on the surrounding road network will not be significant.

7.7 Impact on Neighbouring Areas

The traffic generated by the proposed development is not expected to significantly affect surrounding areas and the road network has been designed to accommodate this type of development traffic. The majority of the traffic from the commercial component of the development is expected to be pass-by traffic.

7.8 Traffic Noise and Vibration

It generally requires a doubling of traffic volumes on a road to produce a perceptible 3dB (A) increase in road noise. The proposed development will not increase traffic volumes on surrounding roads anywhere near this level.

8.0 Parking

The proposed amendment to the adopted structure plan will provide sufficient parking bays to accommodate the needs of the proposed residential and commercial component of the development.

9.0 Conclusions

This Transport Impact Assessment has been prepared by Transcore on behalf of Catholic Archdiocese of Perth. The subject of this report is a proposed amendment to the adopted structure plan for Lot 594 Wanneroo Road, Hocking, in the City of Wanneroo.

A preliminary concept option is prepared for the proposed amendment to the adopted structure plan at Lot 594 Wanneroo Road which indicates business/commercial land uses fronting Wanneroo Road and residential land uses within the eastern part of the site. The residential component of the proposed development is expected to entail 89 dwellings. Currently the proposed land uses for the commercial component of the development is un-known however in order to undertake a robust traffic assessment the higher trip generator land uses such as service station, fast food outlet and showroom are assumed for the commercial part of the development.

In order to separate the commercial traffic from the residential traffic and improve amenity, traffic circulation and permeability it is proposed to provide a left in/ left out crossover on Wanneroo Road.

Transcore has prepared a concept design sketch for the proposed left in/ left out crossover on Wanneroo Road which is included in **Appendix B** of this TIA.

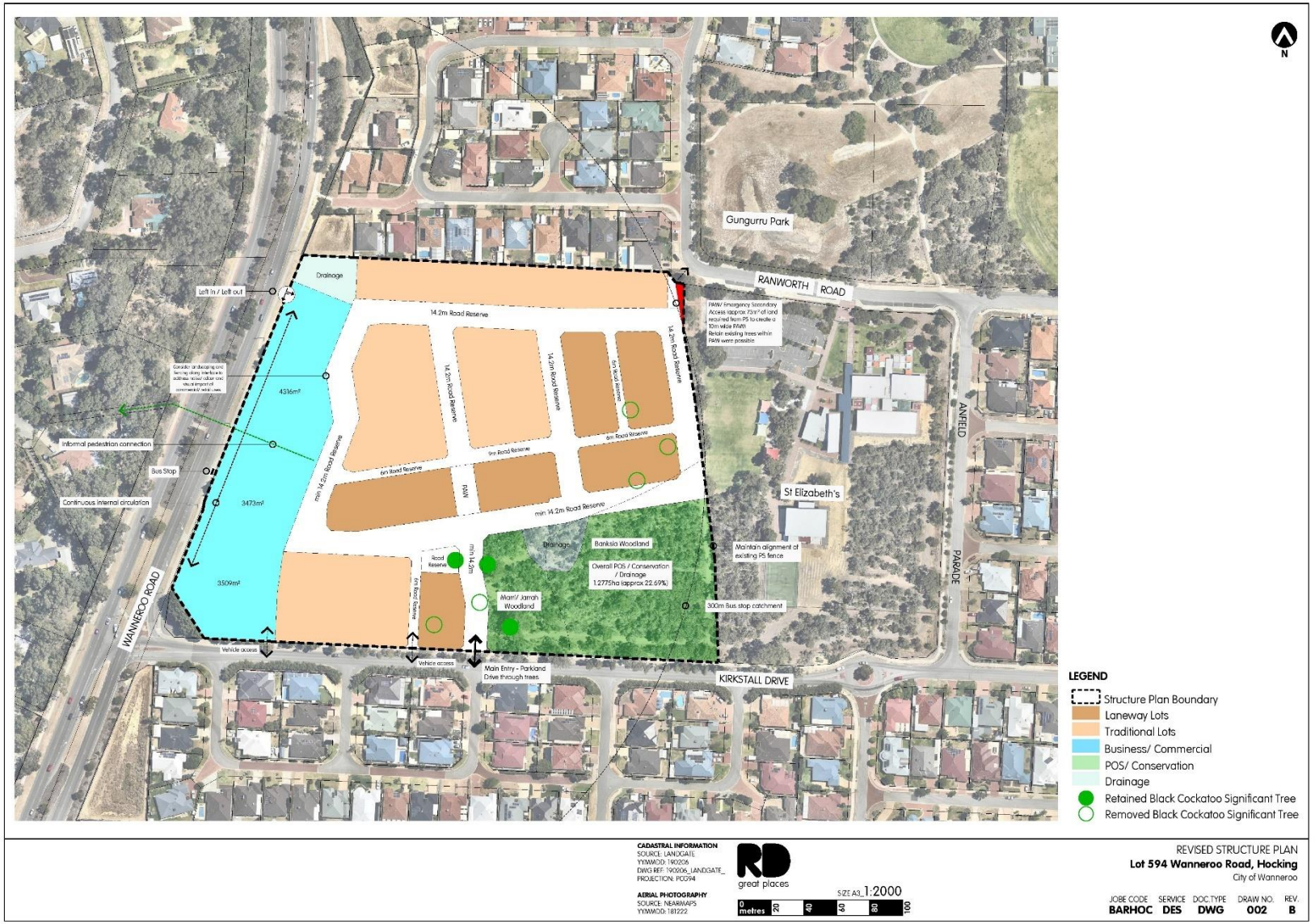
The proposed of left in/ left out crossover on Wanneroo Road would include a left turn slip lane of about 100m and would provide a separation distance of about 50m between the proposed crossover and the existing left turn slip lane of Kirkstall Drive/ Wanneroo Road intersection.

