Proposed Service Station and Bulky Goods Showroom Development

Cnr of Pinjar Road and Porrecta Link, Banksia Grove

Transport Impact Assessment

PREPARED FOR:
Accord Property

November 2019

Document history and status

Author	Revision	Approved by	Date approved	Revision type
M Rasouli	r01	B Bordbar	14/06/19	Draft
Shaju Maharjan	r01a	B Bordbar	02/08/19	Final
M Rasouli	r01b	B Bordbar	14/11/19	Revised Final
M Rasouli	r01c	B Bordbar	15/11/19	Minor Revision

File name: t19.061.mr.r01c

Author: Mohammad Rasouli

Project manager: Behnam Bordbar

Client: Accord Property

Project: Proposed Service Station and Bulky Goods Showroom, Banksia Grove

Document revision: r01c

Project number: t19.061

TABLE OF CONTENTS

REPORT FIGURES

1.0 Summary

This Transport Impact Assessment (TIA) is prepared by Transcore with respect to the proposed service station and bulky goods showroom development to be located at the south-east corner of Pinjar Road and Porrecta Link intersection in Banksia Grove, in the City of Wanneroo.

In order to improve accessibility and permeability of the proposed development and to reduce traffic load at the intersection of Pinjar Road/Jewel Way/ Golf Links Drive a left in/ left out/ right in crossover is proposed for the development on Porrecta Link which provides direct connectivity to the service station. Transcore has prepared a concept design plan for the proposed crossover (refer **Appendix B**). This crossover is designed to accommodate light vehicles only.

Delivery and service trucks are anticipated to enter/egress the subject site via the development crossovers on the new road traversing along the eastern boundary of the development linking Porrecta Link to Jewel Way. The latest development plan shows a straight alignment for the proposed new road and a median opening on Jewel Way. This new road and the proposed T-intersection at Jewel Way will accommodate service vehicles and light vehicles for the proposed development. Transcore prepared a concept plan for the proposed median opening on Jewel Way (refer **Appendix B**).

Traffic generation of the proposed development is estimated to be approximately 107 and 182 trips during the weekday AM and PM peak hours respectively. This level of traffic generation can be accommodated by the standard and function of the surrounding road network.

The proposed development layout has been assessed with respect to fuel tanker and service vehicle entry, egress and circulation. Swept path analysis confirms that the proposed entry and egress arrangements and site layout facilitate safe and efficient fuel tanker and service vehicle circulation through the site.

The SIDRA Network analysis undertaken as part of the TIA confirms satisfactory operation of the T-intersection of Porrecta Link and Pinjar Road and the proposed development crossover on Porrecta Link for existing, post-development and 10 years post-development scenarios.

2.0 Introduction

This Transport Impact Assessment has been prepared by Transcore on behalf of Accord Property. The subject of this report is the proposed service station and bulky goods showroom development at the south-east corner of Pinjar Road and Porrecta Link intersection in Banksia Grove.

The subject site is presently a vacant land as illustrated in **Figure 1**. The location of the subject site in the context of Metropolitan Region Scheme (MRS) is indicated in **Figure 2**.

Key issues that will be addressed in this report include the traffic generation of the proposed development, capacity of nearby intersection, operation of the site crossovers and fuel tanker and service vehicle entry, egress and circulation.

Figure 1: location of the subject site

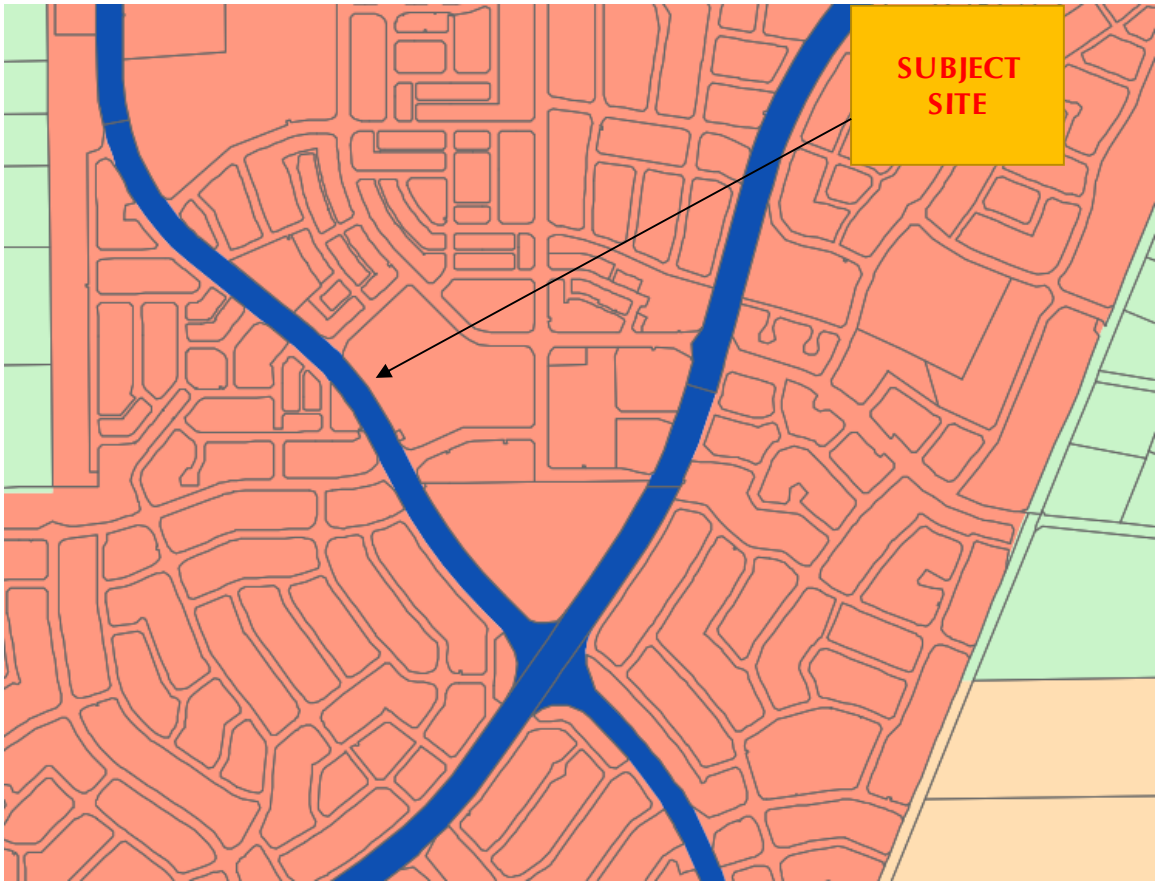


Figure 2: Location of the subject site in context of the Metropolitan Region Scheme

3.0 Existing Situation

3.1 Existing Site Use, Access and Parking

As detailed in **Figure 1**, the subject site is currently vacant and does not have any crossovers on the surrounding roads.

3.2 Existing Site Traffic Generation

The subject site is presently vacant and does not generate any traffic.

3.3 Surrounding Road Network and Traffic Management on Frontage Roads

Porrecta Link

As shown in **Figure 3**, Porrecta Link at this location is constructed to a two-lane divided carriageway standard with on-street cycle lanes on both sides of the road and a concrete shared path on its northern side.

Porrecta Link is classified as an Access Road in the Main Roads WA *Functional Road Hierarchy* and operates under the default, built up area speed limit of 50km/h.

Figure 3: Porrecta Link adjacent to the subject site (looking north)

Pinjar Road

As shown in **Figure 4**, Pinjar Road at this location is constructed to a two-lane divided carriageway standard with shared paths and on road cycle lanes on both sides of the road. Left and right turn slip lanes are provided on Pinjar Road at the intersection with Porrecta Link.

Pinjar Road is classified as Distributor A Road in the Main Roads WA *Functional Road Hierarchy* and operates under the speed limit of 70km/h in the immediate vicinity of the subject site.

Pinjar Road is covered by an Other Regional Roads (ORR) reservation in the MRS (Blue Road).

Figure 4: Pinjar Road adjacent to the subject site (looking south)

3.4 Existing Traffic Volumes on Roads and Major Intersections

Pinjar Road

Traffic count data obtained from Main Roads WA indicates that Pinjar Road carried average weekday traffic flows of approximately 13,892 vehicles per day (vpd) in 2017/2018 north of Joondalup Drive.

The weekday AM peak hour on Pinjar Road occurred between 7:00am and 8:00am and the PM peak hour occurred between 3:00pm and 4:00pm with 1,339 and 1,266vph respectively. The recorded heavy vehicle traffic component was 4.6% of total weekday traffic volume.

Porrecta Link

Transcore undertook a manual traffic count survey at the T-intersection of Pinjar Road / Porrecta Link on Thursday 11th April 2019, between 7:00AM to 8:00AM and 3:00PM to 4:00PM. The survey data indicated two-way traffic flows of about 212vph on Pinjar Road and 107vph on Porrecta Link during the AM peak hour. The PM peak hour figures were about 445vph on Pinjar Road and 191vph on Porrecta Link.

3.5 Public Transport Access

According to current Transperth bus network maps, the subject site does not have direct access to bus route system but relies on indirect access to available bus

routes which are in place in the relative vicinity of subject site. The nearest bus stop is located approximately 155m south-west of the subject site on Golf Links Drive. These bus routes provide an opportunity to transfer to other connecting bus services. Nearby public transport services are shown in **Figure 5**.

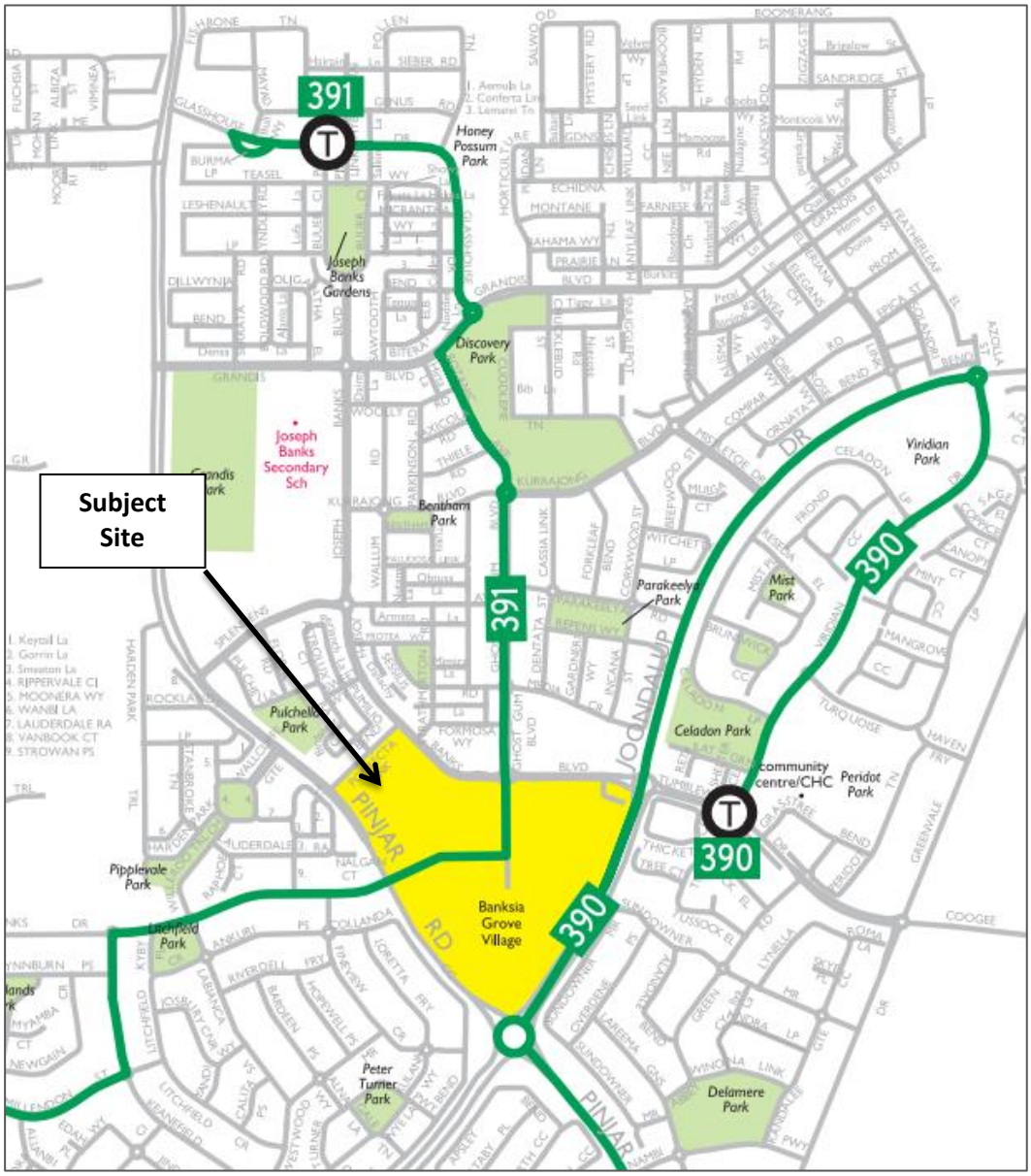


Figure 5: Existing bus routes

3.6 Pedestrian and Cyclist Facilities

On road cycle lanes are currently provided on both sides of Pinjar Road and Porrecta Link. Shared paths are currently in place on north side of the Porrecta Link and both sides of Pinjar Road.

The Department of Transport's *Perth Bike Map* series (see **Figure 6**) shows other shared paths in the vicinity of the subject site.

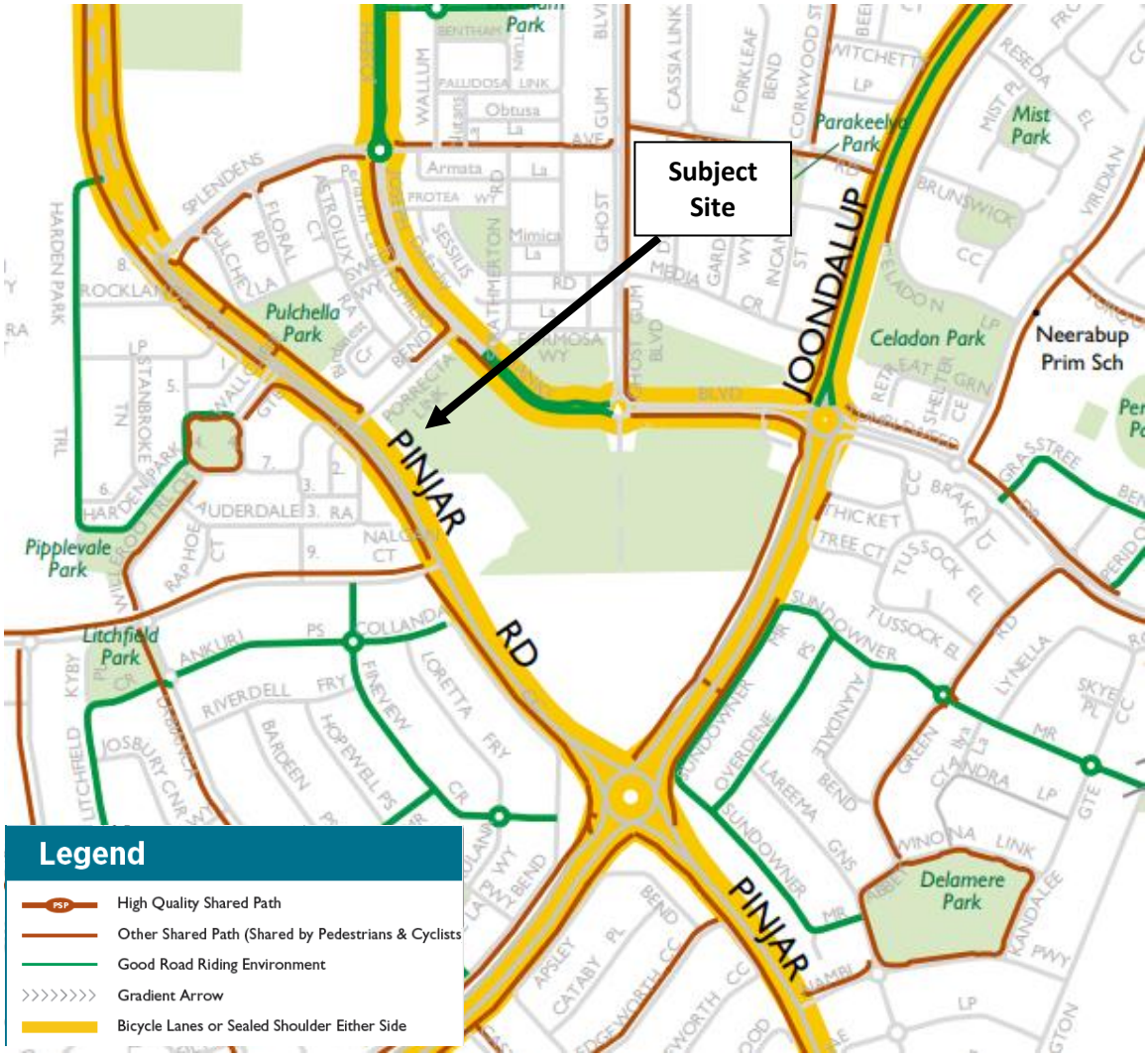


Figure 6: Bike map (source: Department of Transport)

3.7 Crash Data

Information available on the Main Roads WA website indicates that the intersection of Pinjar Road/ Porrecta Link near the subject site recorded a total of 1 road crashes with no casualty during the five-year period ending in December 2018 as illustrated in **Table 1**.

