appendix b

traffic and transport report

(Riley Consulting Pty Ltd)

LWP PROPERTY GROUP

LOT 703 ARMADALE ROAD, TREEBY
STRUCTURE PLAN
TRAFFIC ASSESSMENT

October 2019

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1. CHECKLIST

Item	Included	Comments
Introduction/Background		
Regional context	✔	
Proposed land uses	✔	
Table of land uses and quantities	✔	
Major attractors / generators	✔	
Existing situation		
Existing land uses within structure plan	✔	
Existing land uses within 800 metres of structure plan area	✔	
Existing road network within structure plan area	✔	
Existing pedestrian/cycle networks within structure plan area	✔	
Existing public transport services within structure plan area	✔	
Existing road network within 2 (or 5) km of structure plan area	✔	
Traffic flows on roads within structure plan area (peak hours)	✔	
Traffic flows on roads within 2 (or 5) km (peak hours)	✔	
Existing pedestrian/cycle networks within 800m	✔	
Existing public transport services within 800m	✔	
Proposed internal transport networks		
Changes/additions to existing road network	✔	
proposed new road network	✔	
Road reservation widths	✔	
Road cross-sections & speed limits	✔	
Intersection controls	✔	
Pedestrian/cycle networks and crossing facilities	✔	
Public transport routes	✔	
Changes to external transport networks		
Integration with surrounding area		
Trip attractors/generators within 800 metres	✔	
Proposed changes to land uses within 800 metres	✔	
Travel desire lines to attractors/generators	✔	
Adequacy of external transport networks	✔	
Deficiencies in external transport networks	✔	
Remedial measures to address deficiencies	✔	
Analysis of internal transport networks		
Assessment year(s) and time period(s)	✔	
Structure plan generated traffic	✔	
Extraneous (through) traffic	✔	
Design traffic flows (total traffic)	✔	
Road cross-sections	✔	
Intersection controls	✔	
Access strategy	✔	
Pedestrian/cycle networks	✔	
Safe routes to schools	✔	
Pedestrian permeability & deficiency	✔	
Access to public transport	✔	
Analysis of external transport network		
Extent of analysis	✔	
Base flows for assessment year(s)	✔	
Total traffic flows	✔	
Road cross-sections	✔	
Intersection layouts & controls	✔	
Pedestrian/cycle networks	✔	

2. INTRODUCTION AND BACKGROUND

2.1. Riley Consulting has been commissioned by LWP Property Group to prepare a structure plan traffic report for Lot 703 Armadale Road, Treeby (City of Cockburn) The land in the locality has been previously referred to as Banjup.

2.2. The area of interest to this report lies to the north of Armadale Road and east of Ghostgum Avenue. The site is bounded to the north by bushland and future residential sub-division is proposed to its eastern boundary.

2.3. The subject land is currently vacant.

2.4. The subject land forms part of the Treeby District Structure Plan (DSP).

2.5. Figure 1 indicatively shows the site location. Figure 2 shows an aerial image of the subject land.

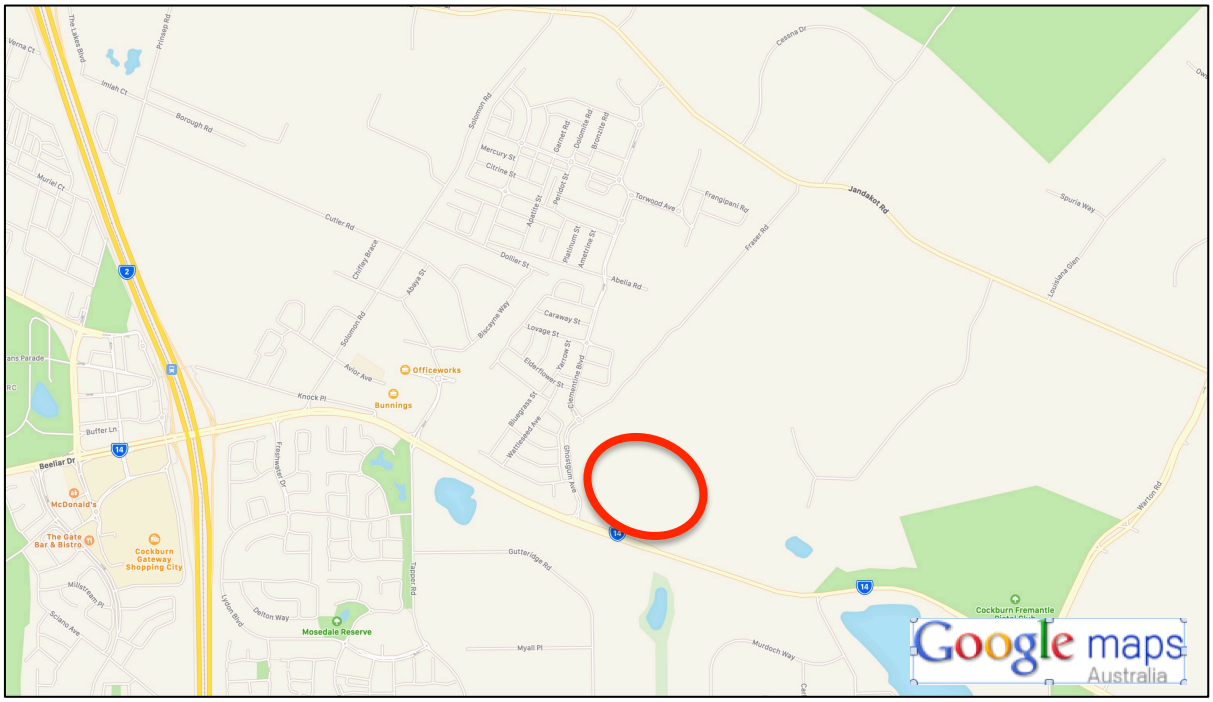


Figure 1 Site Location (Area Indicative)