The SIDRA Network analysis undertaken as part of the Transport Impact Assessment confirms satisfactory traffic operations of the T-intersection of Wanneroo Road/Kirkstall Drive and the proposed development crossovers on Kirkstall Drive for the post-development and 10 years post-development scenarios.

In conclusion, the findings of this Transport Impact Assessment are supportive of the proposed development.

Appendix A

DEVELOPMENT SITE PLAN



CADASTRAL INFORMATION
SOURCE: LANDGATE
YYMMDD: 190206
DWG REF: 190206_LANDGATE_
PROJECTION: PCG94

AERIAL PHOTOGRAPHY
SOURCE: NEARMAPS
YYMMDD: 181222

great places

SIZE A3_1:2000

0 metres 20 40 60 80 100

REVISED STRUCTURE PLAN
Lot 594 Wanneroo Road, Hocking
City of Wanneroo

JOBE CODE	SERVICE	DOC.TYPE	DRAW NO.	REV.
BARHOC	**DES**	**DWG**	**002**	**B**

DISCLAIMER: ISSUED FOR DESIGN INTENT ONLY. ALL AREAS AND DIMENSIONS ARE SUBJECT TO DETAIL DESIGN AND SURVEY

Appendix B

CONCEPT DESIGN SKETCH

Lot 594 Wanneroo Road, Hocking

Proposed left in/left out crossover on Wanneroo Road

t19.056-sk01
SCALE 1:1000@A3
12/04/2019

transcore

Appendix C

SIDRA OUTPUTS

MOVEMENT SUMMARY

Site: [Wanneroo Rd - Kirkstall Dr - Existing - 1st Stage - AM] **Network: N101 [Existing - AM]**