This website indicates that the intersection of Pinjar Road/ Golf Links Drive/ Jewel Way near the subject site recorded a total of 6 road crashes with no casualty during five-year period ending in December 2018 as illustrated in **Table 2** .

Table 1. Crash Statistics for the Pinjar Road/ Porrecta Link

Intersection				Total Crashes	Casualty
Pinjar Road/ Porrecta Link				1	0
Rear End	**Right Angle**	**Pedestrian**	**Daylight**	**Dawn or Dusk**	**Wet**
1	0	0	1	0	0

Table 2. Crash Statistics for the Pinjar Road/ Golf Links Drive/ Jewel Way

Intersection				Total Crashes	Casualty
Pinjar Road/ Golf Links Drive/ Jewel Way				6	0
Rear End	**Right Angle or Right turn Thru**	**Hit object**	**Daylight**	**Dawn or Dusk**	**Wet**
3	2	1	4	2	1

4.0 Development Proposal

4.1 Proposed Site Use

The proposed development comprises:

- A canopy with 8 bowsers, 16 refuelling points for light vehicles;
- Service station with associated retail building; and,
- Bulky goods showroom.

The layout of the proposed development is shown in the site plans included in **Appendix A**.

4.2 Proposed Access for all Modes

Figure 7 shows the location of the proposed development crossovers on surrounding roads. As evident, the development would not have any crossover on Pinjar Road. All vehicular crossovers are proposed on the new road which links Porrecta Link or Jewel Way. In order to improve accessibility and permeability for the proposed development and reduce traffic load on Pinjar Road/Jewel Way/Golf Link Drive intersection and the new road a left in/ left out/ right in crossover is proposed on Porrecta Link as shown in **Figure 7.**

The proposed crossover on Porrecta Link is located about 40m to the east of the Pinjar Road intersection and entails a short right turn pocket of about 30m including taper. Transcore has prepared a concept plan for the proposed crossover on Porrecta Link (refer **Appendix B**). This crossover is planned to accommodate light vehicles only. Service vehicles and fuel tankers are proposed to enter and exit the site from the new road and proposed Jewel Way T- intersection.

Turn path analysis was undertaken for a 19m fuel tanker and 8.8m service vehicle to enter, circulate and exit the subject site. Service vehicle entry, egress and circulation are discussed further in Section 9.0 of this report.

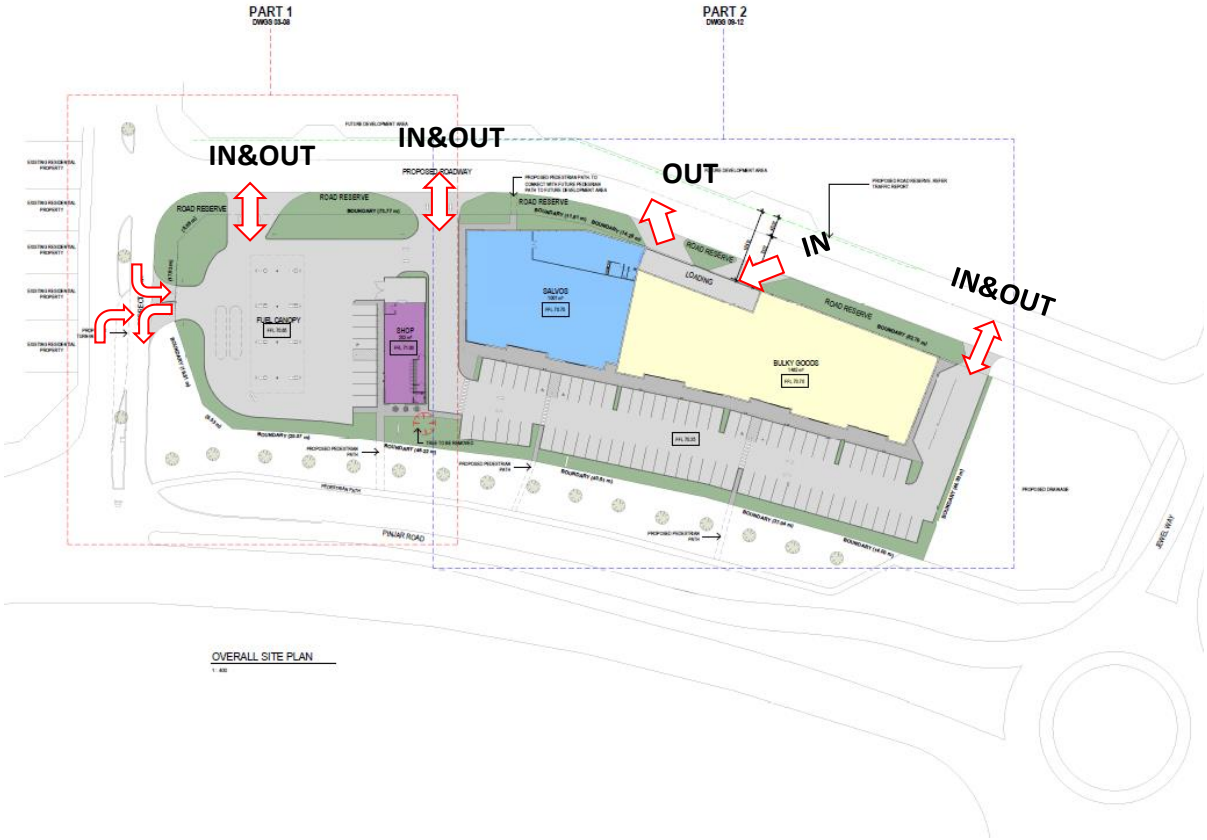


Figure 7: Site plan and proposed development crossovers

5.0 Changes to Surrounding Transport Networks

The proposed local changes to the surrounding road network include a proposed left in/ left out/ right in crossover on Porrecta Link, a T-intersection at Porrecta Link/the proposed new road, a T-intersection at Jewel Way/ the proposed new road and 4 crossovers on the new road.

Banksia Grove District Local Structure Plan No. 1 (refer **Figure 8**) shows the proposed internal road connectivity around the subject site.

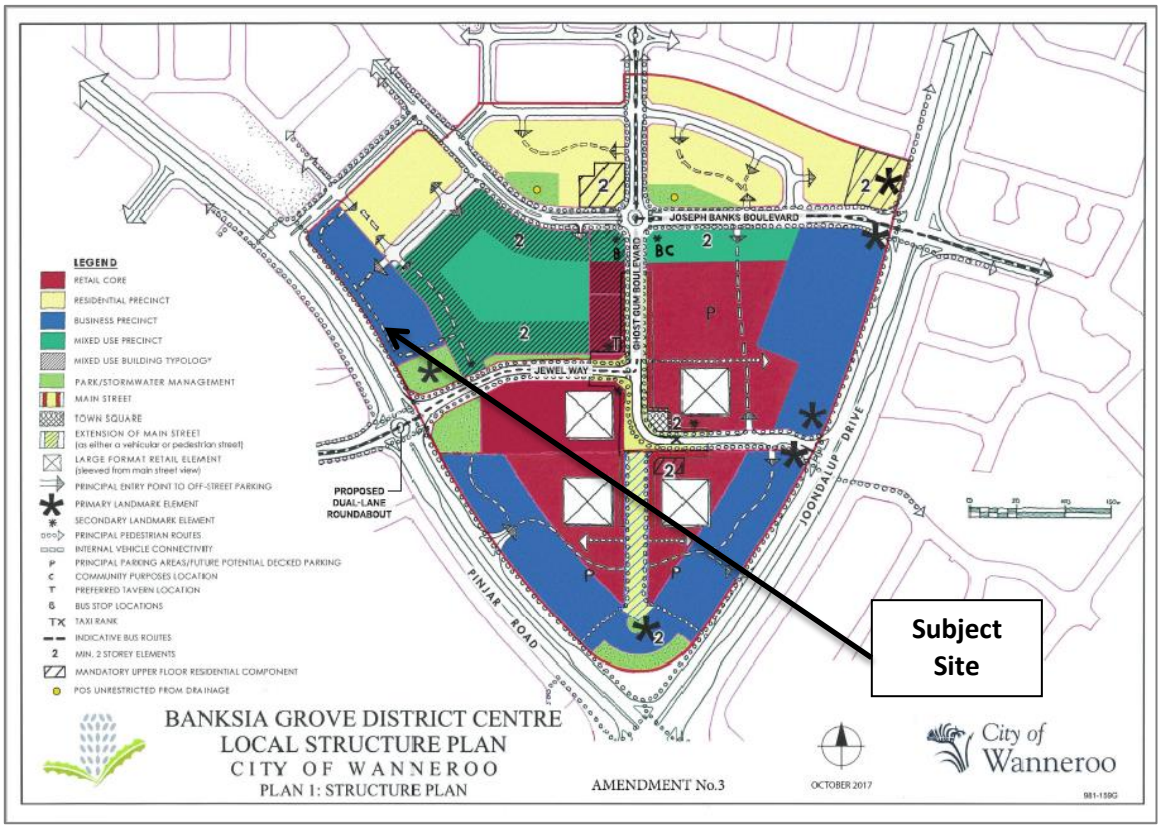


Figure 8: Banksia Grove District Centre Local Structure Plan No.1

It is our understanding that Pinjar Road in this vicinity would be upgraded to 4 lanes in longer term.

6.0 Integration with Surrounding Area

The proposed development is in line with Banksia Grove District Local Structure Plan No. 1.

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 (2019) and 2029 for the 10-year post development scenario.

The proposed development is expected to generate highest traffic movements during the weekday peak hour periods of the adjacent road network.

Review of the Main Roads WA traffic count data indicates that the peak weekday traffic hour on Pinjar Road is between 7:00AM and 8:00AM in the morning and between 3:00PM and 4:00PM in the afternoon.

7.2 Development Generation and Distribution

7.2.1 Proposed Development Traffic Generation

The traffic volumes that would be generated by the proposed development have been estimated using trip generation rates derived from:

- ITE Trip Generation Manual 10th Edition
- TRMS NSW – Guide to Traffic Generating Developments Updated Traffic Surveys 04a (2013)

The trip rates which were used to estimate the proposed development traffic generation are as following:

Gasoline/Service Station with Convenience Market (945) – Regular Fuelling Points

- AM Peak hour: 12.47 trips per fuelling point.
- PM Peak hour: 13.99 trips per fuelling point.

Bulky Goods Showroom

- AM Peak hour: 0.27 trips per 100 sqm GFA
- PM Peak hour: 2.7 trips per 100 sqm GFA

As detailed in Table 3 and Table 4, it is estimated that the proposed development would generate approximately 107 and 182 trips during the weekday AM and PM peak hours respectively.

For this development 65% and 10% passing trade is assumed (in accordance with ITE Trip Generation Manual 10th Edition) for the proposed service station and the proposed bulky goods showroom respectively.

The net addition of traffic when accounting for passing trade is **+42vph (AM peak hour) and +102vph (PM peak hour)** on the surrounding road network.

The directional split of inbound and outbound trips for the proposed development is estimated to be about 50/50 for inbound/outbound trips during the peak hours.

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

- Passing trade traffic as detailed in **Figure 9**.
- Non-passing trade traffic as detailed in **Figure 10**.

The total proposed development traffic is detailed in **Figure 11**. The development traffic distribution modelled in this report has been evaluated by considering the catchment area of the proposed development, existing traffic patterns and the identified key traffic routes.

Table 3: Weekday morning peak and afternoon peak hour trip generation for the proposed land uses

Land use	Quantity	Weekd-AM Peak	Weekd-PM Peak	Cross Trade	Weekd-AM trips	Weekd-PM trips	AM		PM	
							IN	OUT	IN	OUT
Service station + convenience store	8	12.47	13.99	0.00	100	112	50	50	56	56
Bulky Goods	2600	0.0027	0.027	0.00	7	70	4	3	35	35
TOTAL TRAFFIC					**107**	**182**	**54**	**53**	**91**	**91**

Table 4: Passing trade and primary trips components of the trip generation

Passing Trade Component

Passing Trade	AM		PM	
	IN	OUT	IN	OUT
65%	33	32	36	36
10%	0	0	4	4
	33	**32**	**40**	**40**

Primary Trips Component

AM		PM	
IN	OUT	IN	OUT
17	18	20	20
4	3	31	31
21	**21**	**51**	**51**

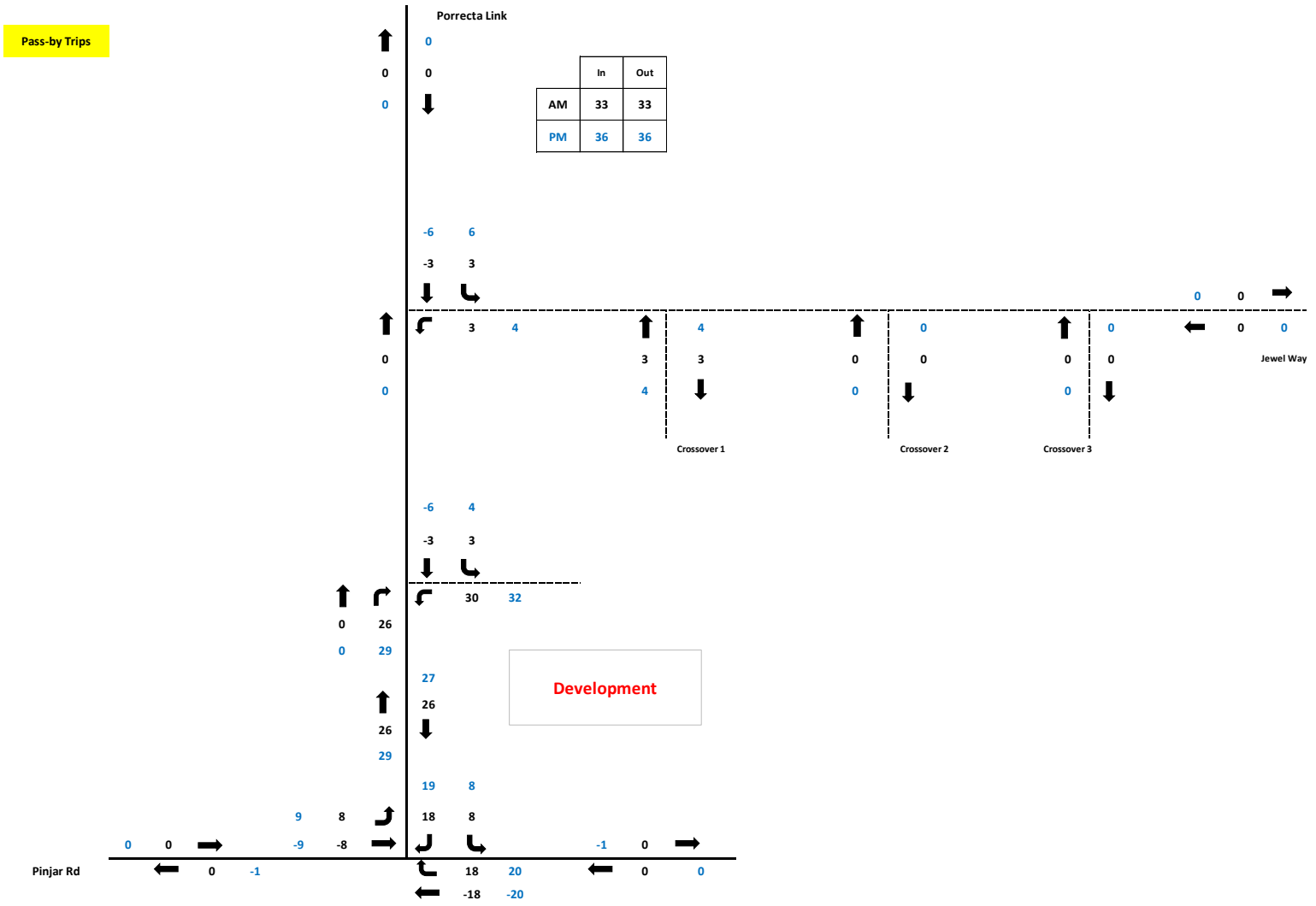


Figure 9: Passing trade component - weekday AM & PM peak hour traffic for the proposed development