Figure 2 Subject Land Area (Land Area Indicative)

3. THE EXISTING TRANSPORT NETWORK

3.1. The existing transport network is discussed below and considers the road network, public transport and cycle facilities.

Armadale Road

3.2. Armadale Road is classified as a primary distributor road in the Main Roads *Functional Road Hierarchy (refer Appendix A)*. It is constructed with a single pavement adjacent to the subject land, but duplication to provide a four lane divided road is currently under way. A speed limit of 70kph exists between the Kwinana Freeway and Ghostgum Avenue. East of Ghostgum Avenue a limit of 80kph applies.

3.3. Traffic data on the Main Roads web site, to the west of Liddelow Road (east of the subject land), indicates 30,738 vehicles per day (vpd) with 10.8% heavy

goods vehicles (HGV). East of the Kwinana Freeway the volumes increases to 45,268vpd with 7.9% HGV.

3.4. Reference to Appendix B indicates that Armadale Road will have capacity to carry 45,000vpd once fully constructed as a four lane divided road. It is noted that the DSP states a capacity of 50,000vpd which is possible with lower Levels of Service. Table 1 shows a summary of the traffic data for Armadale Road.

Table 1 Armadale Road

Volume	AM Peak (8-9)	PM Peak (17-18)	Capacity*
30,738vpd 7.5%HGV (2017/18)	911 east 1.378 west	1,719 east 908 west	45,000vpd*

*Refer Appendix or LN residential amenity value

Ghostgum Avenue

3.5. Ghostgum Avenue is classified as an access street in the Main Roads *Functional Road Hierarchy* and is constructed as a boulevard style road with two 4.5 metre pavements and a 4 metre to 5 metre wide median.

3.6. Traffic data is available form the traffic signals at Armadale Road that indicates 3,017vpd. As development of the locality continues, the demand will increase to a forecast 5,000vpd with full development.

3.7. Reference to Appendix B indicates that Ghostgum Avenue would have capacity to carry 25,200vpd, however as a suburban street the Liveable neighbourhoods residential amenity value of 7,000vpd would be applied. Table 2 shows a summary of the traffic data for Ghostgum Avenue.

Table 2 Ghostgum Avenue

Volume	AM Peak (8-9)	PM Peak (17-18)	Capacity*
3,000vpd (2019)	81 North 165 South	115 North 105 South	7,000vpd*

*Residential amenity value, not actual capacity

Jandakot Road

3.8. Jandakot Road is classified as a regional distributor in the Main Roads *Functional Road Hierarchy.* It provides an east-west link between Warton Road and Berrigan Drive, where access to the Kwinana Freeway is made. It is constructed with a single pavement of about 9 metres.

3.9. Traffic data on the Main Roads web site shows 16,810vpd south of Berrigan Drive.

3.10. Reference to Appendix B indicates that Jandakot Road would have capacity to carry 22,900vpd. Table 3 shows a summary of the traffic data for Jandakot Road.

Table 3 Jandakot Road

Volume	AM Peak (7-8)	PM Peak (16-17)	Capacity*
16,810vpd 8.7%HGV (2016/17)	392 east 897 west	870 east 644 west	22,900vpd

*Residential amenity value, not actual capacity

Fraser Road

3.11. Fraser Road is an existing road reservation to the north of an existing roundabout on Ghostgum Avenue. It has a cycle path to Calleya dog park. Future planning shows Fraser Road will not be constructed north of the current roundabout at Clementine Boulevard.

Clementine Boulevard

3.12. Clementine Boulevard is classified as an access street in the Main Roads *Functional Road Hierarchy.* It is constructed as a boulevard style road with two 4.5 metre pavements and a 2 metre to 3 metre wide median.

3.13. Clementine Boulevard provides the primary access to the Calleya estate sub-division.

3.14. Traffic data is not available, but the traffic demand on Ghostgum Avenue can be used as at present, only a display village has access between the existing roundabout at Ghostgum Avenue and Armadale Road.

3.15. Reference to Appendix B indicates that Clementine Boulevard would have capacity to carry 25,200vpd.

Major Attractors / Generators

3.16. The subject land is located approximately 2km from the regional centre of Cockburn (Cockburn Gateway). The centre provides significant shopping facilities and access to public transport.

3.17. Between the subject land and the Kwinana Freeway, commercial uses have been built comprising of a Bunning's warehouse and other large format bulky goods retailers.

Public Transport

3.18. There are no existing public transport services within the study area.

3.19. The subject land is approximately 1.9km from Cockburn railway station where frequent train services are provided to access Perth CBD, Mandurah and Joondalup.