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Wanneroo Rd (S)														
3	R2	42	2.0	42	2.0	0.347	41.5	LOS E	1.1	8.5	0.94	1.01	1.09	25.8
Approach		42	2.0	42	2.0	0.347	41.5	NA	1.1	8.5	0.94	1.01	1.09	25.8
East: Kirkstall Dr (E)														
4	L2	27	2.0	27	2.0	0.045	9.2	LOS A	0.2	1.2	0.63	0.79	0.63	39.9
5	T1	37	0.0	37	0.0	0.194	22.6	LOS C	0.6	4.1	0.90	0.95	0.94	31.0
Approach		64	0.9	64	0.9	0.194	16.9	LOS C	0.6	4.1	0.78	0.88	0.81	34.6
North: Wanneroo Rd (N)														
7	L2	36	2.0	36	2.0	0.023	6.7	LOS A	0.1	0.6	0.11	0.55	0.11	52.7
8	T1	1661	5.0	1661	5.0	0.451	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	69.8
Approach		1697	4.9	1697	4.9	0.451	0.2	LOS A	0.1	0.6	0.00	0.01	0.00	69.0
All Vehicles		1803	4.7	1803	4.7	0.451	1.8	NA	1.1	8.5	0.05	0.07	0.06	64.4

MOVEMENT SUMMARY

Site: [Wanneroo Rd - Kirkstall Dr - Existing - 2nd Stage - AM] **Network: N101 [Existing - AM]**

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Wanneroo Rd (S)														
2	T1	1027	7.0	1027	7.0	0.289	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
Approach		1027	7.0	1027	7.0	0.289	0.0	NA	0.0	0.0	0.00	0.00	0.00	69.9
East: Median Storage Area (E)														
6	R2	37	2.0	37	2.0	0.017	2.9	LOS A	0.1	0.5	0.50	0.60	0.50	55.0
Approach		37	2.0	37	2.0	0.017	2.9	LOS A	0.1	0.5	0.50	0.60	0.50	55.0
All Vehicles		1064	6.8	1064	6.8	0.289	0.1	NA	0.1	0.5	0.02	0.02	0.02	69.6

MOVEMENT SUMMARY

Site: [Wanneroo Rd - Kirkstall Dr - Existing - 1st Stage - PM] **Network: N101 [Existing - PM]**

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Wanneroo Rd (S)														
3	R2	51	2.0	51	2.0	0.162	16.3	LOS C	0.5	4.1	0.81	0.92	0.81	37.0
Approach		51	2.0	51	2.0	0.162	16.3	NA	0.5	4.1	0.81	0.92	0.81	37.0
East: Kirkstall Dr (E)														
4	L2	22	2.0	22	2.0	0.025	7.1	LOS A	0.1	0.7	0.52	0.66	0.52	41.5
5	T1	29	0.0	29	0.0	0.077	11.6	LOS B	0.2	1.7	0.76	0.87	0.76	38.0
Approach		52	0.9	52	0.9	0.077	9.7	LOS A	0.2	1.7	0.65	0.78	0.65	39.6
North: Wanneroo Rd (N)														
7	L2	85	2.0	85	2.0	0.055	6.7	LOS A	0.2	1.6	0.13	0.55	0.13	52.7
8	T1	1191	5.0	1191	5.0	0.324	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
Approach		1276	4.8	1276	4.8	0.324	0.5	LOS A	0.2	1.6	0.01	0.04	0.01	67.5
All Vehicles		1378	4.5	1378	4.5	0.324	1.4	NA	0.5	4.1	0.06	0.10	0.06	64.1

MOVEMENT SUMMARY

Site: [Wanneroo Rd - Kirkstall Dr - Existing - 2nd Stage - PM] **Network: N101 [Existing - PM]**

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Wanneroo Rd (S)														
2	T1	1999	7.0	1999	7.0	0.562	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	69.7
Approach		1999	7.0	1999	7.0	0.562	0.1	NA	0.0	0.0	0.00	0.00	0.00	69.7
East: Median Storage Area (E)														
6	R2	29	2.0	29	2.0	0.031	5.4	LOS A	0.1	0.8	0.74	0.86	0.74	51.2
Approach		29	2.0	29	2.0	0.031	5.4	LOS A	0.1	0.8	0.74	0.86	0.74	51.2
All Vehicles		2028	6.9	2028	6.9	0.562	0.2	NA	0.1	0.8	0.01	0.01	0.01	69.5