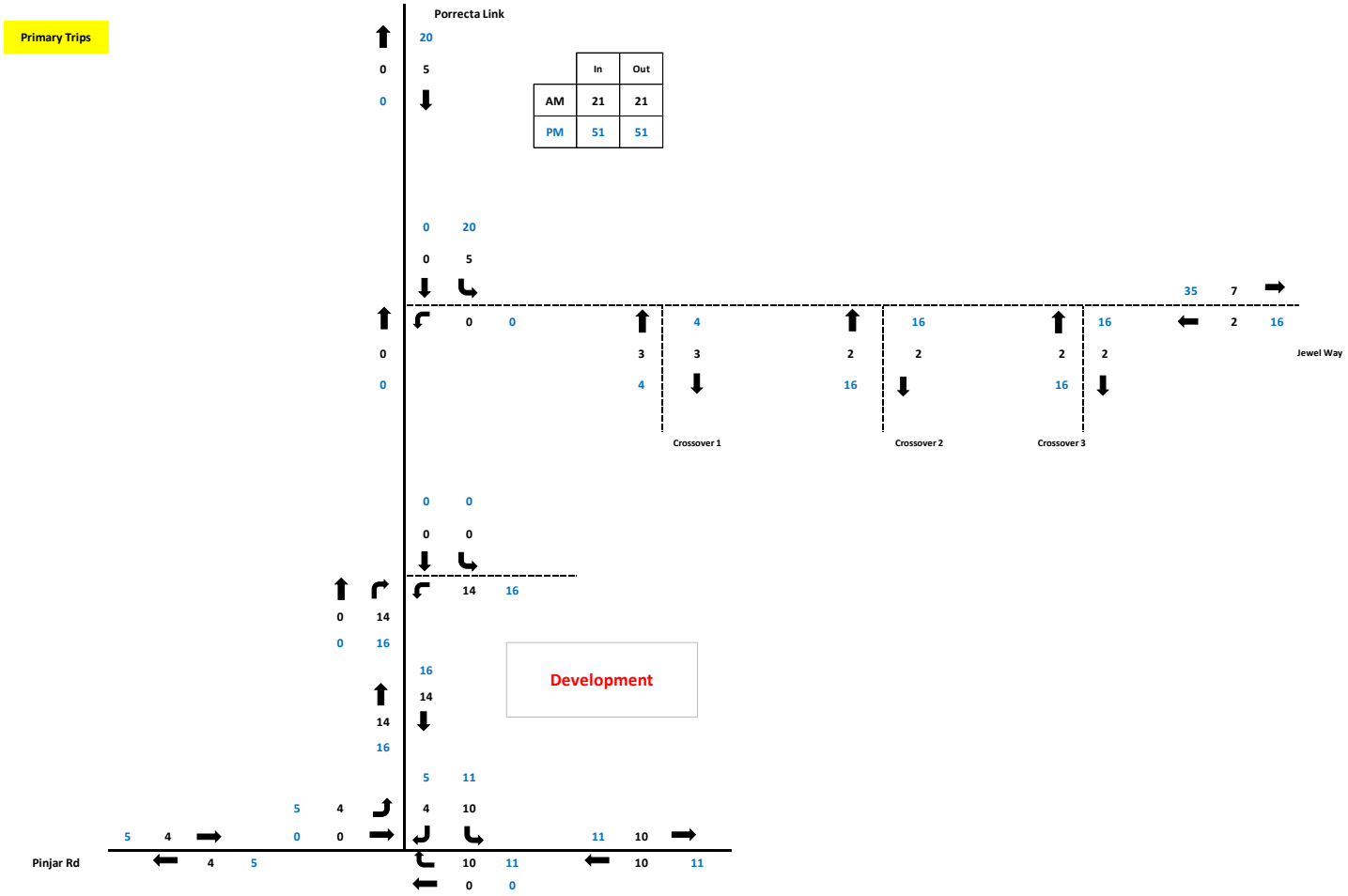


Figure 10: Additional (non-passing trade) component - weekday AM & PM peak hour traffic for the proposed development

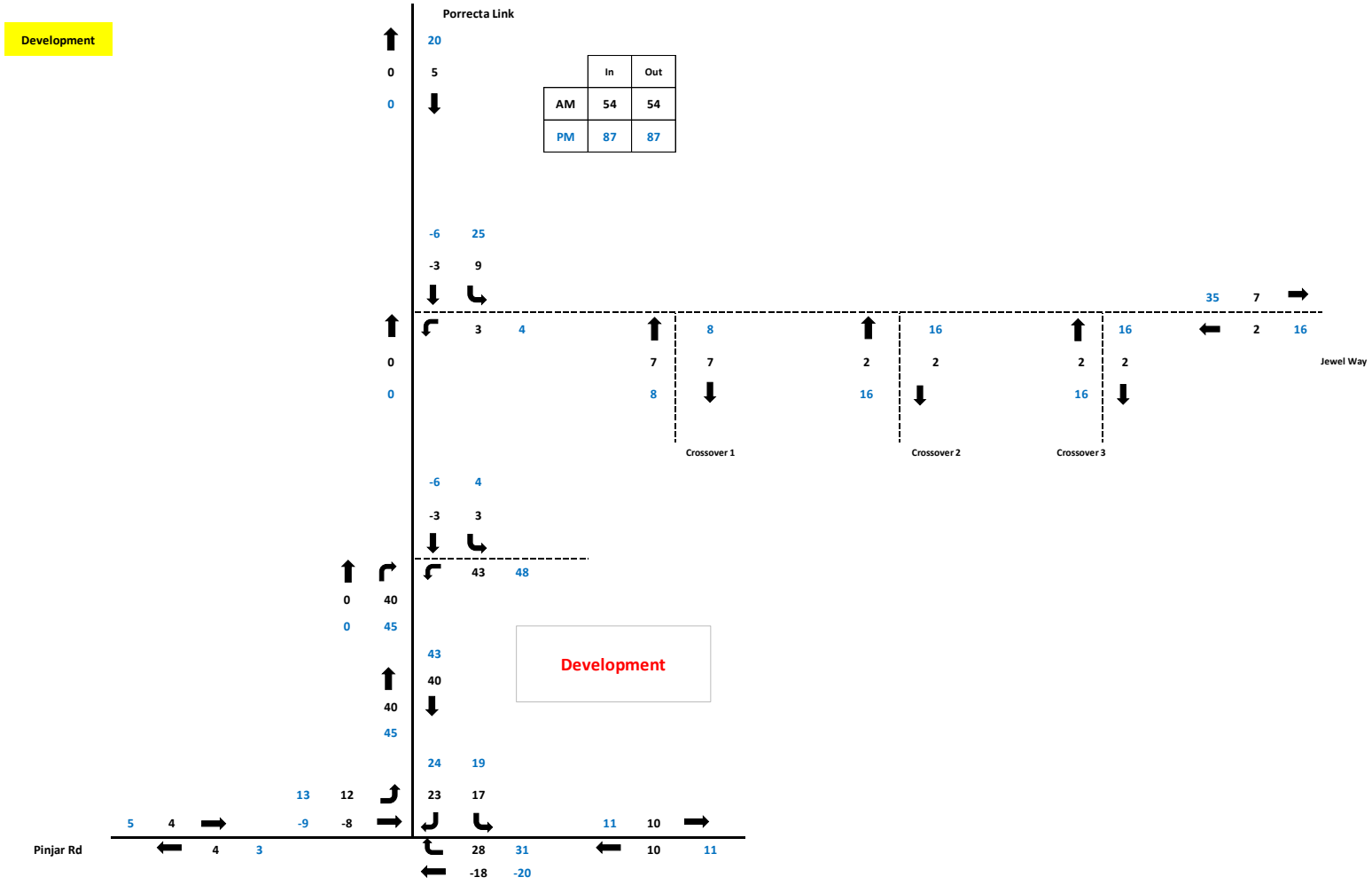


Figure 11: Total peak hour traffic generated by the proposed development – Weekday AM and PM peak hours

7.3 Traffic Flows

The existing traffic flows used as a base for traffic assessment are presented in **Figure 12**. The existing traffic volumes were derived from traffic survey conducted by Transcore.

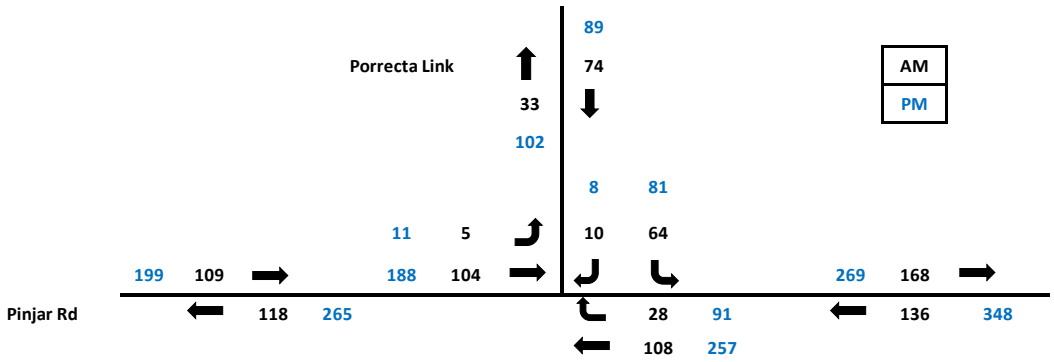


Figure 12: Existing traffic flows at the intersection of Pinjar Road/ Porrecta Link – Weekday AM & PM peak hours

The combined base and development traffic volumes for the post-development scenario are presented in **Figure 13**.

To approximate the 10-year post development traffic on relevant roads a traffic growth of 2% per annum was applied to background traffic at the intersection of Pinjar Road and Porrecta Link.

The total ten-year post-development traffic volumes are presented in **Figure 14**.

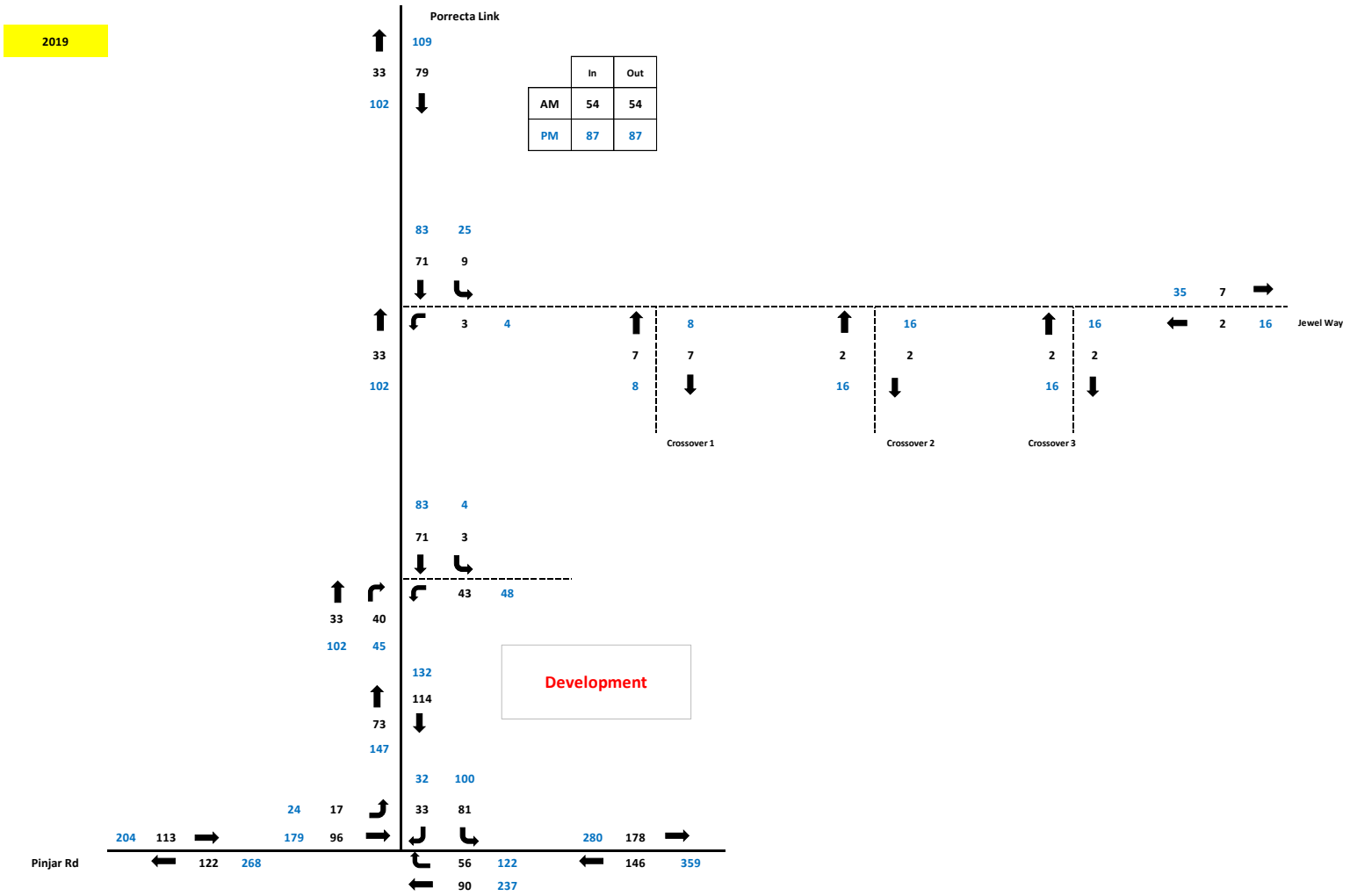


Figure 13: Post-development traffic flows– Weekday AM and PM peak hours

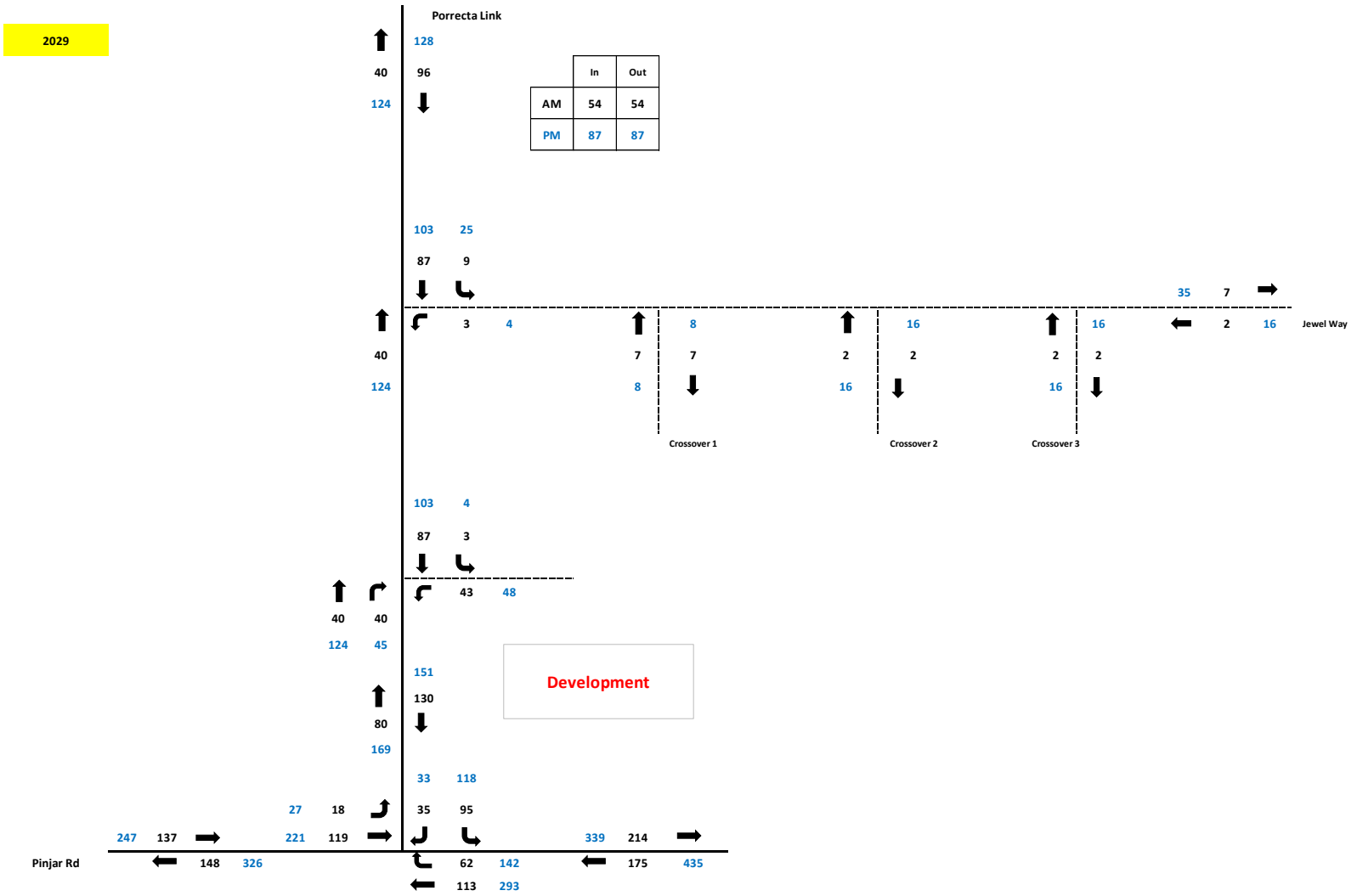


Figure 14: Estimated 10-year total post-development traffic flows– Weekday AM and PM peak hours

7.4 Analysis of Intersections and Development Accesses

The operation of the intersection of Pinjar Road/Porrecta Link, Porrecta Link/new road intersection and the proposed crossover on Porrecta Link was analysed for the existing, post-development and 10-year post development scenarios for the weekday AM and PM peak hours.