3.20. There is a single bus service using Armadale Road that provides access to Cockburn district centre and the railway station. Route 518 provides a half hourly service throughout the day with up to 7 services during peak periods. The service operates between Murdoch TAFE and Cockburn station.

3.21. A bus stop is provided on Armadale Road in the left turn slip lane to Ghostgum Avenue for eastbound services. There presently appears to be no stop for westbound services. It is important that a westbound bus stop be provided in proximity to the existing traffic signals at Ghostgum Avenue to provide safe pedestrian access (using the traffic signals). It is noted that road upgrading to Armadale Road is currently occurring.

3.22. Figure 3 shows the current public transport routes in the locality.

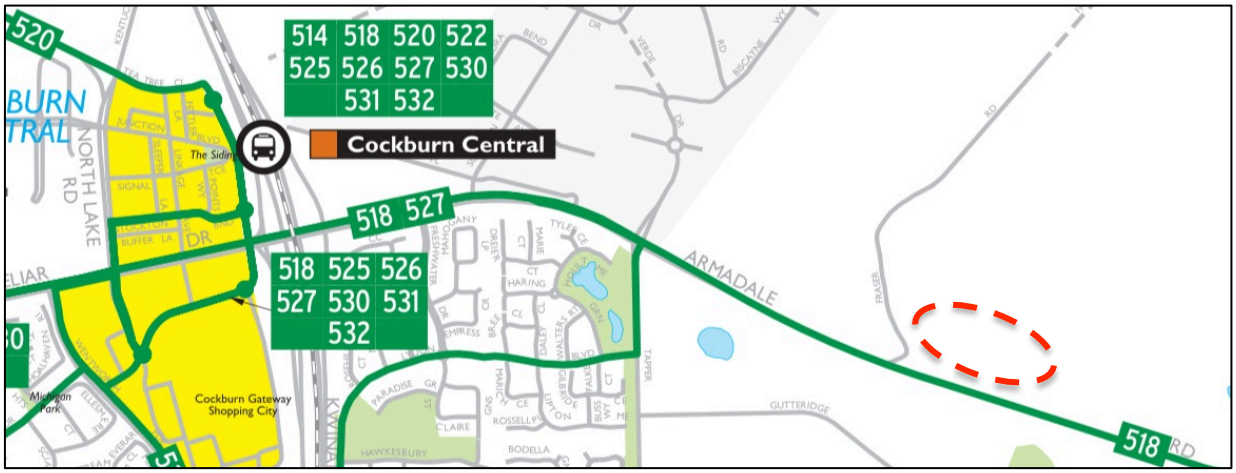


Figure 3 **Public Transport Network** (land area indicative)

Cycling

3.23. There are no cycle facilities in the local area at present.

3.24. A sealed shoulder is provided along Armadale Road, although it would not be a desirable cycling option. It would be expected that future widening of Armadale Road would include for cycle lanes either on-street or within a dedicated path.

3.25. There is a regional cycle path adjacent to the Kwinana Freeway that can be accessed from Armadale Road and Berrigan Drive.

3.26. Figure 4 shows the current cycle network.

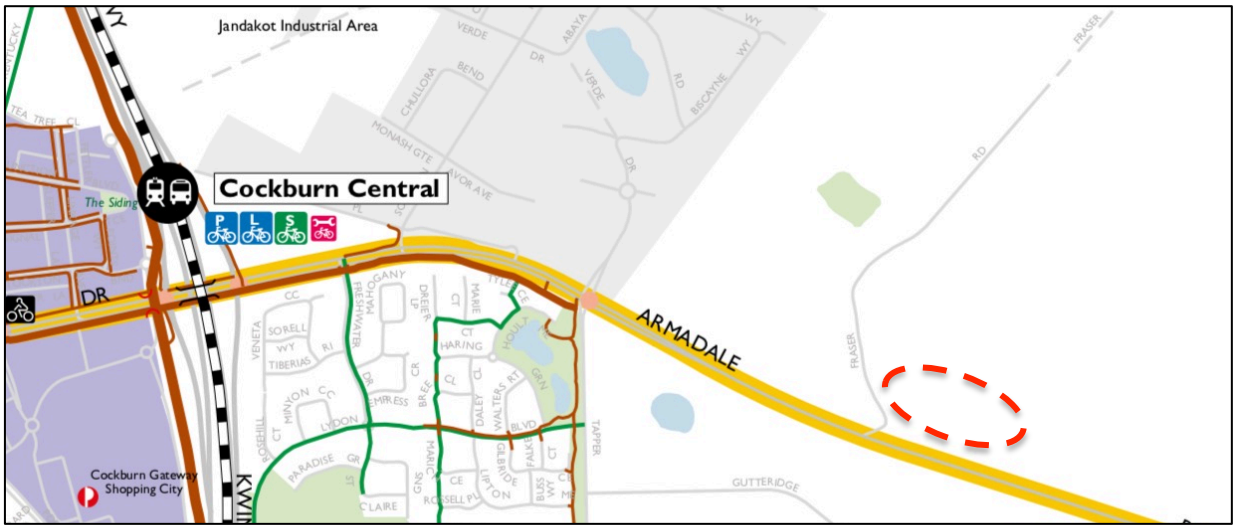


Figure 4 **Local Bicycle Network** (land area indicative)

4. STRUCTURE PLAN PROPOSAL

4.1. The area of the structure plan lies to the north of Armadale Road and east of Ghostgum Avenue in the suburb of Banjup. Figure 5 shows the structure plan.