MOVEMENT SUMMARY

Site: [Wanneroo Rd - Kirkstall Dr - 2019 - 1st Stage - AM] **Network: N101 [2019 - AM]**

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Wanneroo Rd (S)														
3	R2	75	0.0	75	0.0	0.567	47.8	LOS E	2.1	15.2	0.96	1.06	1.33	6.5
Approach		75	0.0	75	0.0	0.567	47.8	NA	2.1	15.2	0.96	1.06	1.33	6.5
East: Kirkstall Dr (E)														
4	L2	79	2.0	79	2.0	0.128	9.4	LOS A	0.5	3.5	0.65	0.83	0.65	26.7
5	T1	107	0.0	107	0.0	0.577	32.7	LOS D	2.2	15.2	0.94	1.09	1.37	8.5
Approach		186	0.8	186	0.8	0.577	22.8	LOS C	2.2	15.2	0.82	0.98	1.06	14.1
North: Wanneroo Rd (N)														
7	L2	42	2.0	42	2.0	0.028	6.8	LOS A	0.1	0.8	0.16	0.55	0.16	55.1
8	T1	1648	5.0	1648	5.0	0.448	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	69.8
Approach		1691	4.9	1691	4.9	0.448	0.2	LOS A	0.1	0.8	0.00	0.01	0.00	69.4
All Vehicles		1952	4.3	1952	4.3	0.577	4.2	NA	2.2	15.2	0.12	0.15	0.16	59.9

MOVEMENT SUMMARY

Site: [Wanneroo Rd - Kirkstall Dr - 2019 - 2nd Stage - AM] **Network: N101 [2019 - AM]**

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Wanneroo Rd (S)														
2	T1	1012	7.0	1012	7.0	0.285	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
Approach		1012	7.0	1012	7.0	0.285	0.0	NA	0.0	0.0	0.00	0.00	0.00	69.9
East: Median Storage Area (E)														
6	R2	107	2.0	107	2.0	0.050	3.0	LOS A	0.2	1.5	0.50	0.64	0.50	54.9
Approach		107	2.0	107	2.0	0.050	3.0	LOS A	0.2	1.5	0.50	0.64	0.50	54.9
All Vehicles		1119	6.5	1119	6.5	0.285	0.3	NA	0.2	1.5	0.05	0.06	0.05	68.9

MOVEMENT SUMMARY

Site: 101 [Access Rd 2 - Kirkstall Dr - 2019 - AM]

Network: N101 [2019 - AM]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Kirkstall Dr (E)														
2	T1	83	2.0	83	2.0	0.069	0.2	LOS A	0.2	1.7	0.15	0.17	0.15	47.4
3	R2	39	2.0	39	2.0	0.069	5.0	LOS A	0.2	1.7	0.15	0.17	0.15	43.9
Approach		122	2.0	122	2.0	0.069	1.7	NA	0.2	1.7	0.15	0.17	0.15	46.1
North: Access Rd 02 (N)														
4	L2	17	2.0	17	2.0	0.090	0.3	LOS A	0.3	2.4	0.25	0.24	0.25	41.0
6	R2	82	2.0	82	2.0	0.090	1.5	LOS A	0.3	2.4	0.25	0.24	0.25	17.7
Approach		99	2.0	99	2.0	0.090	1.3	LOS A	0.3	2.4	0.25	0.24	0.25	28.1
West: Kirkstall Dr (W)														
7	L2	29	2.0	29	2.0	0.063	4.6	LOS A	0.0	0.0	0.00	0.14	0.00	10.3
8	T1	88	2.0	88	2.0	0.063	0.0	LOS A	0.0	0.0	0.00	0.14	0.00	48.7
Approach		118	2.0	118	2.0	0.063	1.2	NA	0.0	0.0	0.00	0.14	0.00	38.2
All Vehicles		339	2.0	339	2.0	0.090	1.4	NA	0.3	2.4	0.13	0.18	0.13	39.9