A SIDRA Network model was developed for the analysis. The modelled network geometry is shown in **Figure 15.**

Capacity analysis was undertaken using the SIDRA 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 attached in **Appendix C** and briefly discussed in the following paragraphs.

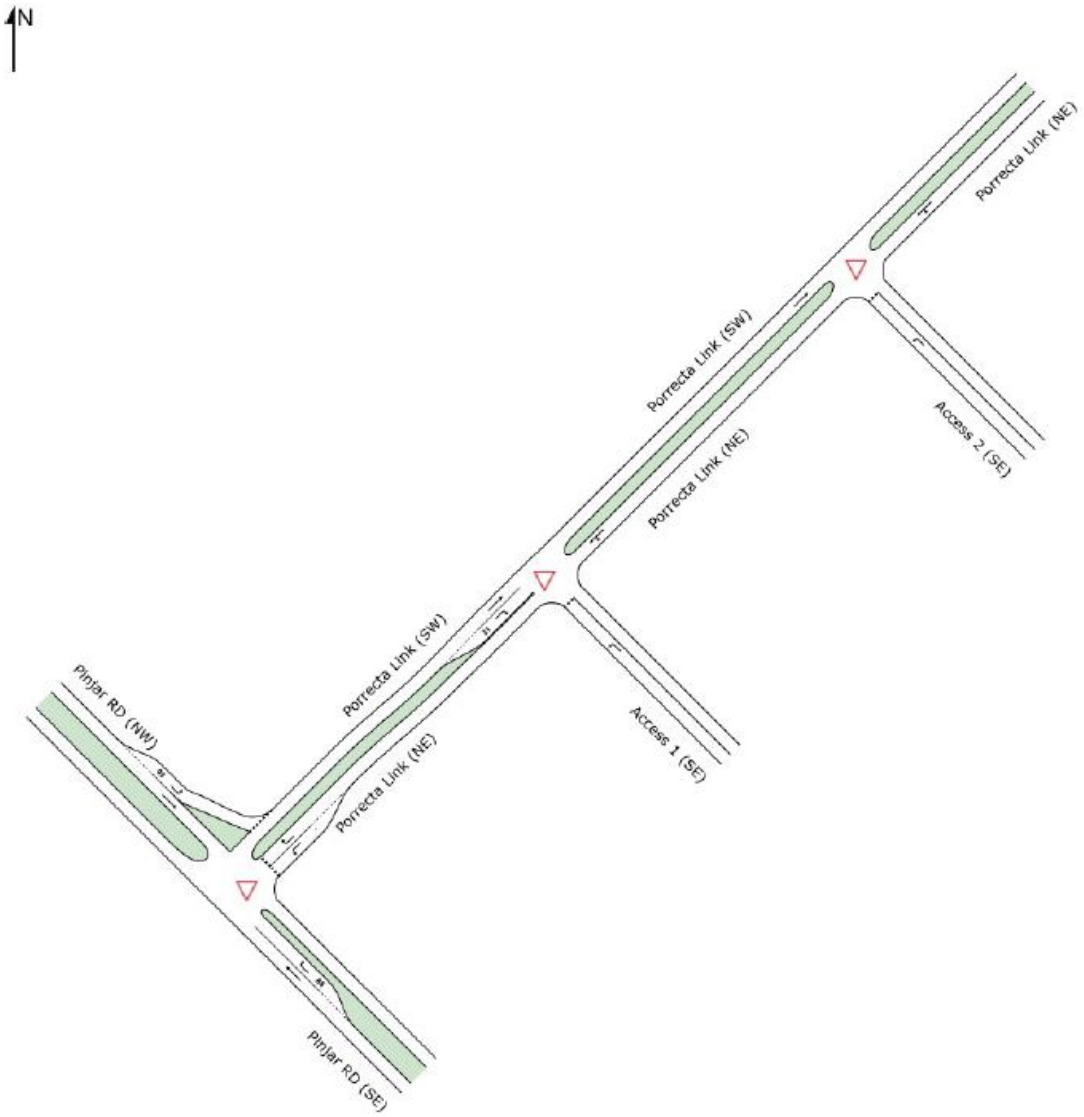


Figure 15: Network Model– SIDRA Layout

Intersection of Pinjar Road / Porrecta Link

The SIDRA analysis results indicate that the intersection of Pinjar Road/Porrecta Link presently operates satisfactorily and with an overall LoS A with almost no queues and delays during both weekday peak hours (refer **Table 5** and **Table 6** in **Appendix C** for more details).

The addition of the development-generated traffic to the intersection of Pinjar Road / Porrecta Link resulted in negligible increases in overall queues and delays. No change in overall LoS for the intersection is reported and ample spare capacity remains available in the post-development stage (refer **Table 7** and **Table 8** in **Appendix C** for more details).

The SIDRA assessment for the 10-year post development during AM and PM peak periods rendered similar results to post-development scenario with again marginal increases in delays and queues and no changes to the Level of Service for any of the movements. Importantly, this intersection retains ample spare capacity for future traffic growth (refer **Table 9** and **Table 10** in **Appendix C** for more details).

Proposed Porrecta Link Crossover

The SIDRA analysis results indicate that the proposed development crossovers on Porrecta Link will operate at an overall LoS A for both post-development and 10-year post-development scenarios (refer **Table 7**, **Table 8**, **Table 9** and **Table 10** in **Appendix C** for more details).

Intersection of Porrecta Link/New Road

The SIDRA analysis results indicate that the Intersection of Porrecta Link/New Road will operate at an overall LoS A for both post-development and 10-year post-development scenarios.

Network Operation

Relevant SIDRA network outputs were reviewed for assessed peak hours to assess the operation of the proposed development crossover on Porrecta Link, the left in/ left out intersection of Porrecta Link/new road and the intersection of Pinjar Road/ Porrecta Link as an integrated network.

As detailed in **Figure 16** and **Figure 17**, no queuing back from the intersection of Pinjar Road / Porrecta Link to the development crossover is anticipated. Additionally, no queuing from the development crossover back to the intersection is anticipated. Similarly, no queue back from the development crossover to the left in/ left out intersection of Porrecta Link/new road is reported.

The SIDRA analysis indicates that the proposed intersection of Pinjar Road/ Porrecta Link will operate satisfactorily with overall level of service A for existing and post development scenarios. The maximum reported 95% queue on Porrecta Link (WB) is one vehicle during the peak hours for year 2029 and therefore this queue back does not extend to the development crossovers on Porrecta Link.

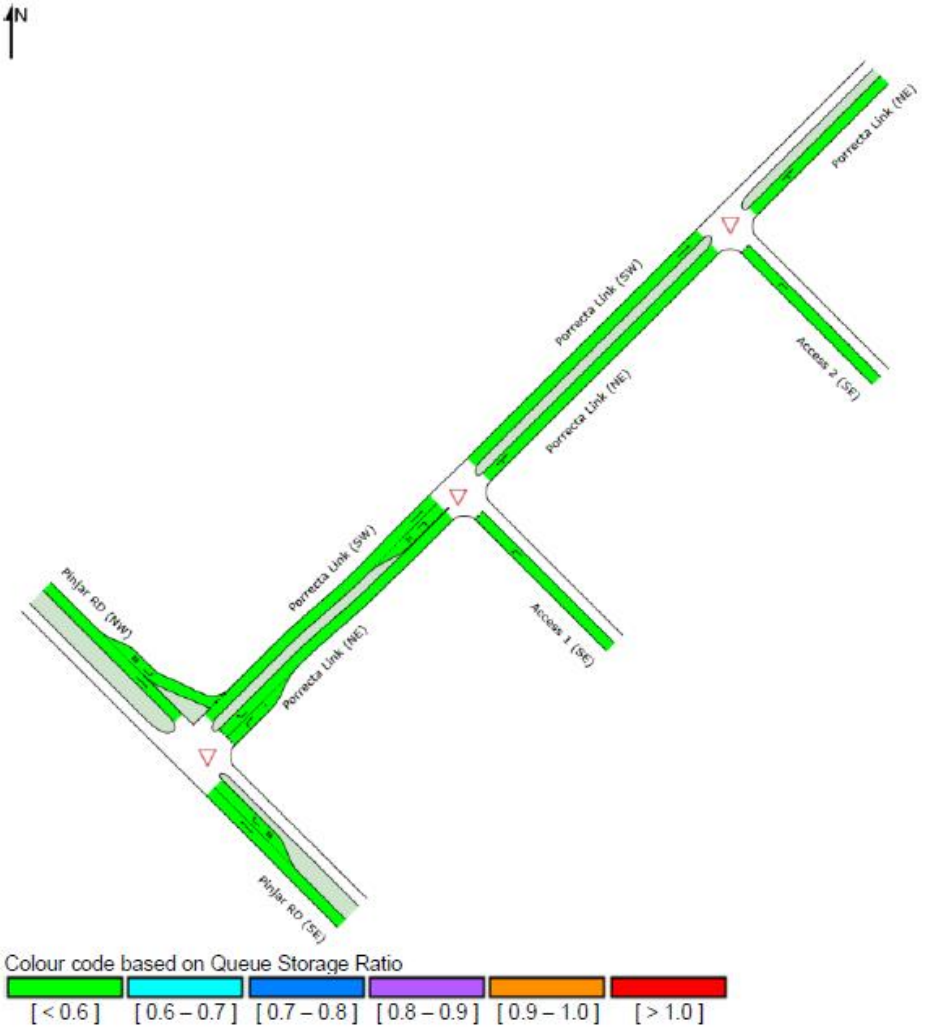


Figure 16: Weekday AM peak hour network analysis – queue storage ratio (10-year time horizon)

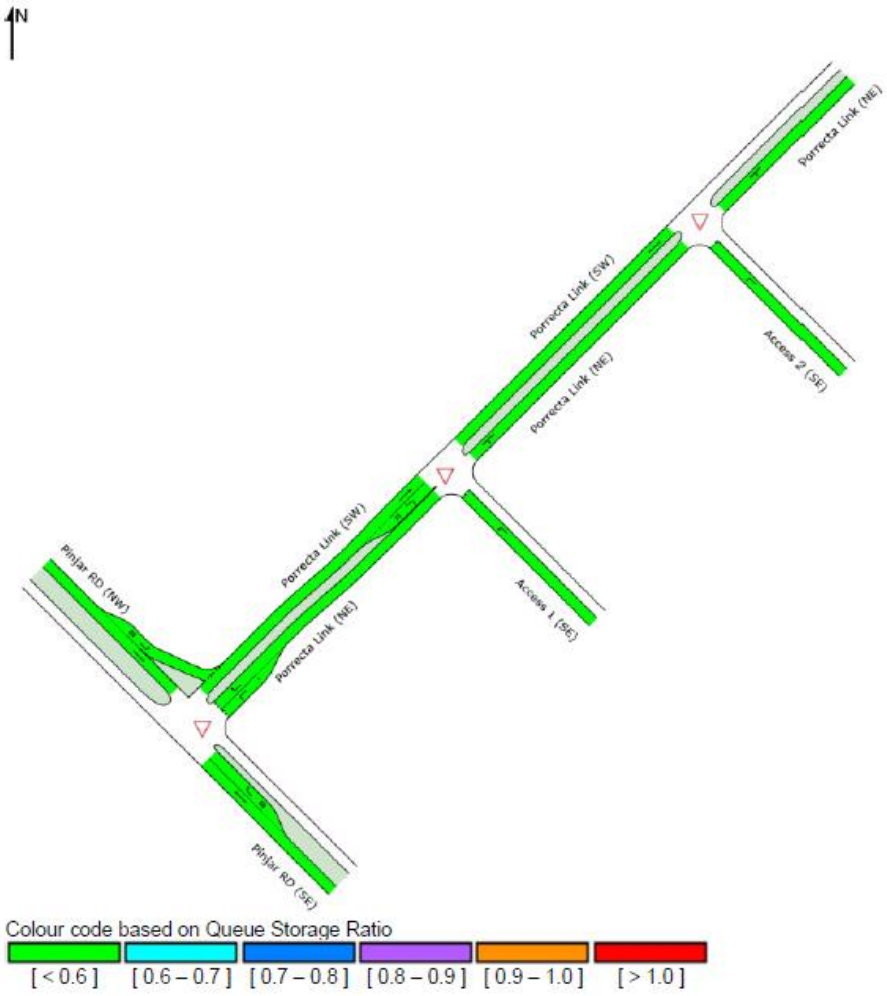


Figure 17: Weekday PM peak hour network analysis – queue storage ratio (10-year time horizon)

7.5 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 proposed development will not increase traffic flows anywhere near the quoted WAPC threshold to warrant further detailed analysis. As detailed in Section 7, the proposed development will not increase traffic on any lanes on the surrounding road network by more than 100 vph therefore the impact on the surrounding road network is insignificant.

7.6 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.

7.7 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 development provides 82 car parking spaces including 5 ACROD bays, 16 fuelling positions and 3 loading bays.

It is considered that the proposed parking provision is sufficient to accommodate the needs of the proposed development.

9.0 Provision for Heavy Vehicles

The largest service vehicle which is expected to use the subject site is a 19m tanker for fuel deliveries. Delivery and service trucks are anticipated to entry/egress the subject site via the proposed crossovers on the new road. The delivery and service trucks would enter the site from Jewel Way, and exit back to Jewel Way via the proposed T-intersection of Jewel Way/the proposed new road.

The proposed new road and T-intersection of Jewel Way/the proposed new road have been designed to be able to accommodate the delivery and service trucks.

Turn path analysis was undertaken for delivery and service vehicles to confirm satisfactory access, egress and circulation. The turn path diagrams are included in **Appendix D**.

10.0 Conclusions

This Transport Impact Assessment (TIA) is prepared by Transcore with respect to the proposed service station and bulky goods showroom development to be located at the south-east corner of Pinjar Road and Porrecta Link intersection in Banksia Grove, in the City of Wanneroo.

In order to improve accessibility and permeability of the proposed development and reduce traffic load through the intersection of Pinjar Road/Jewel Way/ Golf Link Drive and the new road a left in/ left out/ right in crossover is proposed on Porrecta Link which provides direct connectivity to the service station**.**

The proposed crossover on Porrecta Link entails a short right turn pocket of about 30m including taper along Porrecta Link. Transcore has prepared a concept design plan for the proposed crossover (refer **Appendix B**). This crossover is designed to accommodate light vehicles only.

Delivery and service trucks are anticipated to enter/egress the subject site via the proposed crossovers on the new road along the eastern boundary of the subject site. The delivery and service trucks would enter the site from Jewel Way, and exit back to Jewel Way via the proposed T-intersection of Jewel Way/the proposed new road.