4.2. The structure plan sets out to create a new residential community of 324 residential lots and 42 seniors living lots. A child care centre is also indicated on the concept plan. Based on the land area allocated to the child care centre, it is anticipated it could accommodate up to 90 children[1].

4.3. Managed parklands and retained bushland are also shown. Table 4 shows the proposed land uses.

Table 4 **Proposed Land Uses**

Use	Area / Number
Residential Lots	324
Seniors Living Lots	42
Child care	90 children

[1] Most child care centres have about 80 children.



Figure 5 **Structure Plan** (reference only refer to planning documentation)

5. CHANGES TO EXTERNAL TRANSPORT NETWORKS

5.1. Lot 703 Armadale Road is included within the Treeby District Structure Plan (DSP) shown in Appendix C.

5.2. The DSP is based on an overall yield of 3,500 residential lots, a commercial precinct, a shopping precinct and two primary schools.

5.3. The DSP identifies Ghostgum Avenue to be classified as a neighbourhood connector. It forms part of a north-south neighbourhood link through the Calleya sub division linking to Jandakot Road.

5.4. The internal east-west road though Lot 703 is identified in the DSP as a neighbourhood connector type B.

5.5. There are changes proposed to the surrounding arterial road network that will provide widening of Armadale Road to four lanes (under construction) and duplication of Jandakot Road to four lanes (longer term).

5.6. There is also a longer term proposal to widen Armadale Road to six lanes.

5.7. It is understood that construction of an underpass at Verde Drive to allow the extension of North Lake Road over the Kwinana Freeway to Armadale Road is funded and due to be constructed. It is further understood that the works will

NOT impact the existing traffic signals provided on Armadale Road at Ghostgum Avenue.

6. INTEGRATION WITH SURROUNDING AREA

6.1. As discussed, Lot 703 Armadale Road is part of the Treeby DSP. The development of the land for residential purposes is in-keeping with the surrounding land uses proposed.

6.2. The proposed child care centre site is a key facility for local residents.

7. ANALYSIS OF INTERNAL TRANSPORT NETWORK

7.1. This structure plan traffic report for Lot 703 Armadale Road assumes full development of the precinct and is based on a future forecast year of 2031 as identified in the Treeby DSP.

7.2. The structure plan has been modelled using a Saturn traffic model that assigns traffic to the local road network based on road capacity, speed and length. The model includes the development of land east of Lot 703 that will have an impact upon internal traffic movements to Lot 703. Other future development that would not impact Lot 703 is not included in the traffic model.

Traffic Generation

7.3. The Treeby DSP was modelled on the basis of 8 trips per residential lot per day. This is a standard urban residential trip rate and is used for Lot 703.

7.4. The child care centre is expected to cater for about 90 children and a trip rate of 4.2 trips per child per day is used to provide robustness of assessment and allow for a larger centre if local demand requires.

7.5. The seniors living lots are modelled with a trip rate of 3 trips per lot per day. The trip rate is at the higher range of data provided in the RTA *Guide to Traffic Generating Developments*.

7.6. With a forecast yield of 324 residential lots, 42 seniors lots and a child care centre, the subject land is forecast to generate 3,096 trips per day.

7.7. To provide robustness and flexibility to the structure plan, it is noted that if market conditions dictate, the seniors living area could become standard housing. It is more likely that a lower yield would occur, but for the purpose of the structure plan the full residential trip rate is applied to the seniors living precinct.

7.8. Thus an overall dwelling yield of (324 + 42) 366 lots is assumed. With the child care centre, the structure plan is forecast to generate 3,306 trips per day.

7.9. Table 5 shows the land use and traffic generation.

Table 5 Traffic Generation

Use	Yield	Trip rate	Trips (vpd)
Residential	*324*	*8*	*2,592*
Seniors Living	*42*	*3*	*126*
Child care	*90*	*4.2*	*378*
Total			***3,096***
All residential scenario			
Residential	324	8	2,928
Child care	90	4.2	378
Total			**3,306**

Distribution

7.10. The distribution of traffic to the external road network is based on trip purpose. Historical research suggests the following trip purposes and proportions:

- Work trips 32%
- Home based other 34%
- Home based evening 20%
- Non homed based 14%

7.11. Education trips are based on 0.35 primary students per dwelling with a typical school trip rate of 2.6 trips per child (as per the Education Departments schools brief).

7.12. The Saturn traffic model will distribute the generated traffic over the modelled road network based on travel times.

Non Structure Plan Traffic

7.13. The Lot 703 traffic modelling is cognisant of the future development indicated within the Treeby District Structure plan. Allowance is made in the model for free movement of generated traffic between adjacent residential cells and access to the external road network. This allows for adjacent sub-division traffic to pass through Lot 703 to access the external road network, local shops and schools.

7.14. Land to the east is modelled with 700 residential dwellings.

Internal Road Network

7.15. Appendix D shows the Saturn model output for the whole area modelled. As would be expected the model shows traffic generated by Lot 703 to take primary access to Armadale Road. Two scenarios are shown to assess the impact of the current traffic signal access at Ghostgum Avenue and the impact of restricting Ghostgum Avenue to left in / left out.