MOVEMENT SUMMARY

Site: [Wanneroo Rd - Kirkstall Dr - 2019 - 1st Stage - PM]

Network: N101 [2019 - PM]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Wanneroo Rd (S)														
3	R2	98	2.0	98	2.0	0.308	18.1	LOS C	1.2	9.0	0.83	0.97	0.99	15.0
Approach		98	2.0	98	2.0	0.308	18.1	NA	1.2	9.0	0.83	0.97	0.99	15.0
East: Kirkstall Dr (E)														
4	L2	64	2.0	64	2.0	0.073	7.2	LOS A	0.3	2.1	0.52	0.70	0.52	29.4
5	T1	85	0.0	85	0.0	0.234	13.4	LOS B	0.8	5.7	0.80	0.92	0.88	16.7
Approach		149	0.9	149	0.9	0.234	10.7	LOS B	0.8	5.7	0.68	0.82	0.73	22.4
North: Wanneroo Rd (N)														
7	L2	109	2.0	109	2.0	0.073	6.9	LOS A	0.3	2.1	0.19	0.55	0.19	54.8
8	T1	1178	5.0	1178	5.0	0.320	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
Approach		1287	4.7	1287	4.7	0.320	0.6	LOS A	0.3	2.1	0.02	0.05	0.02	68.5
All Vehicles		1535	4.2	1535	4.2	0.320	2.7	NA	1.2	9.0	0.13	0.18	0.15	62.6

MOVEMENT SUMMARY

Site: [Wanneroo Rd - Kirkstall Dr - 2019 - 2nd Stage - PM]

Network: N101 [2019 - PM]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Wanneroo Rd (S)														
2	T1	1983	7.0	1983	7.0	0.558	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	69.7
Approach		1983	7.0	1983	7.0	0.558	0.1	NA	0.0	0.0	0.00	0.00	0.00	69.7
East: Median Storage Area (E)														
6	R2	85	2.0	85	2.0	0.089	5.5	LOS A	0.3	2.2	0.75	0.88	0.75	51.1
Approach		85	2.0	85	2.0	0.089	5.5	LOS A	0.3	2.2	0.75	0.88	0.75	51.1
All Vehicles		2068	6.8	2068	6.8	0.558	0.3	NA	0.3	2.2	0.03	0.04	0.03	69.2

MOVEMENT SUMMARY

Site: 101 [Access Rd 2 - Kirkstall Dr - 2019 - PM]

Network: N101 [2019 - PM]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Kirkstall Dr (E)														
2	T1	40	2.0	40	2.0	0.050	0.5	LOS A	0.2	1.7	0.28	0.29	0.28	45.7
3	R2	42	2.0	42	2.0	0.050	5.3	LOS A	0.2	1.7	0.28	0.29	0.28	42.6
Approach		82	2.0	82	2.0	0.050	3.0	NA	0.2	1.7	0.28	0.29	0.28	44.0
North: Access Rd 02 (N)														
4	L2	21	2.0	21	2.0	0.105	0.6	LOS A	0.4	2.8	0.32	0.29	0.32	40.8
6	R2	88	2.0	88	2.0	0.105	1.7	LOS A	0.4	2.8	0.32	0.29	0.32	17.4
Approach		109	2.0	109	2.0	0.105	1.5	LOS A	0.4	2.8	0.32	0.29	0.32	28.7
West: Kirkstall Dr (W)														
7	L2	32	2.0	32	2.0	0.110	4.6	LOS A	0.0	0.0	0.00	0.08	0.00	10.4
8	T1	176	2.0	176	2.0	0.110	0.0	LOS A	0.0	0.0	0.00	0.08	0.00	49.2
Approach		207	2.0	207	2.0	0.110	0.7	NA	0.0	0.0	0.00	0.08	0.00	42.7
All Vehicles		399	2.0	399	2.0	0.110	1.4	NA	0.4	2.8	0.14	0.18	0.14	40.9