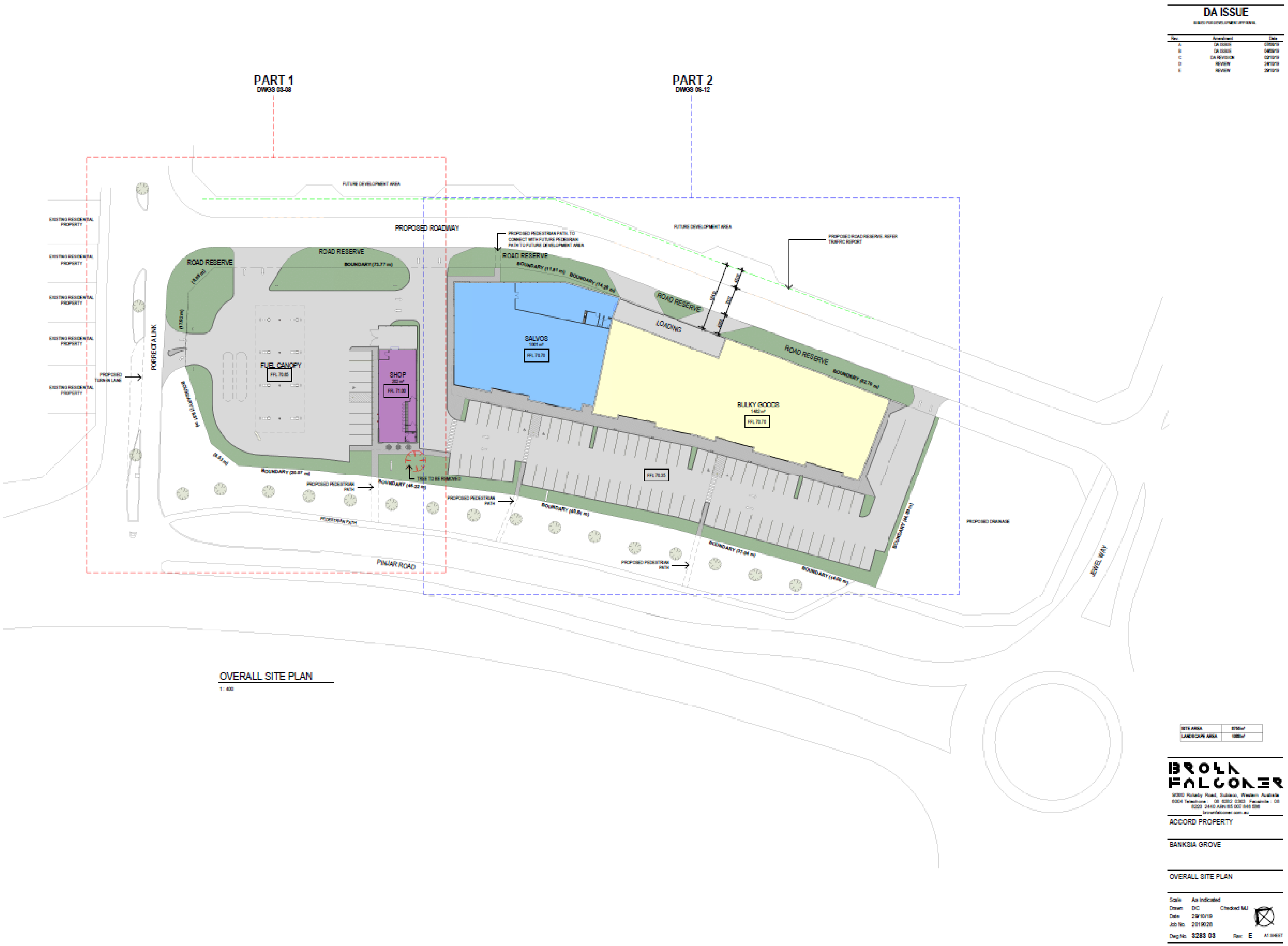
Transcore has prepared a concept design plan for the proposed T-intersection of Jewel Way/the proposed new road (refer **Appendix B**). This crossover is designed to accommodate turning movements of 19m fuel tankers.

The operation of the proposed development crossover on Porrecta Link, the proposed full-movement intersection of Porrecta Link/new road and the intersection of Pinjar Road/Porrecta Link have been analysed with SIDRA Network. The analysis result indicates satisfactory traffic operations of the intersections and the crossover.

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

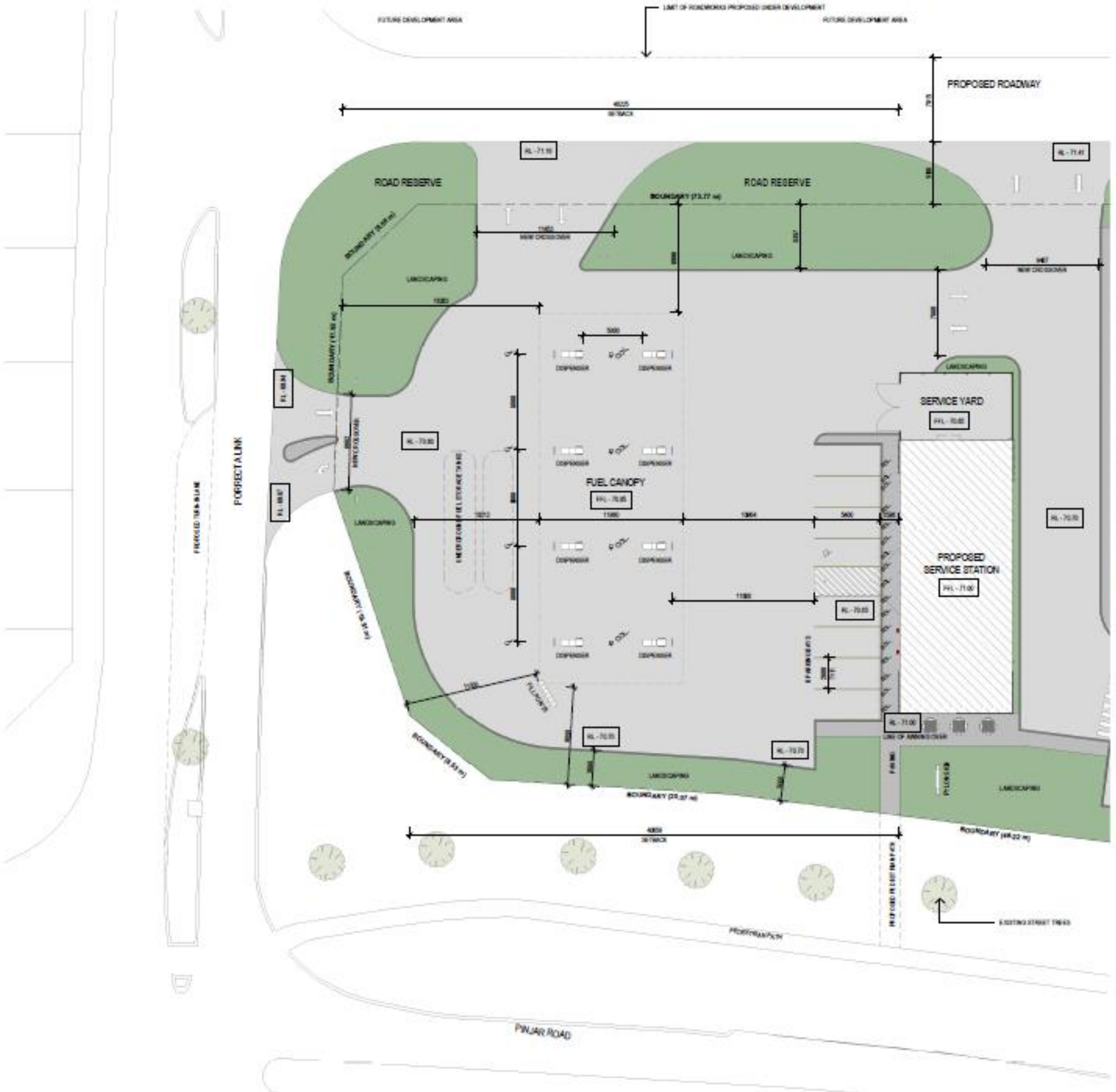
Appendix A

PROPOSED SITE PLANS


DA ISSUE
PART 1
PART 2
PROPOSED ROADWAY
ROAD RESERVE
SALVOS
BULKY GOODS
FUEL CANOPY
SHOP
LOADING
PINJAR ROAD
JEWEL WAY
OVERALL SITE PLAN
ACCORD PROPERTY
BANKSIA GROVE
OVERALL SITE PLAN
Scale As indicated
Drawn DC Checked MJ
Date 29/10/19
Job No. 2019028
Dwg No. 8288 03 Rev E

DA ISSUE

Rev.	Amendment	Date
A	DA ISSUE	[illegible]
B	DA ISSUE	[illegible]
C	DA REVISION	[illegible]
D	REVIEW	[illegible]
E	REVIEW	[illegible]



SITE PLAN PART 1

1 : 200

BROWN FALCONER

ACCORD PROPERTY

BANKSIA GROVE

SITE PLAN PART 1

Scale 1 : 200
Drawn DC Checked MJ
Date 29/10/19
Job No. 2019026
Dwg No. 3283 04 Rev. E

DA ISSUE

Rev	Amendment	Date
A	DA ISSUE	07/05/19
B	DA ISSUE	04/06/19
C	DA REVISION	02/12/19
D	REVISION	24/12/19
E	REVISION	29/12/19

SITE PLAN PART 2

1 : 200

BROAD FALCONER

ACCORD PROPERTY

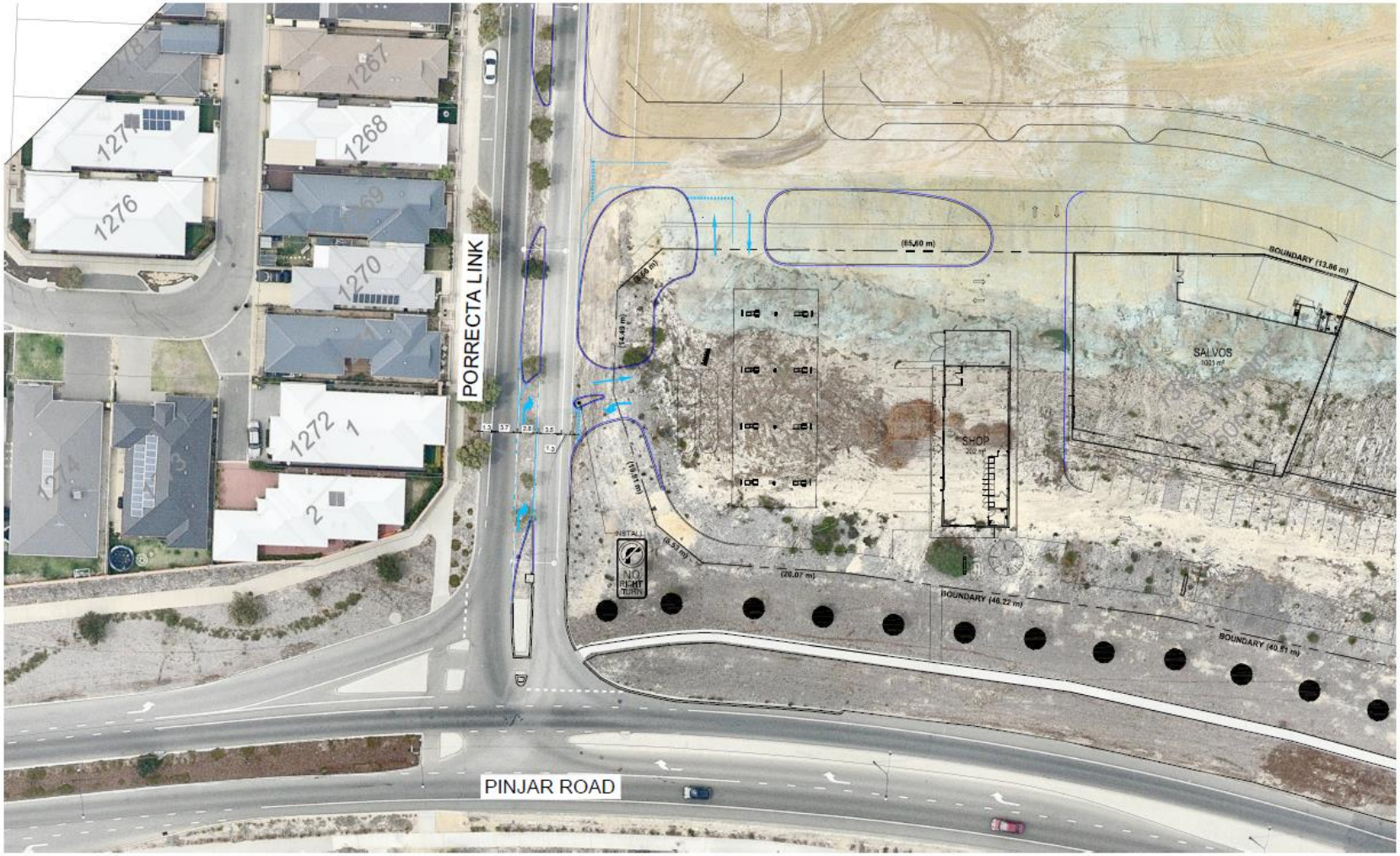
BANKSIA GROVE

SITE PLAN PART 2

Scale 1 : 200
Drawn DC Checked MJ
Date 29/10/19
Job No 2519028
Dwg No 3283 09 Rev E

Appendix B

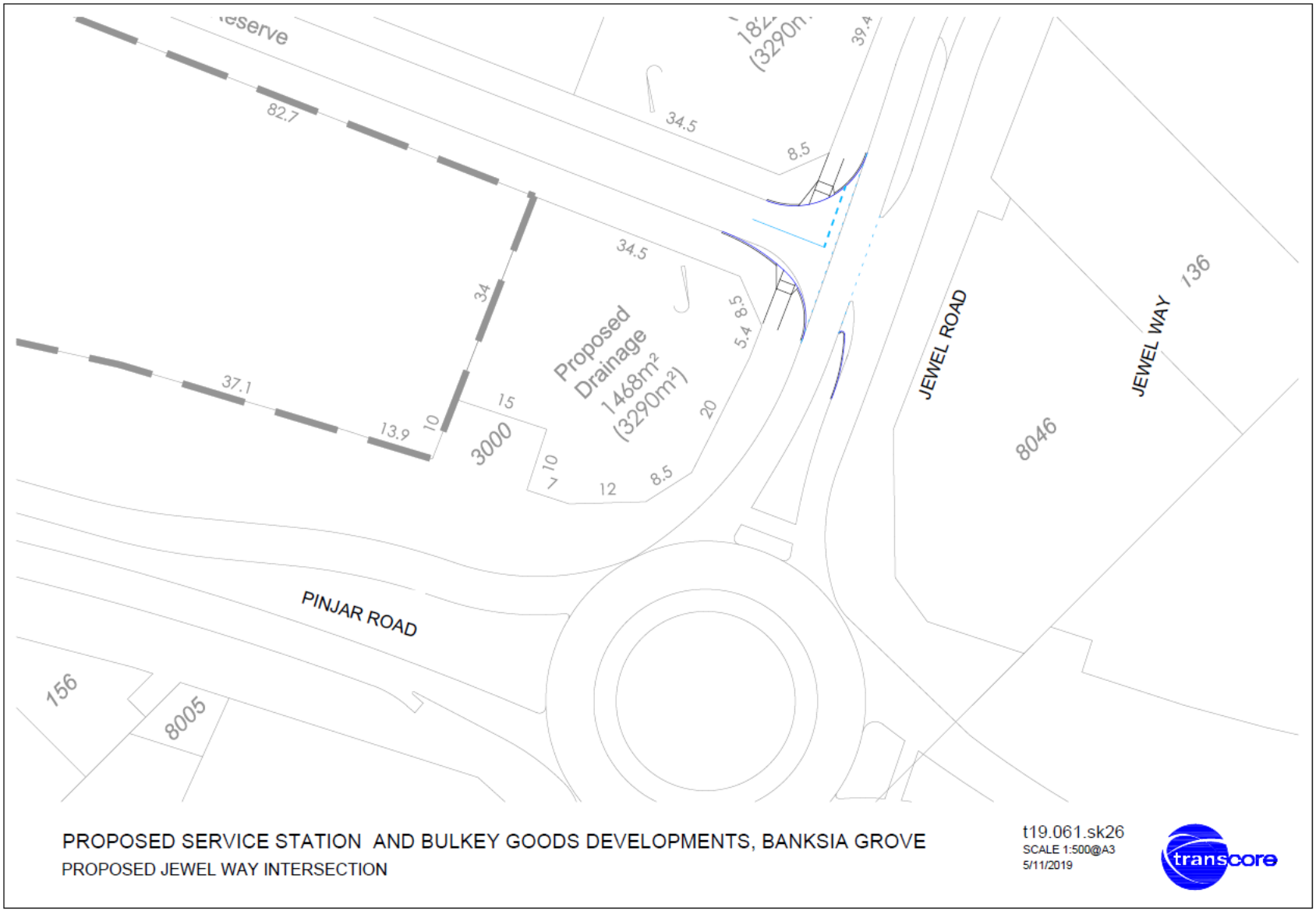
Concept plans for the proposed development crossover on Porrecta Link and Jewel Way median opening



PROPOSED SERVICE STATION AND BULKEY GOODS DEVELOPMENTS, BANKSIA GROVE

PROPOSED PORRECTA LINK INTERSECTION AND CROSSOVER

t19.061.sk27
SCALE 1:500@A3
5/11/2019


Reserve
82.7
34.5
8.5
34.5
34
37.1
13.9
10
15
3000
10
7
12
8.5
20
5.4
8.5
Proposed
Drainage
1468m²
(3290m²)
JEWEL ROAD
JEWEL WAY
136
8046
PINJAR ROAD
156
8005
PROPOSED SERVICE STATION AND BULKEY GOODS DEVELOPMENTS, BANKSIA GROVE
PROPOSED JEWEL WAY INTERSECTION
t19.061.sk26
SCALE 1:500@A3
5/11/2019
transcore