7.16. Appendix E shows the modelling for the local area structure plan road traffic demands based on *Liveable Neighbourhoods* thresholds. The plans show roads passing <1,000vpd, 1,000vpd to 3,000vpd and those roads forecast to carry more then 3,000vpd.

7.17. Based on the plans attached at Appendix E, it can be seen that all roads within Lot 703 will carry less than 3,000vpd regardless of the access controls imposed to Armadale Road. Figure 8 shows the recommended road hierarchy.

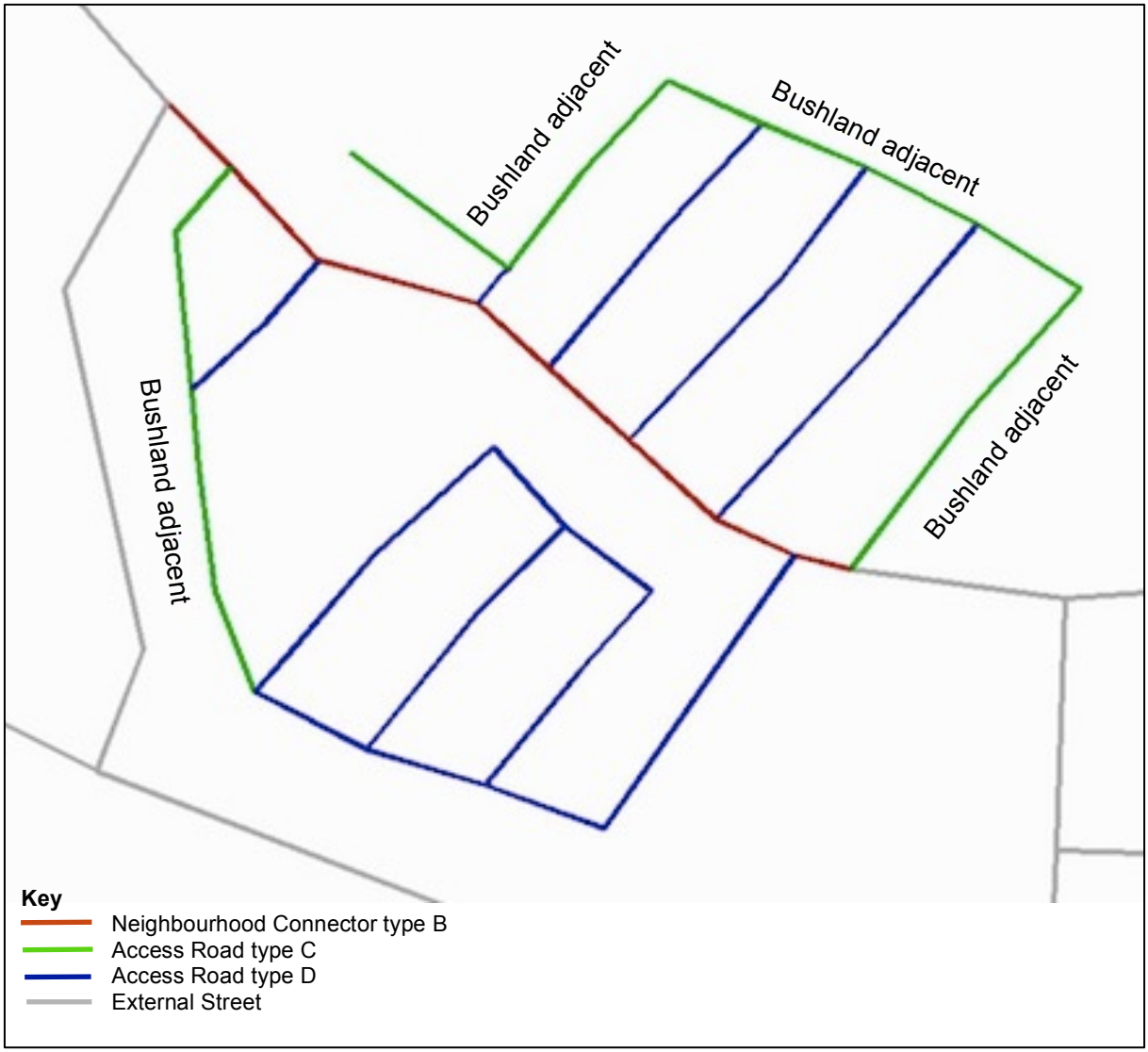


Figure 8 **Recommended Road Hierarchy** (road network indicative)

Neighbourhood Connectors

7.18. No road within Lot 703 would be considered as a neighbourhood connector based on the forecast traffic demands. However, the central east-west spine road is classified as a neighbourhood connector type B to provide recognition of the route through the sub-division and to accord with the DSP.

7.19. A 20 metre wide road reservation is proposed to provide for a boulevard style road comprising of two lanes with a 2.4 metre planted median. Verges of 4.5 metres are shown and provided a footpath of 1.5 metres to one side and a dual use path of 2.1m to the other. The road pavement is shown at 3.7 metres with over run kerbing to meet Austroads minimum pavement widths. The 20 metre road reservation is shown to extend from Ghostgum Avenue to the central public open space.