MOVEMENT SUMMARY

Site: [Wanneroo Rd - Kirkstall Dr - 2029 - 1st Stage - AM] Network: N101 [2029 - AM]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Wanneroo Rd (S)														
3	R2	84	2.0	84	2.0	1.033	191.6	LOS F	7.7	57.9	1.00	1.48	3.34	1.7
Approach		84	2.0	84	2.0	1.033	191.6	NA	7.7	57.9	1.00	1.48	3.34	1.7
East: Kirkstall Dr (E)														
4	L2	85	2.0	85	2.0	0.160	10.6	LOS B	0.6	4.3	0.71	0.86	0.71	25.4
5	T1	116	0.0	116	0.0	0.884	81.6	LOS F	4.5	31.6	0.99	1.36	2.37	3.8
Approach		201	0.8	201	0.8	0.884	51.5	LOS F	4.5	31.6	0.87	1.15	1.67	7.5
North: Wanneroo Rd (N)														
7	L2	49	2.0	49	2.0	0.033	6.8	LOS A	0.1	0.9	0.17	0.55	0.17	55.0
8	T1	1823	5.0	1823	5.0	0.496	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	69.8
Approach		1873	4.9	1873	4.9	0.496	0.3	LOS A	0.1	0.9	0.00	0.01	0.00	69.3
All Vehicles		2158	4.4	2158	4.4	1.033	12.5	NA	7.7	57.9	0.12	0.18	0.29	47.5

MOVEMENT SUMMARY

Site: [Wanneroo Rd - Kirkstall Dr - 2029 - 2nd Stage - AM] Network: N101 [2029 - AM]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Wanneroo Rd (S)														
2	T1	1119	7.0	1119	7.0	0.315	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
Approach		1119	7.0	1119	7.0	0.315	0.0	NA	0.0	0.0	0.00	0.00	0.00	69.9
East: Median Storage Area (E)														
6	R2	116	2.0	116	2.0	0.058	3.1	LOS A	0.2	1.7	0.53	0.67	0.53	54.7
Approach		116	2.0	116	2.0	0.058	3.1	LOS A	0.2	1.7	0.53	0.67	0.53	54.7
All Vehicles		1235	6.5	1235	6.5	0.315	0.3	NA	0.2	1.7	0.05	0.06	0.05	68.9

MOVEMENT SUMMARY

Site: 101 [Access Rd 2 - Kirkstall Dr - 2029 - AM]

Network: N101 [2029 - AM]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Kirkstall Dr (E)														
2	T1	97	2.0	97	2.0	0.077	0.2	LOS A	0.2	1.8	0.15	0.16	0.15	47.5
3	R2	39	2.0	39	2.0	0.077	5.0	LOS A	0.2	1.8	0.15	0.16	0.15	44.0
Approach		136	2.0	136	2.0	0.077	1.6	NA	0.2	1.8	0.15	0.16	0.15	46.4
North: Access Rd 02 (N)														
4	L2	17	2.0	17	2.0	0.093	0.3	LOS A	0.3	2.4	0.27	0.26	0.27	40.9
6	R2	82	2.0	82	2.0	0.093	1.6	LOS A	0.3	2.4	0.27	0.26	0.27	17.6
Approach		99	2.0	99	2.0	0.093	1.4	LOS A	0.3	2.4	0.27	0.26	0.27	28.0
West: Kirkstall Dr (W)														
7	L2	29	2.0	29	2.0	0.071	4.6	LOS A	0.0	0.0	0.00	0.12	0.00	10.4
8	T1	105	2.0	103	2.0	0.071	0.0	LOS A	0.0	0.0	0.00	0.12	0.00	48.8
Approach		135	2.0	132[N1]	2.0	0.071	1.0	NA	0.0	0.0	0.00	0.12	0.00	39.6
All Vehicles		369	2.0	367[N1]	2.0	0.093	1.3	NA	0.3	2.4	0.13	0.17	0.13	40.8