Appendix C

SIDRA OUTPUTS

Table 5. SIDRA results for the Pinjar Road/Porrecta Link – weekday AM peak period – (existing situation)

Movement Performance - Vehicles												
Mov ID	Turn	Demand 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
SouthEast: Pinjar RD (SE)												
5	T1	114	5.9	0.062	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	70.0
23	R2	29	0.0	0.018	6.5	LOS A	0.1	0.6	0.21	0.56	0.21	52.2
Approach		143	4.7	0.062	1.4	NA	0.1	0.6	0.04	0.12	0.04	67.1
NorthEast: Porrecta Link (NE)												
24	L2	67	2.0	0.045	3.7	LOS A	0.2	1.3	0.20	0.49	0.20	53.9
26	R2	11	2.0	0.012	4.7	LOS A	0.0	0.3	0.36	0.53	0.36	52.6
Approach		78	2.0	0.045	3.9	LOS A	0.2	1.3	0.22	0.49	0.22	53.7
NorthWest: Pinjar RD (NW)												
27	L2	5	0.0	0.003	6.6	LOS A	0.0	0.1	0.09	0.55	0.09	53.1
11	T1	104	4.9	0.056	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	70.0
Approach		109	4.7	0.056	0.3	LOS A	0.0	0.1	0.00	0.03	0.00	69.4
All Vehicles		330	4.0	0.062	1.6	NA	0.2	1.3	0.07	0.18	0.07	65.5

Table 6. **SIDRA results for the Pinjar Road/Porrecta Link – weekday PM peak period – (existing situation)**

Movement Performance - Vehicles												
Mov ID	Turn	Demand 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
SouthEast: Pinjar RD (SE)												
5	T1	271	5.9	0.148	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	70.0
23	R2	96	0.0	0.063	6.8	LOS A	0.3	2.0	0.30	0.59	0.30	51.7
Approach		366	4.4	0.148	1.8	NA	0.3	2.0	0.08	0.15	0.08	66.2
NorthEast: Porrecta Link (NE)												
24	L2	85	2.0	0.062	4.0	LOS A	0.2	1.8	0.28	0.52	0.28	53.5
26	R2	8	2.0	0.014	7.3	LOS A	0.1	0.4	0.54	0.65	0.54	49.3
Approach		94	2.0	0.062	4.3	LOS A	0.2	1.8	0.31	0.53	0.31	53.1
NorthWest: Pinjar RD (NW)												
27	L2	12	0.0	0.008	6.8	LOS A	0.0	0.2	0.18	0.54	0.18	52.6
11	T1	188	4.9	0.102	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	70.0
Approach		200	4.6	0.102	0.4	LOS A	0.0	0.2	0.01	0.03	0.01	69.2
All Vehicles		660	4.1	0.148	1.7	NA	0.3	2.0	0.09	0.17	0.09	65.7

Table 7. SIDRA results for the Pinjar Road/Porrecta Link/Access road 1/Access road 2 – weekday AM peak period – (post development)

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
SouthEast: Pinjar RD (SE)														
5	T1	95	5.9	95	5.9	0.052	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	70.0
23	R2	59	0.0	59	0.0	0.036	6.5	LOS A	0.2	1.1	0.20	0.57	0.20	55.3
Approach		154	3.6	154	3.6	0.052	2.5	NA	0.2	1.1	0.08	0.22	0.08	65.8
NorthEast: Porrecta Link (NE)														
24	L2	85	2.0	85	2.0	0.057	3.7	LOS A	0.2	1.6	0.19	0.49	0.19	54.0
26	R2	35	2.0	35	2.0	0.039	4.9	LOS A	0.1	1.1	0.37	0.56	0.37	52.4
Approach		120	2.0	120	2.0	0.057	4.0	LOS A	0.2	1.6	0.24	0.51	0.24	53.5
NorthWest: Pinjar RD (NW)														
27	L2	18	0.0	18	0.0	0.011	6.7	LOS A	0.0	0.3	0.14	0.55	0.14	55.3
11	T1	96	4.9	96	4.9	0.052	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	70.0
Approach		114	4.1	114	4.1	0.052	1.1	LOS A	0.0	0.3	0.02	0.09	0.02	68.4
All Vehicles		388	3.3	388	3.3	0.057	2.6	NA	0.2	1.6	0.11	0.27	0.11	63.4
SouthEast: Access 1 (SE)														
21	L2	45	0.0	45	0.0	0.029	0.2	LOS A	0.1	0.8	0.16	0.05	0.16	18.6
Approach		45	0.0	45	0.0	0.029	0.2	LOS A	0.1	0.8	0.16	0.05	0.16	18.6
NorthEast: Porrecta Link (NE)														
24	L2	3	0.0	3	0.0	0.041	2.0	LOS A	0.0	0.0	0.00	0.02	0.00	33.4
25	T1	75	2.0	75	2.0	0.041	0.0	LOS A	0.0	0.0	0.00	0.02	0.00	46.8
Approach		78	1.9	78	1.9	0.041	0.1	NA	0.0	0.0	0.00	0.02	0.00	44.8
SouthWest: Porrecta Link (SW)														
31	T1	35	2.0	35	2.0	0.018	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
32	R2	42	0.0	42	0.0	0.025	3.6	LOS A	0.1	0.8	0.17	0.50	0.17	26.1
Approach		77	0.9	77	0.9	0.025	2.0	NA	0.1	0.8	0.09	0.27	0.09	31.2
All Vehicles		200	1.1	200	1.1	0.041	0.8	NA	0.1	0.8	0.07	0.12	0.07	27.9
SouthEast: Access 2 (SE)														
21	L2	3	0.0	3	0.0	0.002	0.2	LOS A	0.0	0.1	0.15	0.04	0.15	18.6
Approach		3	0.0	3	0.0	0.002	0.2	LOS A	0.0	0.1	0.15	0.04	0.15	18.6
NorthEast: Porrecta Link (NE)														
24	L2	9	0.0	9	0.0	0.045	4.6	LOS A	0.0	0.0	0.00	0.06	0.00	47.4
25	T1	75	2.0	75	2.0	0.045	0.0	LOS A	0.0	0.0	0.00	0.06	0.00	49.3
Approach		84	1.8	84	1.8	0.045	0.5	NA	0.0	0.0	0.00	0.06	0.00	49.1
SouthWest: Porrecta Link (SW)														
31	T1	35	2.0	35	2.0	0.018	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		35	2.0	35	2.0	0.018	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0
All Vehicles		122	1.8	122	1.8	0.045	0.4	NA	0.0	0.1	0.00	0.04	0.00	49.1

Table 8. SIDRA results for the Pinjar Road/Porrecta Link/Access road 1/Access road 2 – weekday PM peak period – (post development)

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
SouthEast: Pinjar RD (SE)														
5	T1	249	5.9	249	5.9	0.137	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	70.0
23	R2	128	0.0	128	0.0	0.084	6.8	LOS A	0.4	2.7	0.30	0.59	0.30	54.7
Approach		378	3.9	378	3.9	0.137	2.3	NA	0.4	2.7	0.10	0.20	0.10	66.1
NorthEast: Porrecta Link (NE)														
24	L2	105	2.0	105	2.0	0.076	4.0	LOS A	0.3	2.2	0.28	0.52	0.28	53.5
26	R2	34	2.0	34	2.0	0.057	7.5	LOS A	0.2	1.5	0.55	0.72	0.55	49.0
Approach		139	2.0	139	2.0	0.076	4.9	LOS A	0.3	2.2	0.34	0.56	0.34	52.4
NorthWest: Pinjar RD (NW)														
27	L2	25	0.0	25	0.0	0.017	6.9	LOS A	0.1	0.5	0.22	0.55	0.22	54.7
11	T1	179	4.9	179	4.9	0.097	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	70.0
Approach		204	4.3	204	4.3	0.097	0.9	LOS A	0.1	0.5	0.03	0.07	0.03	68.7
All Vehicles		721	3.6	721	3.6	0.137	2.4	NA	0.4	2.7	0.13	0.23	0.13	64.7
SouthEast: Access 1 (SE)														
21	L2	51	0.0	51	0.0	0.033	0.2	LOS A	0.1	0.9	0.17	0.06	0.17	18.4
Approach		51	0.0	51	0.0	0.033	0.2	LOS A	0.1	0.9	0.17	0.06	0.17	18.4
NorthEast: Porrecta Link (NE)														
24	L2	4	0.0	4	0.0	0.048	2.0	LOS A	0.0	0.0	0.00	0.02	0.00	33.4
25	T1	87	2.0	87	2.0	0.048	0.0	LOS A	0.0	0.0	0.00	0.02	0.00	46.4
Approach		92	1.9	92	1.9	0.048	0.1	NA	0.0	0.0	0.00	0.02	0.00	44.3
SouthWest: Porrecta Link (SW)														
31	T1	107	2.0	107	2.0	0.057	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
32	R2	47	0.0	47	0.0	0.028	3.6	LOS A	0.1	0.9	0.19	0.50	0.19	26.0
Approach		155	1.4	155	1.4	0.057	1.1	NA	0.1	0.9	0.06	0.15	0.06	36.1
All Vehicles		297	1.3	297	1.3	0.057	0.6	NA	0.1	0.9	0.06	0.10	0.06	31.5
SouthEast: Access 2 (SE)														
21	L2	4	0.0	4	0.0	0.003	0.2	LOS A	0.0	0.1	0.17	0.05	0.17	18.5
Approach		4	0.0	4	0.0	0.003	0.2	LOS A	0.0	0.1	0.17	0.05	0.17	18.5
NorthEast: Porrecta Link (NE)														
24	L2	26	0.0	26	0.0	0.060	4.6	LOS A	0.0	0.0	0.00	0.13	0.00	46.8
25	T1	87	2.0	87	2.0	0.060	0.0	LOS A	0.0	0.0	0.00	0.13	0.00	48.6
Approach		114	1.5	114	1.5	0.060	1.1	NA	0.0	0.0	0.00	0.13	0.00	48.1
SouthWest: Porrecta Link (SW)														
31	T1	107	2.0	107	2.0	0.057	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		107	2.0	107	2.0	0.057	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0
All Vehicles		225	1.7	225	1.7	0.060	0.5	NA	0.0	0.1	0.00	0.07	0.00	48.9

Table 9. SIDRA results for the Pinjar Road/Porrecta Link/Access road 1/Access road 2 – weekday AM peak period – (10-year time horizon)

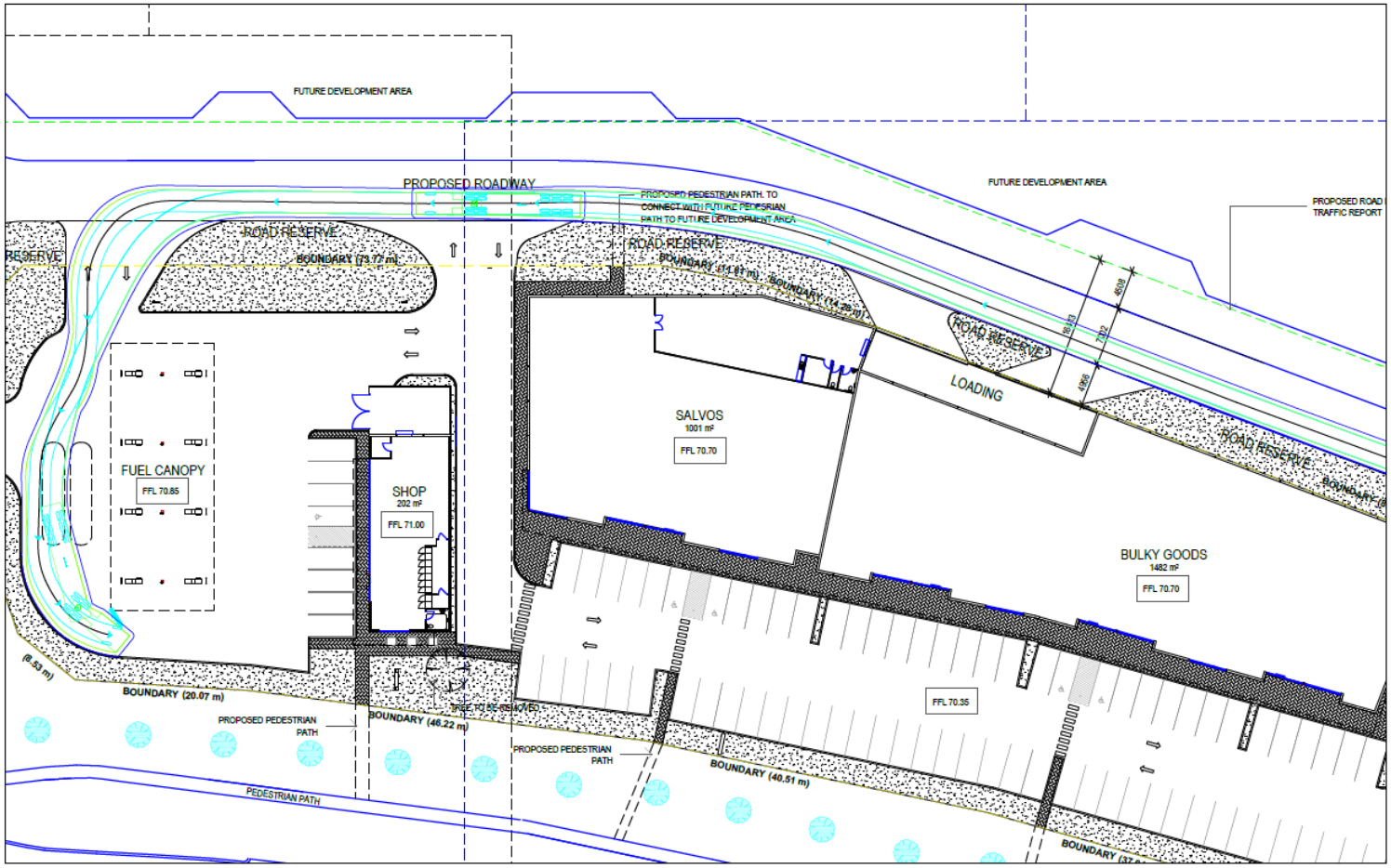
Movement Performance - Vehicles															
Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Pinjar RD (SE)														
5	T1	119	5.9	119	5.9	0.065	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	70.0
23	R2	65	0.0	65	0.0	0.040	6.6	LOS A	0.2	1.3	0.23	0.57	0.23	55.1
Approach		184	3.8	184	3.8	0.065	2.3	NA	0.2	1.3	0.08	0.20	0.08	66.1
NorthEast: Porrecta Link (NE)														
24	L2	100	2.0	100	2.0	0.068	3.8	LOS A	0.3	2.0	0.22	0.50	0.22	53.8
26	R2	37	2.0	37	2.0	0.044	5.2	LOS A	0.2	1.2	0.41	0.59	0.41	51.9
Approach		137	2.0	137	2.0	0.068	4.2	LOS A	0.3	2.0	0.27	0.52	0.27	53.3
NorthWest: Pinjar RD (NW)														
27	L2	19	0.0	19	0.0	0.012	6.7	LOS A	0.0	0.3	0.14	0.55	0.14	55.2
11	T1	119	4.9	119	4.9	0.064	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	70.0
Approach		138	4.2	138	4.2	0.064	0.9	LOS A	0.0	0.3	0.02	0.07	0.02	68.6
All Vehicles		459	3.4	459	3.4	0.068	2.5	NA	0.3	2.0	0.12	0.26	0.12	63.7
SouthEast: Access 1 (SE)														
21	L2	45	0.0	45	0.0	0.030	0.3	LOS A	0.1	0.8	0.18	0.06	0.18	18.4
Approach		45	0.0	45	0.0	0.030	0.3	LOS A	0.1	0.8	0.18	0.06	0.18	18.4
NorthEast: Porrecta Link (NE)														
24	L2	3	0.0	3	0.0	0.050	2.0	LOS A	0.0	0.0	0.00	0.02	0.00	33.5
25	T1	92	2.0	92	2.0	0.050	0.0	LOS A	0.0	0.0	0.00	0.02	0.00	47.3
Approach		95	1.9	95	1.9	0.050	0.1	NA	0.0	0.0	0.00	0.02	0.00	45.6
SouthWest: Porrecta Link (SW)														
31	T1	42	2.0	42	2.0	0.022	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
32	R2	42	0.0	42	0.0	0.025	3.6	LOS A	0.1	0.8	0.19	0.50	0.19	26.0
Approach		84	1.0	84	1.0	0.025	1.8	NA	0.1	0.8	0.10	0.25	0.10	31.8
All Vehicles		224	1.2	224	1.2	0.050	0.8	NA	0.1	0.8	0.07	0.11	0.07	28.7
SouthEast: Access 2 (SE)														
21	L2	3	0.0	3	0.0	0.002	0.2	LOS A	0.0	0.1	0.17	0.05	0.17	18.4
Approach		3	0.0	3	0.0	0.002	0.2	LOS A	0.0	0.1	0.17	0.05	0.17	18.4
NorthEast: Porrecta Link (NE)														
24	L2	9	0.0	9	0.0	0.053	4.6	LOS A	0.0	0.0	0.00	0.05	0.00	47.5
25	T1	92	2.0	92	2.0	0.053	0.0	LOS A	0.0	0.0	0.00	0.05	0.00	49.4
Approach		101	1.8	101	1.8	0.053	0.4	NA	0.0	0.0	0.00	0.05	0.00	49.2
SouthWest: Porrecta Link (SW)														
31	T1	42	2.0	42	2.0	0.022	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		42	2.0	42	2.0	0.022	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0
All Vehicles		146	1.8	146	1.8	0.053	0.3	NA	0.0	0.1	0.00	0.04	0.00	49.3