7.20. Adjacent to the public open space a 15 metre road reservation is shown. The 15 metre road reservation will provide a 7.2 metre wide pavement and continue the 4.5 metre verge with shared path adjacent to the residential dwellings. A residual verge of 2.7 metres is shown adjacent to the public open spaces and provides a footpath of 1.5 metres.

7.21. Appendix F shows typical cross sections for the neighbourhood connector type B.

7.22. Corner radii of 9 metres should be used at all intersections with neighbourhood connectors. This will provide appropriate access for larger vehicles whilst maintaining lane discipline on the busier road.

Access Streets Type C

7.23. The higher order residential streets within the structure plan area will be classified as Access Road type C. However, traffic demands are well below the threshold of 3,000vpd. Access Street type C cross sections aim to encourage a 40kph traffic speed to the local road network, whilst allowing ample width for traffic to pass.

7.24. The access street adjacent to the child care centre is classified an Access street type C to recognise its function to access to the child care centre. Further, a 20 metre road reservation is required on this street for bushfire purposes.

7.25. Other streets adjacent to bush land are also identified as Access Street type C as a 20 metre road reservation is required.

7.26. A pavement of 6 metres is suited to this street. A selection of cross sections are included at Appendix F, showing how these streets will interface with bushland.

7.27. Corner radii as per *Liveable Neighbourhoods* guidelines are recommended.

Access Streets Type D

7.28. Access street type D will be the most used road classification within the structure plan. These roads are quiet residential streets and predominantly provide access to frontage properties.

7.29. A 6 metre wide pavement could be used for these streets to ensure traffic is not encouraged to drive at inappropriate speeds. The density of the future development would not be expected to result in a significant on-street parking demand.

7.30. Combined with 4.5 metre residual verges, the minimum road reservation would be 15 metres. A typical cross section is shown in Appendix F.

7.31. *Liveable Neighbourhoods* recommends the use of 4.5 metre corner radii where access streets meet. A maximum corner radii of 6 metres is advise for access streets to ensure higher traffic speed do not occur at intersections.

7.32. Adjacent to public open space Access Street type D can be reduced to 13.5 metres.

7.33. Reference to *Liveable Neighbourhoods* recommendation of lot truncations should be made to reduce road reservation maintenance.

Lanes

7.34. There are several lanes within Lot 703 that provide rear access to lots fronting the neighbourhood connector.

7.35. A lane is also proposed to the east of the site, south of the POS. The lane has been included in the traffic model and is found to have an expected daily forecast demand of 170 vehicles. *Liveable Neighbourhoods* identifies that lanes should carry no more than 300 vehicles per day and the proposed lane meets this requirement.

8. ROADS AND INTERSECTIONS

8.1. All roads within the structure plan have low traffic demands, with no street shown to carry more than 3,000vpd.

8.2. As a residential sub-division the blanket speed limit of 50kph will apply to all residential streets.

8.3. The Saturn model has been interrogated to determine the forecast traffic demands at each intersection. It is generally recognised that four way priority intersections (yield or give way conditions) should not be used when more than 2,000vpd pass though the intersection.

8.4. The modelling shows that no four-way intersection between access streets will require control. Give way markings are appropriate at all internal road intersections.

Access To Frontage Properties

8.5. There are no roads within Lot 703 that would require control of access to frontage properties.

Location of Intersections

8.6. All internal road intersections have been located in accordance with the principles of *Liveable Neighbourhoods*.

8.7. No supplementary intersection control is required within Lot 703.

8.8. Roundabouts are located on the east-west link at the property boundary. The roundabout on Ghostgum Avenue is already constructed.

9. PEDESTRIAN AND CYCLE NETWORKS

9.1. The layout of Lot 703 is based on the principles set out in *Liveable Neighbourhoods* to provide a pedestrian friendly environment.

9.2. Internal to the structure plan area there are no requirements to provide pedestrian crossings. All roads have low traffic flows and pedestrians will not be restricted in crossing any internal road as a result of the passing traffic.