MOVEMENT SUMMARY

Site: [Wanneroo Rd - Kirkstall Dr - 2029 - 1st Stage - PM]

Network: N101 [2029 - PM]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Wanneroo Rd (S)														
3	R2	109	2.0	109	2.0	0.430	23.9	LOS C	1.7	13.0	0.89	1.02	1.17	11.9
Approach		109	2.0	109	2.0	0.430	23.9	NA	1.7	13.0	0.89	1.02	1.17	11.9
East: Kirkstall Dr (E)														
4	L2	69	2.0	69	2.0	0.086	7.7	LOS A	0.3	2.4	0.55	0.74	0.55	28.8
5	T1	92	0.0	92	0.0	0.311	17.1	LOS C	1.1	7.7	0.86	0.97	1.01	14.1
Approach		161	0.9	161	0.9	0.311	13.1	LOS B	1.1	7.7	0.73	0.87	0.81	20.1
North: Wanneroo Rd (N)														
7	L2	128	2.0	128	2.0	0.087	6.9	LOS A	0.4	2.5	0.21	0.56	0.21	54.7
8	T1	1303	5.0	1303	5.0	0.354	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
Approach		1432	4.7	1432	4.7	0.354	0.7	LOS A	0.4	2.5	0.02	0.05	0.02	68.4
All Vehicles		1702	4.2	1702	4.2	0.430	3.3	NA	1.7	13.0	0.14	0.19	0.17	61.4

MOVEMENT SUMMARY

Site: [Wanneroo Rd - Kirkstall Dr - 2029 - 2nd Stage - PM] Network: N101 [2029 - PM]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Wanneroo Rd (S)														
2	T1	2192	7.0	2192	7.0	0.617	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	69.6
Approach		2192	7.0	2192	7.0	0.617	0.1	NA	0.0	0.0	0.00	0.00	0.00	69.6
East: Median Storage Area (E)														
6	R2	92	2.0	92	2.0	0.122	6.7	LOS A	0.4	2.9	0.81	0.91	0.81	49.5
Approach		92	2.0	92	2.0	0.122	6.7	LOS A	0.4	2.9	0.81	0.91	0.81	49.5
All Vehicles		2283	6.8	2283	6.8	0.617	0.4	NA	0.4	2.9	0.03	0.04	0.03	69.0

MOVEMENT SUMMARY

Site: 101 [Access Rd 2 - Kirkstall Dr - 2029 - PM] Network: N101 [2029 - PM]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Kirkstall Dr (E)														
2	T1	52	2.0	52	2.0	0.058	0.6	LOS A	0.2	1.9	0.29	0.25	0.29	46.0
3	R2	42	2.0	42	2.0	0.058	5.4	LOS A	0.2	1.9	0.29	0.25	0.29	42.8
Approach		94	2.0	94	2.0	0.058	2.7	NA	0.2	1.9	0.29	0.25	0.29	44.5
North: Access Rd 02 (N)														
4	L2	21	2.0	21	2.0	0.109	0.7	LOS A	0.4	2.9	0.34	0.32	0.34	40.7
6	R2	88	2.0	88	2.0	0.109	2.0	LOS A	0.4	2.9	0.34	0.32	0.34	17.3
Approach		109	2.0	109	2.0	0.109	1.7	LOS A	0.4	2.9	0.34	0.32	0.34	28.5
West: Kirkstall Dr (W)														
7	L2	32	2.0	32	2.0	0.127	4.6	LOS A	0.0	0.0	0.00	0.07	0.00	10.4
8	T1	206	2.0	206	2.0	0.127	0.0	LOS A	0.0	0.0	0.00	0.07	0.00	49.3
Approach		238	2.0	238	2.0	0.127	0.6	NA	0.0	0.0	0.00	0.07	0.00	43.6
All Vehicles		441	2.0	441	2.0	0.127	1.3	NA	0.4	2.9	0.15	0.17	0.15	41.8