Table 10. SIDRA results for the Pinjar Road/Porrecta Link/Access road 1/Access road 2 – weekday PM peak period – (10-year time horizon)

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
SouthEast: Pinjar RD (SE)														
5	T1	308	5.9	308	5.9	0.170	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	70.0
23	R2	149	0.0	149	0.0	0.102	7.0	LOS A	0.5	3.3	0.34	0.60	0.34	54.4
Approach		458	4.0	458	4.0	0.170	2.3	NA	0.5	3.3	0.11	0.20	0.11	66.2
NorthEast: Porrecta Link (NE)														
24	L2	124	2.0	124	2.0	0.093	4.2	LOS A	0.4	2.7	0.32	0.54	0.32	53.4
26	R2	35	2.0	35	2.0	0.070	9.0	LOS A	0.3	1.8	0.60	0.78	0.60	47.3
Approach		159	2.0	159	2.0	0.093	5.2	LOS A	0.4	2.7	0.38	0.59	0.38	51.9
NorthWest: Pinjar RD (NW)														
27	L2	28	0.0	28	0.0	0.020	7.0	LOS A	0.1	0.5	0.24	0.55	0.24	54.5
11	T1	221	4.9	221	4.9	0.119	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	70.0
Approach		249	4.3	249	4.3	0.119	0.8	LOS A	0.1	0.5	0.03	0.06	0.03	68.8
All Vehicles		866	3.7	866	3.7	0.170	2.4	NA	0.5	3.3	0.14	0.23	0.14	64.8
SouthEast: Access 1 (SE)														
21	L2	51	0.0	51	0.0	0.034	0.3	LOS A	0.1	0.9	0.20	0.08	0.20	18.2
Approach		51	0.0	51	0.0	0.034	0.3	LOS A	0.1	0.9	0.20	0.08	0.20	18.2
NorthEast: Porrecta Link (NE)														
24	L2	4	0.0	4	0.0	0.060	2.0	LOS A	0.0	0.0	0.00	0.02	0.00	33.5
25	T1	108	2.0	108	2.0	0.060	0.0	LOS A	0.0	0.0	0.00	0.02	0.00	47.0
Approach		113	1.9	113	1.9	0.060	0.1	NA	0.0	0.0	0.00	0.02	0.00	45.2
SouthWest: Porrecta Link (SW)														
31	T1	131	2.0	131	2.0	0.069	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
32	R2	47	0.0	47	0.0	0.029	3.7	LOS A	0.1	0.9	0.22	0.50	0.22	25.8
Approach		178	1.5	178	1.5	0.069	1.0	NA	0.1	0.9	0.06	0.13	0.06	37.2
All Vehicles		341	1.4	341	1.4	0.069	0.6	NA	0.1	0.9	0.06	0.09	0.06	32.6
SouthEast: Access 2 (SE)														
21	L2	4	0.0	4	0.0	0.003	0.3	LOS A	0.0	0.1	0.19	0.06	0.19	18.3
Approach		4	0.0	4	0.0	0.003	0.3	LOS A	0.0	0.1	0.19	0.06	0.19	18.3
NorthEast: Porrecta Link (NE)														
24	L2	26	0.0	26	0.0	0.071	4.6	LOS A	0.0	0.0	0.00	0.11	0.00	47.0
25	T1	108	2.0	108	2.0	0.071	0.0	LOS A	0.0	0.0	0.00	0.11	0.00	48.8
Approach		135	1.6	135	1.6	0.071	0.9	NA	0.0	0.0	0.00	0.11	0.00	48.4
SouthWest: Porrecta Link (SW)														
31	T1	131	2.0	131	2.0	0.069	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		131	2.0	131	2.0	0.069	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0
All Vehicles		269	1.8	269	1.8	0.071	0.5	NA	0.0	0.1	0.00	0.05	0.00	49.1

Appendix D

SWEPT PATH ANALYSIS



Pinjar Road, Banksia Grove

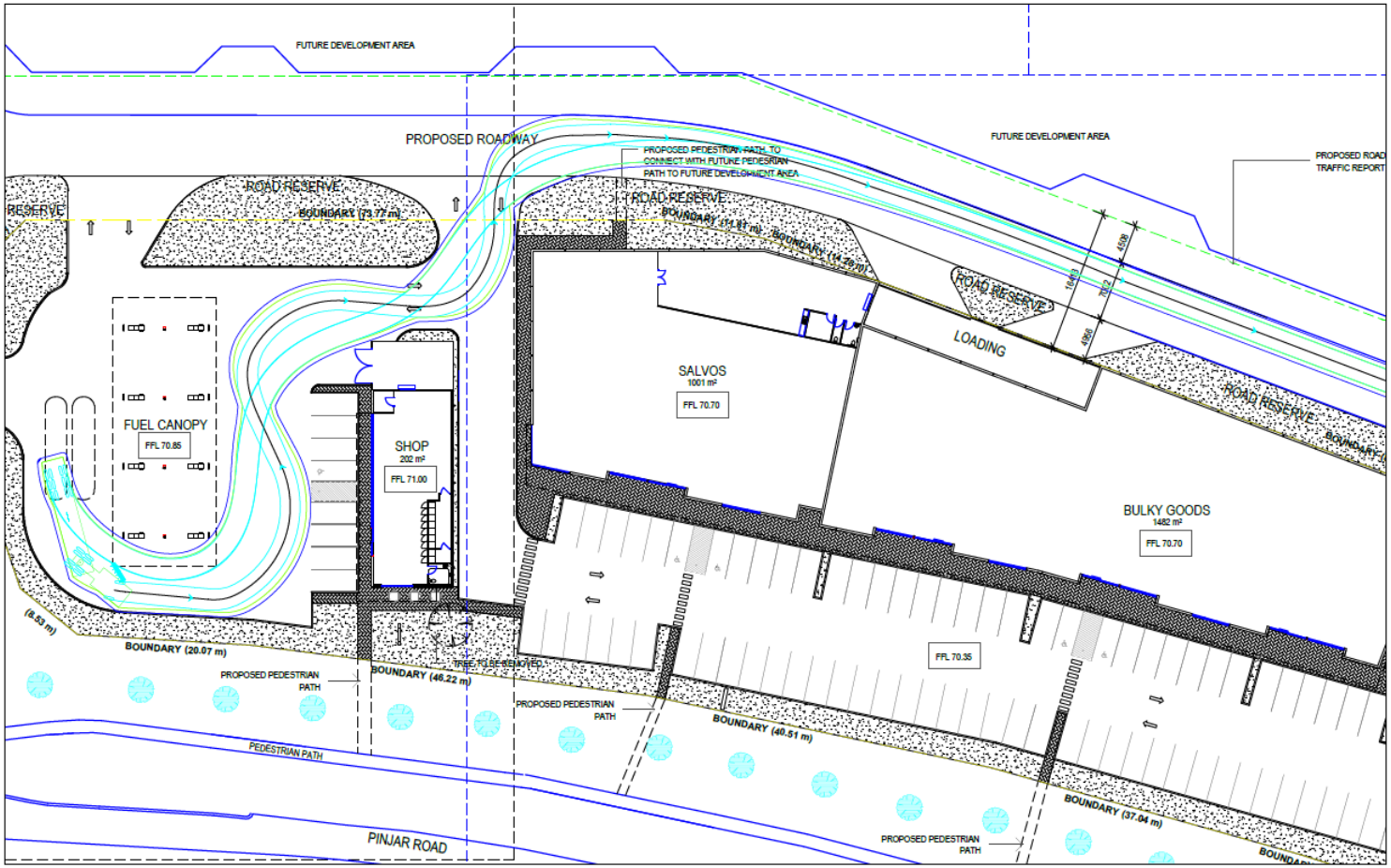
Austroads 2013: 19.0m Semi-Trailer
Truck Circulation