9.3. Figure 10 shows the minimum recommended requirements for paths and cycle facilities.

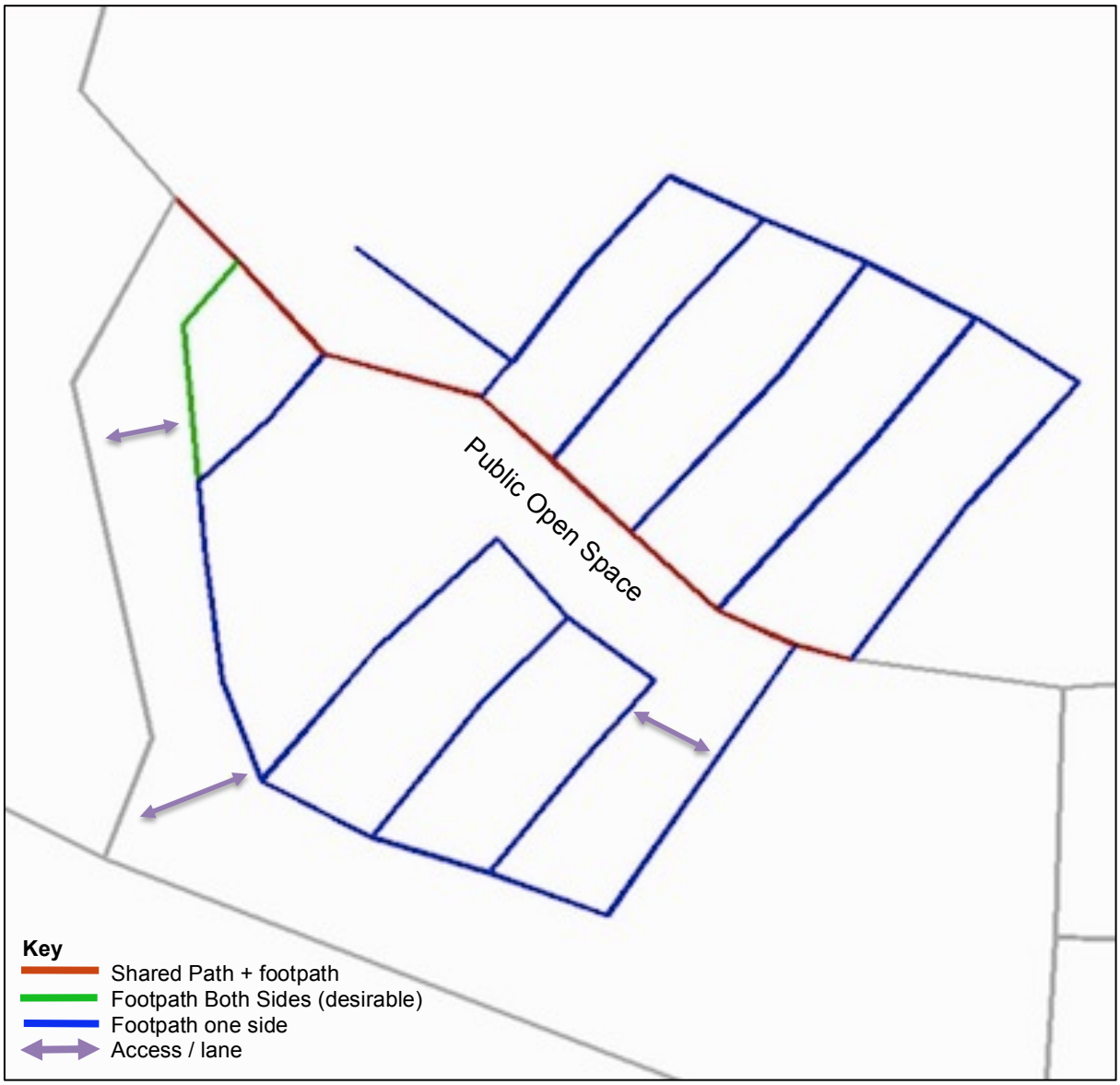


Figure 10 Cycle and Footpaths

10. SAFE WALK/CYCLE TO SCHOOL ASSESSMENT

10.1. A primary school is not proposed within Lot 703 and the location of local primary schools shown in the Banjup DSP would be too far to walk for residents of Lot 703. However, a shared path network is proposed to provide safe and appropriate access through the land area.

11. PEDESTRIAN PERMEABILITY AND EFFICIENCY

11.1. Lot 703 is designed in accordance with the *Liveable Neighbourhoods* policies and as such a permeable and walkable environment is provided.

12. ACCESS TO PUBLIC TRANSPORT

12.1. The majority of dwellings will be within 400 metres of Ghostgum Avenue where the future bus service can be expected to operate. The route would eventually pass through the precinct to link Jandakot Road to Armadale Road.

12.2. Figure 11 shows the DSP planned bus routes.

12.3. It is considered important that bus stops are located on Ghostgum Avenue between Armadale Road and the subject land roundabout to achieve maximum public transport access to the local community. The recommended bus stop locations will also provide maximum accessibility for new subdivision west of Ghostgum Avenue.

12.4. Figure 12 shows the desirable location of future bus stops on Ghostgum Avenue and indicates the area of Lot 703 that would typically be within 400 metres of the bus stops.