LEGEND

- Vehicle Body
- Wheel Path
- 500mm Clearance

t19.061.sk24a
12/11/2019
Scale: 1:400 @ A3

transcore

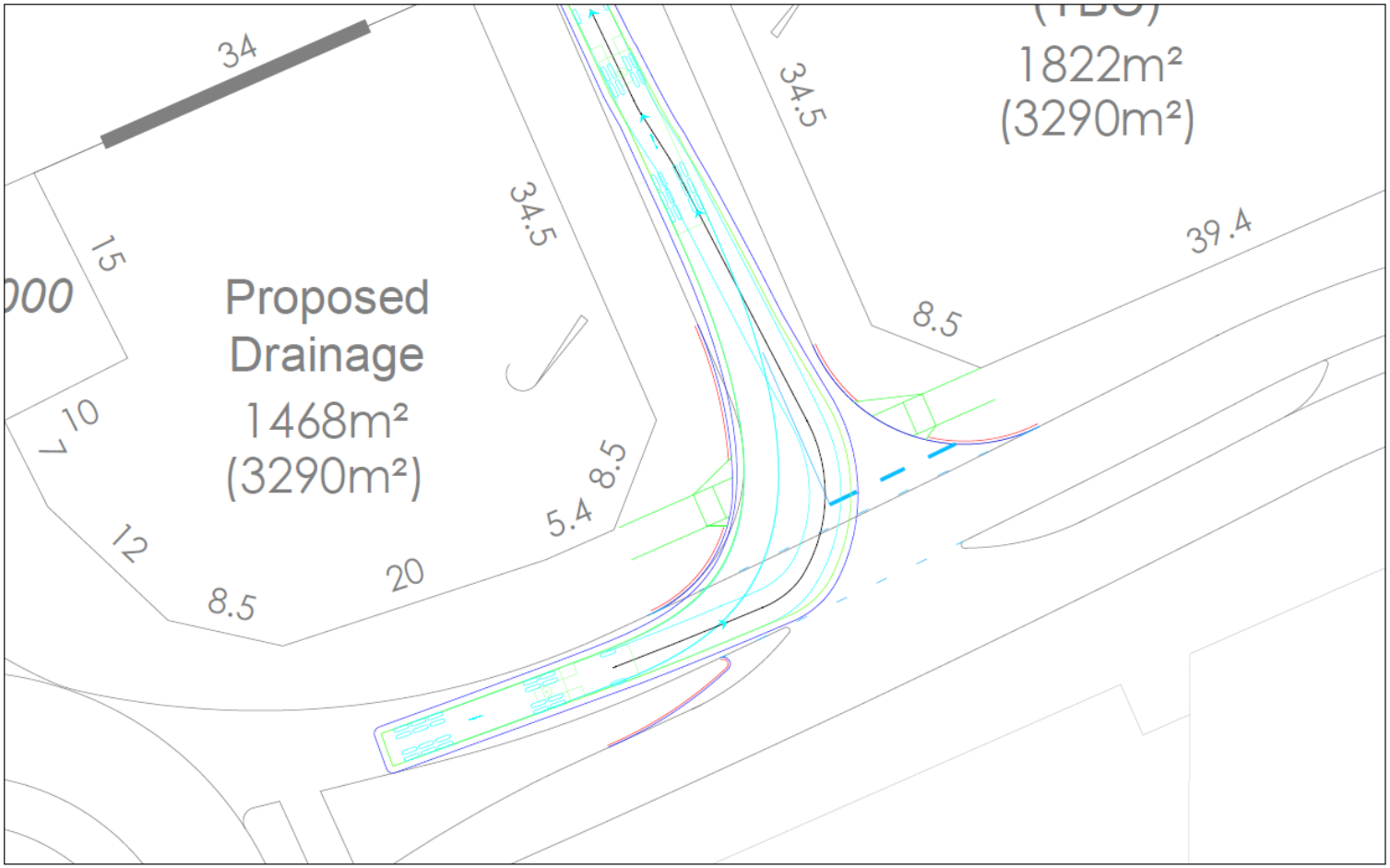


Pinjar Road, Banksia Grove
Austroads 2013: 19.0m Semi-Trailer
Truck Circulation

LEGEND
Vehicle Body
Wheel Path
500mm Clearance

t19.061.sk25a
12/11/2019
Scale: 1:400 @ A3

transcore

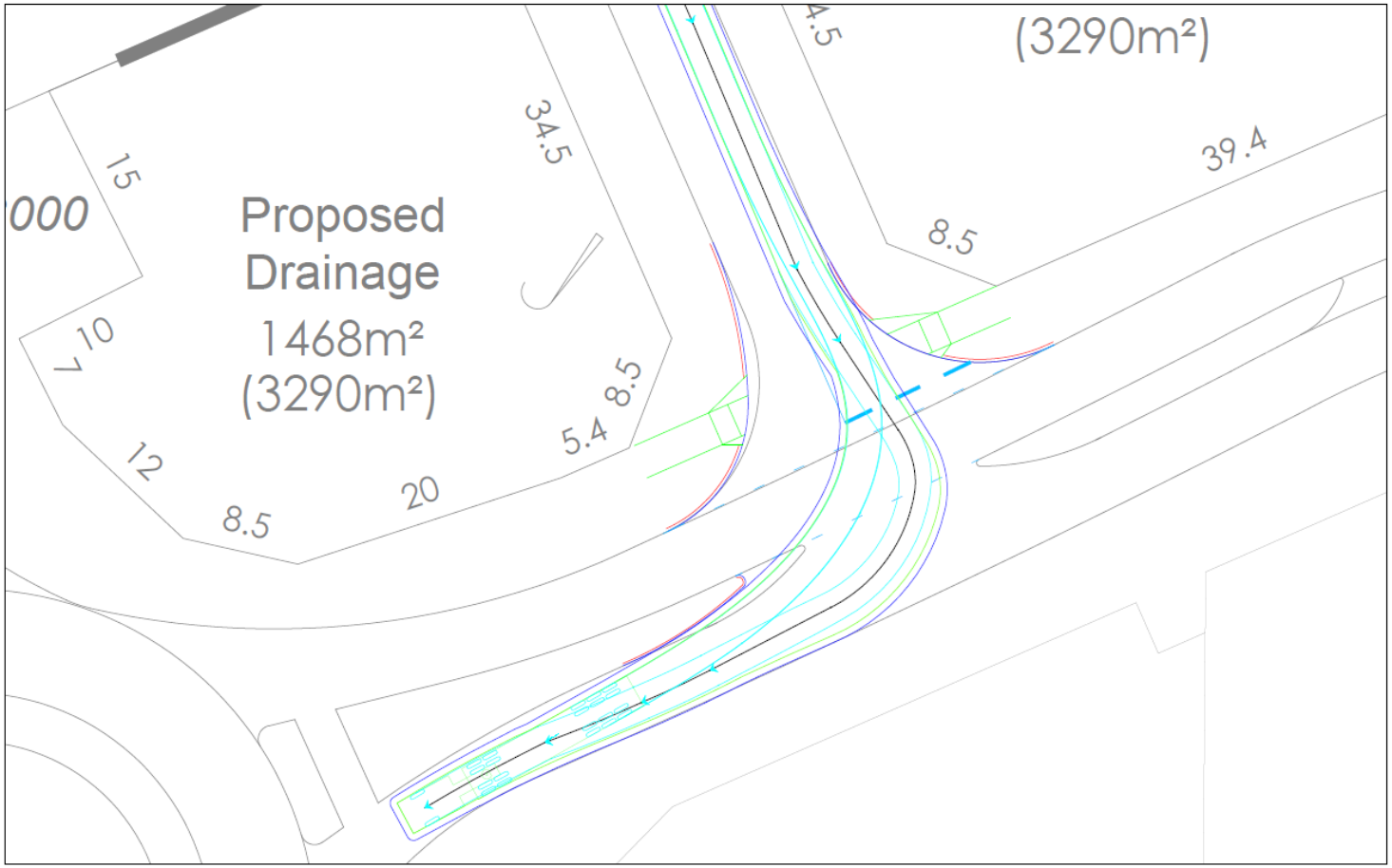


Pinjar Road, Banksia Grove
Austroads 2013: 19.0m Semi-Trailer
Truck Circulation

LEGEND
Vehicle Body
Wheel Path
500mm Clearance

t19.061.sk26
12/11/2019
Scale: 1:250 @ A3

transcore

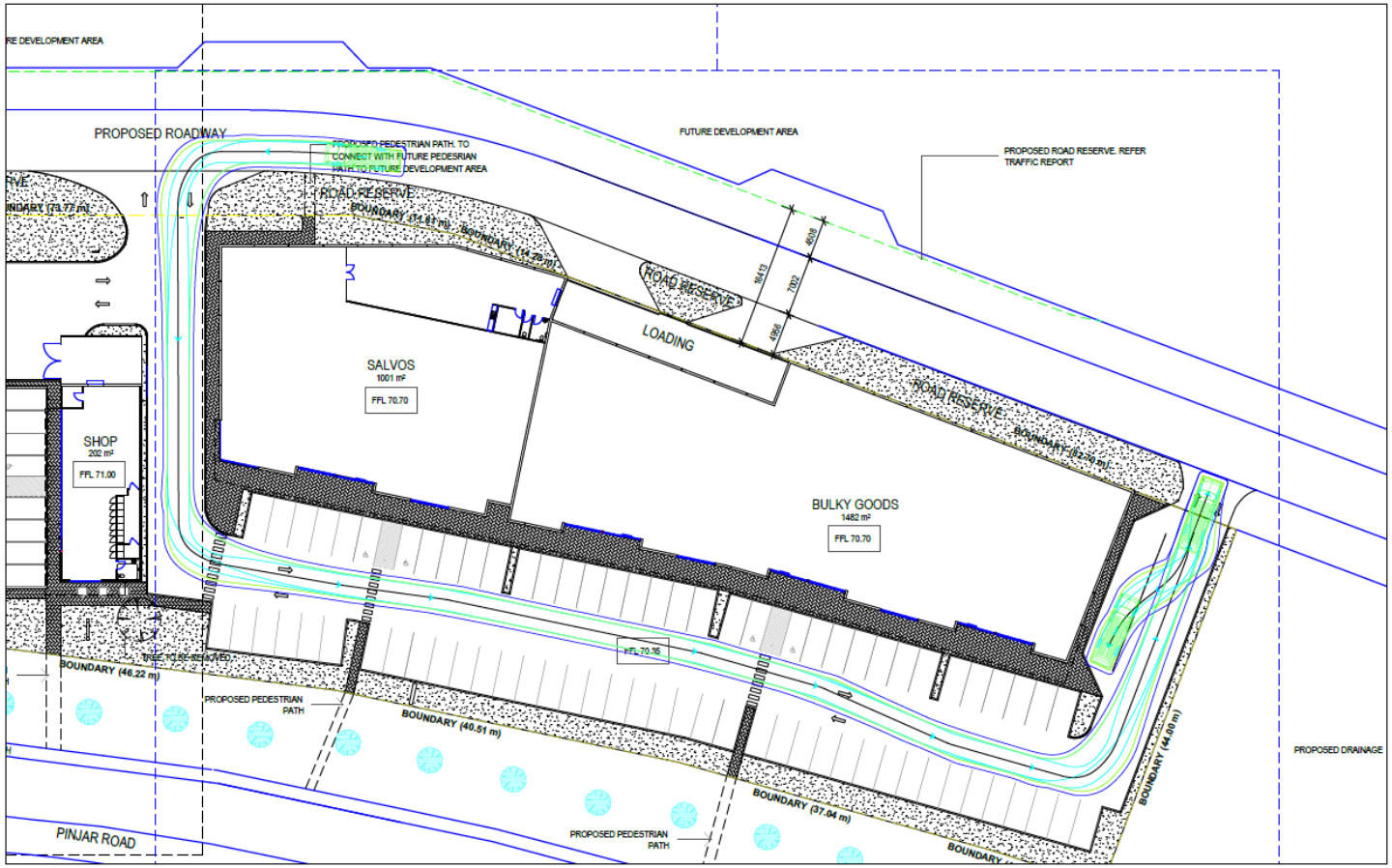


Pinjar Road, Banksia Grove
Austroads 2013: 19.0m Semi-Trailer
Truck Circulation

LEGEND
Vehicle Body
Wheel Path
500mm Clearance

t19.061.sk27
12/11/2019
Scale: 1:250 @ A3

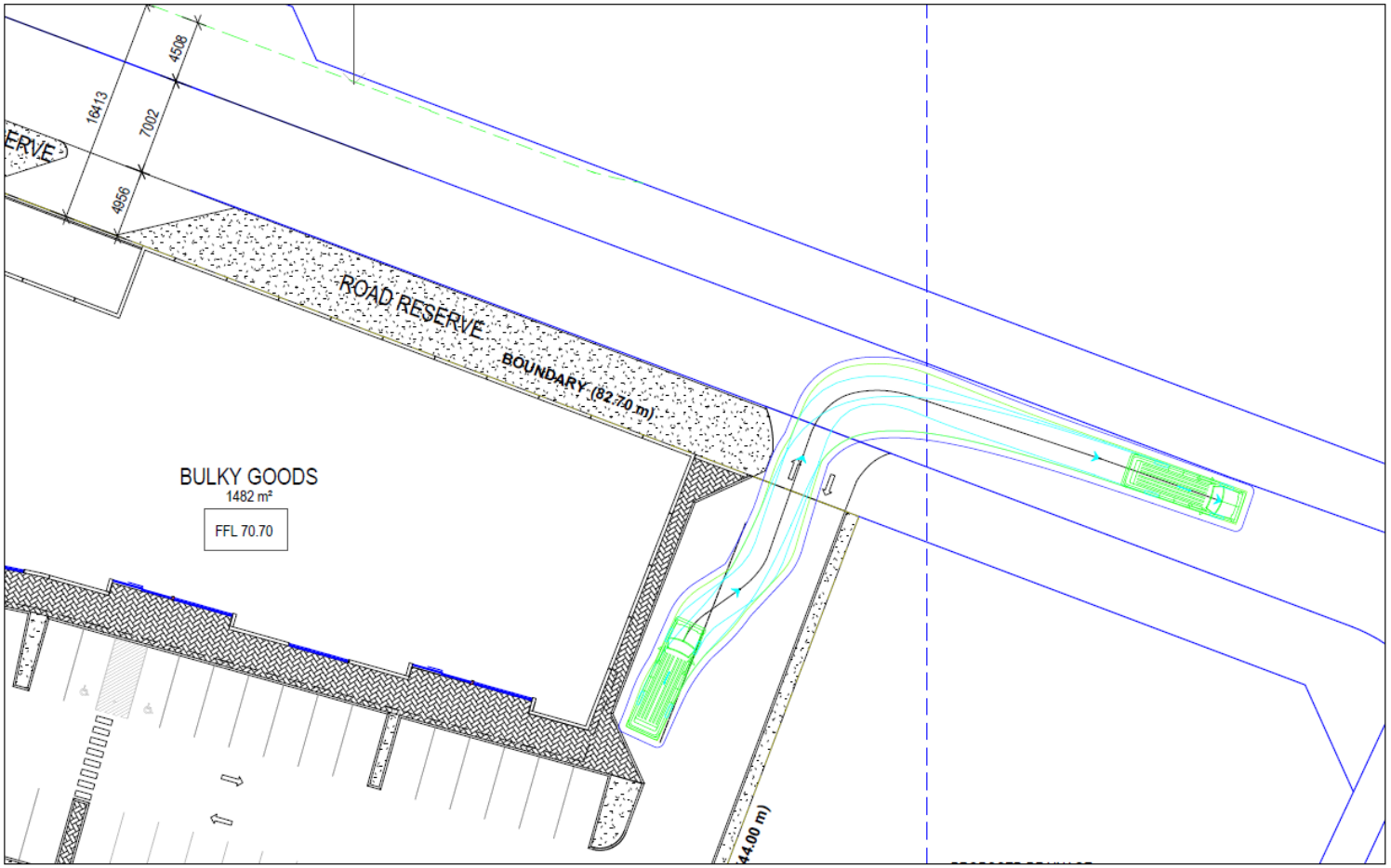
transcore



Pinjar Road, Banksia Grove
Austroads 2013: 8.8m Service Vehicle
Service Vehicle Circulation

LEGEND
Vehicle Body
Wheel Path
500mm Clearance

t19.061.sk02e
01/11/2019
Scale: 1:400 @ A3

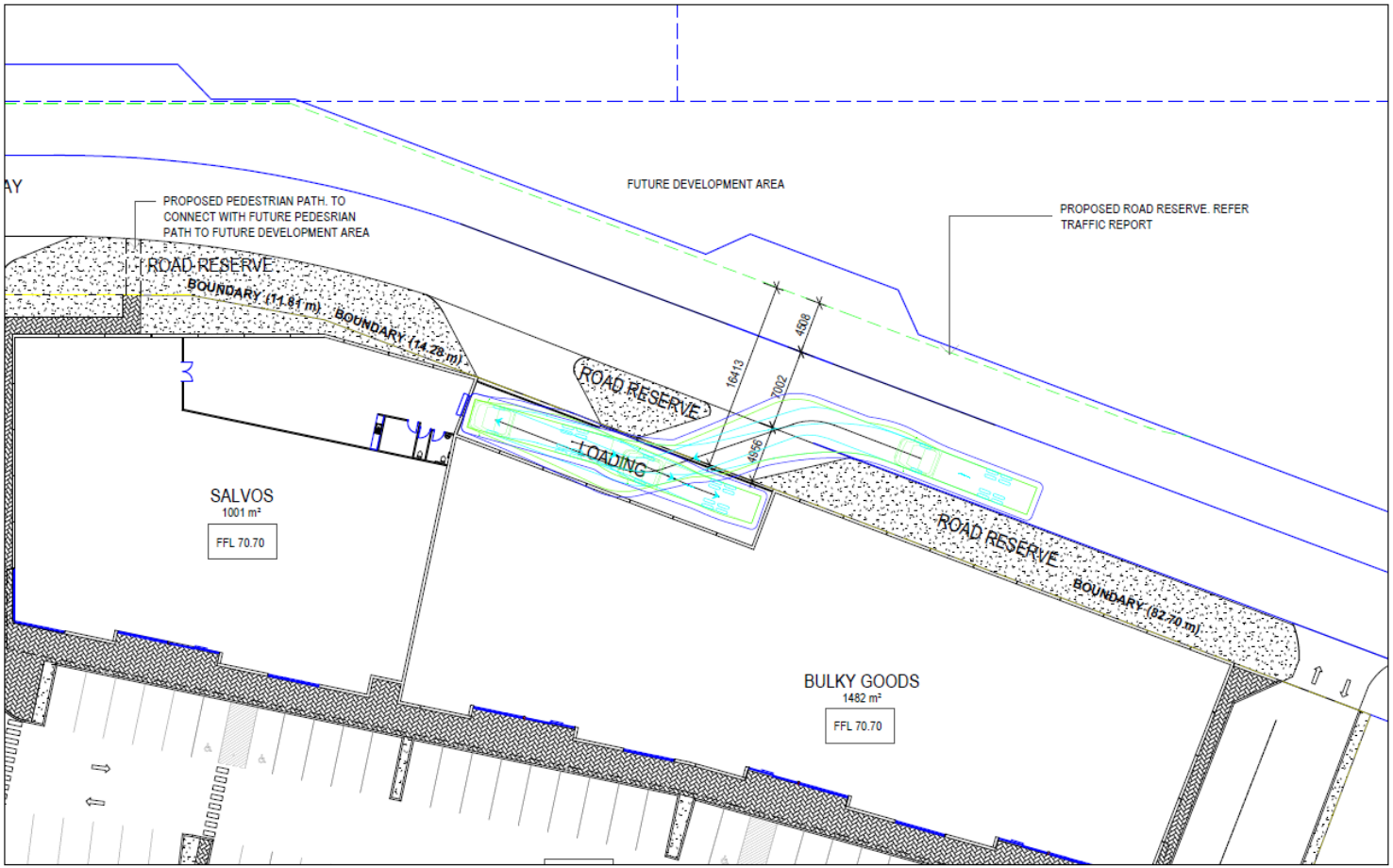


Pinjar Road, Banksia Grove
Austroads 2013: 8.8m Service Vehicle
Service Vehicle Circulation

LEGEND
Vehicle Body
Wheel Path
500mm Clearance

t19.061.sk03e
01/11/2019
Scale: 1:250 @ A3

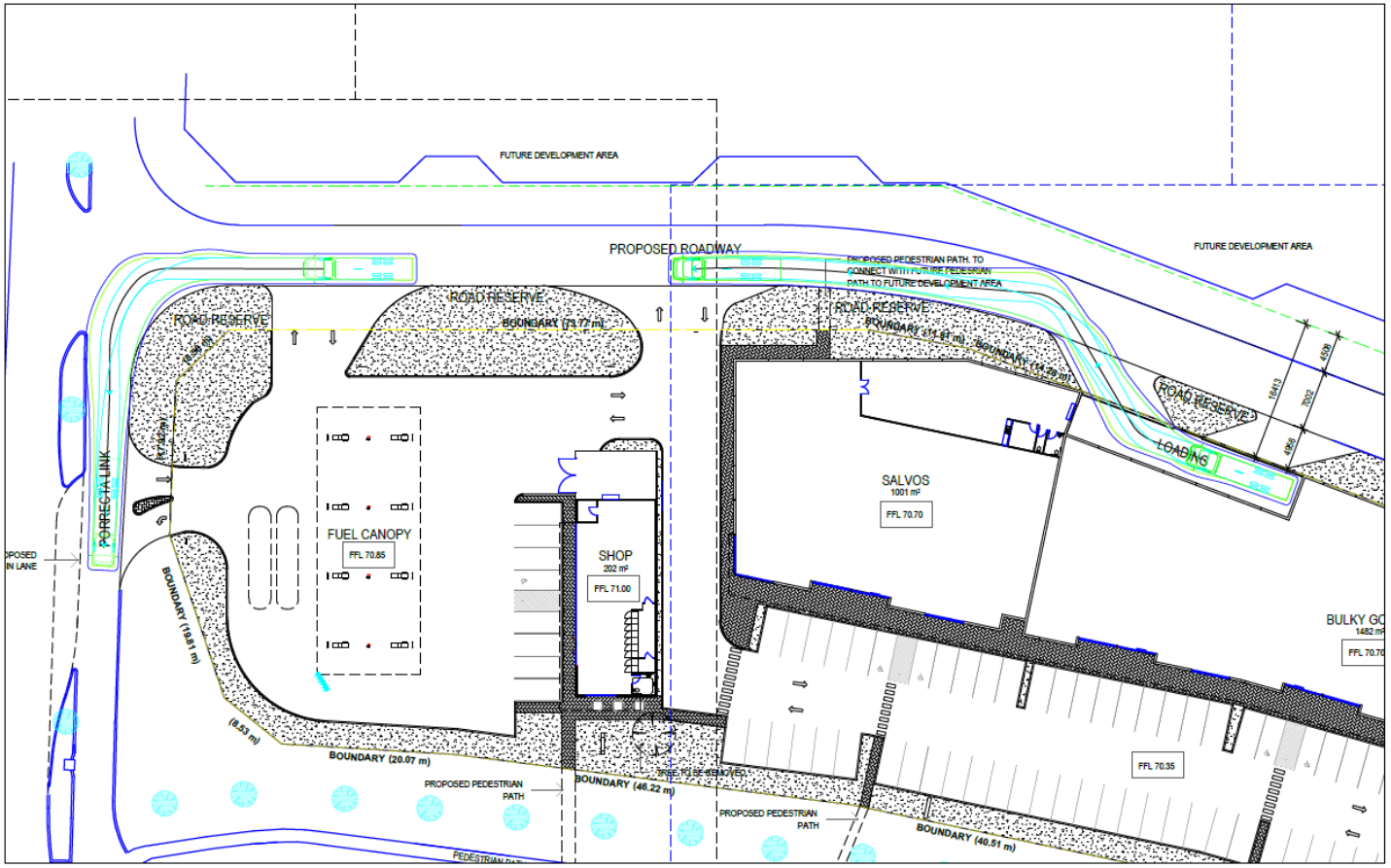
transcore



Pinjar Road, Banksia Grove
Austroads 2013: 12.5m SU Truck
Service Truck Circulation

LEGEND
Vehicle Body
Wheel Path
500mm Clearance

t19.061.sk10d
31/10/2019
Scale: 1:300 @ A3



Pinjar Road, Banksia Grove
Austroads 2013: 12.5m SU Truck
Service Truck Circulation

LEGEND

Vehicle Body	
Wheel Path	
500mm Clearance	

t19.061.sk11d
31/10/2019
Scale: 1:400 @ A3

transcore