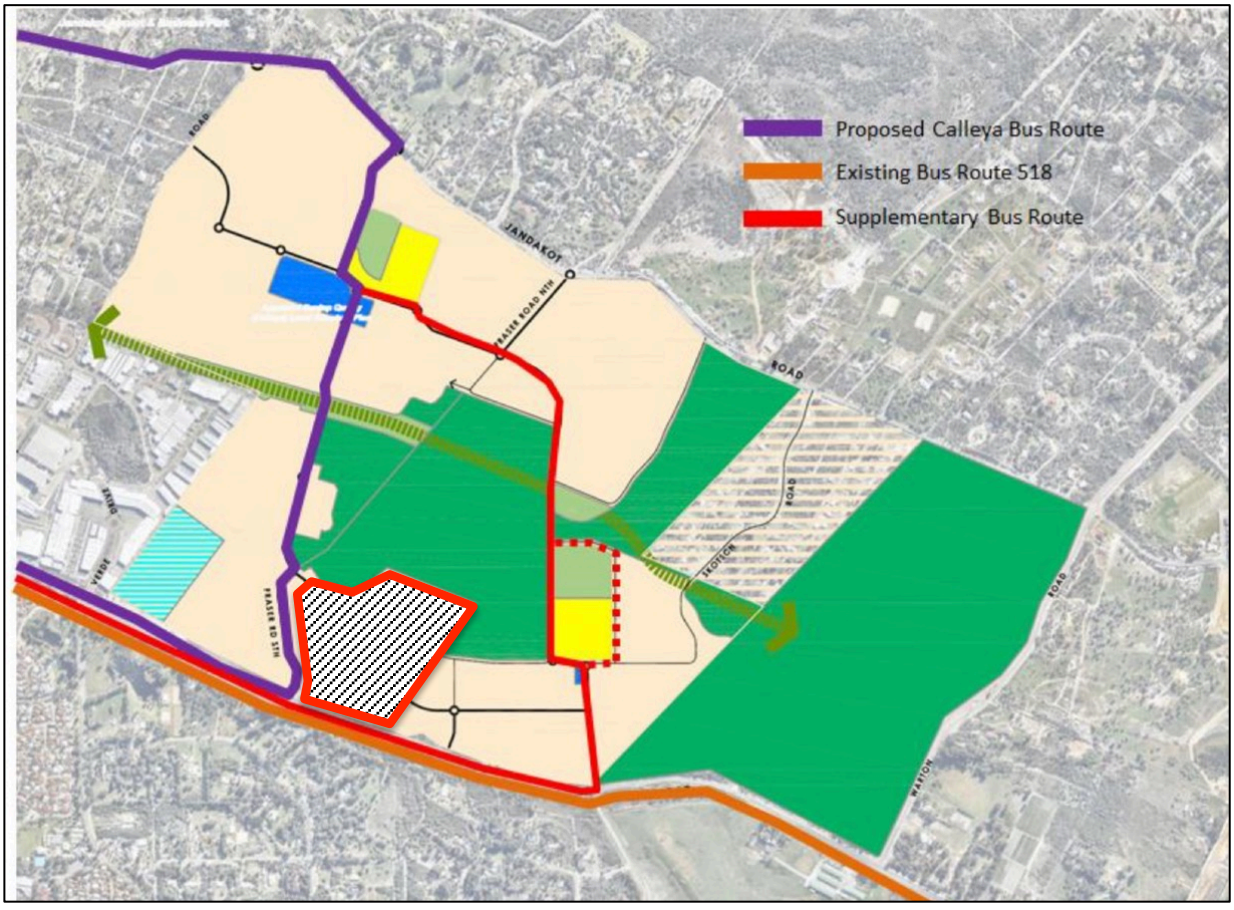


Figure 11 District Structure Plan Proposed Bus Routes



Figure 12 Ghostgum Avenue Bus Stops Location and Walkable Catchment

13. TRAFFIC FLOWS ON EXTERNAL ROAD NETWORKS

13.1. The development of the subject land has been identified in local government planning documentation and the future traffic increase to Armadale Road, Jandakot Road and local distributors has been identified.

13.2. The traffic modelling indicates that traffic from Lot 703 can be expected to access Jandakot Road, but will do so via the neighbourhood connector passing through the Calleya sub-division.

13.3. Based on the current regional road network, the model indicates that less than 100 vehicles per day would pass through Calleya to access Jandakot Road. The District Structure Plan indicates Jandakot Road has a forecast demand of 30,000vpd with full development of the locality. The traffic demand from Lot 703 would equate to just 0.2% of the future daily traffic demand.

13.4. The traffic modelling shown also indicates that Solomon Road will experience no traffic increase as a result of the development of Lot 703.

14. STAGING

14.1. The development of the subject land will be undertaken in 6 stages. As a result of the staged development, alternative access to Armadale Road would not be available until the east-west neighbourhood connector is connected through adjacent development. Further, once stage 6 is achieved, there is no guarantee that alternative access can be achieved.

14.2. It is important therefore to assess the operation of the roundabout that has been constructed to provide access to Ghostgum Avenue to ensure it can cater for the full development of Lot 703.

14.3. The DSP traffic report analysed the operation of the existing traffic signals of Ghostgum Avenue and Armadale Road for the long-term development traffic demands (5,00vpd) and demonstrated the intersection would operate in an acceptable manner. Level of Service E was indicated for the right turn from Armadale Road to Ghostgum Avenue (delay of 67 seconds). Ghostgum Avenue was shown to experience Level of Service D and Armadale Road was shown to operate with Level of Service B/C.

14.4. The full development of Lot 703 is shown to generate 3,306 vehicle movements per day in isolation. The forecast traffic demand equates to a peak demand of 330 two-way movements, of which 200 are expected to access Ghostgum Avenue. As a residential development a peak split of 80/20 would be expected.

14.5. To add robustness to the assessment a peak demand of 300 vehicles is assumed, split 240 vehicles departing and 60 entering the subject site during the morning peak period (the reverse would be expected in the evening peak).

14.6. The Calleya traffic demand, north of the Ghostgum Avenue roundabout, is shown to be 3,000vpd equating to 300 peak movements. These movements would also be expected to have an 80/20 peak split (240/60)

14.7. Analysis of the Ghostgum Avenue / Clementine Boulevard / Lot 703 access has been undertaken using Sidra. The summary analysis is attached at Appendix G.

14.8. The Sidra analysis shows that all movements are expected to operate with Level of Service A.

15. CONCLUSIONS

15.1. The structure plan traffic analysis undertaken for the future development of Lot 703 Armadale Road indicates that:

15.2. The subject land can be expected to generate about 3,306 vehicle movements per day.

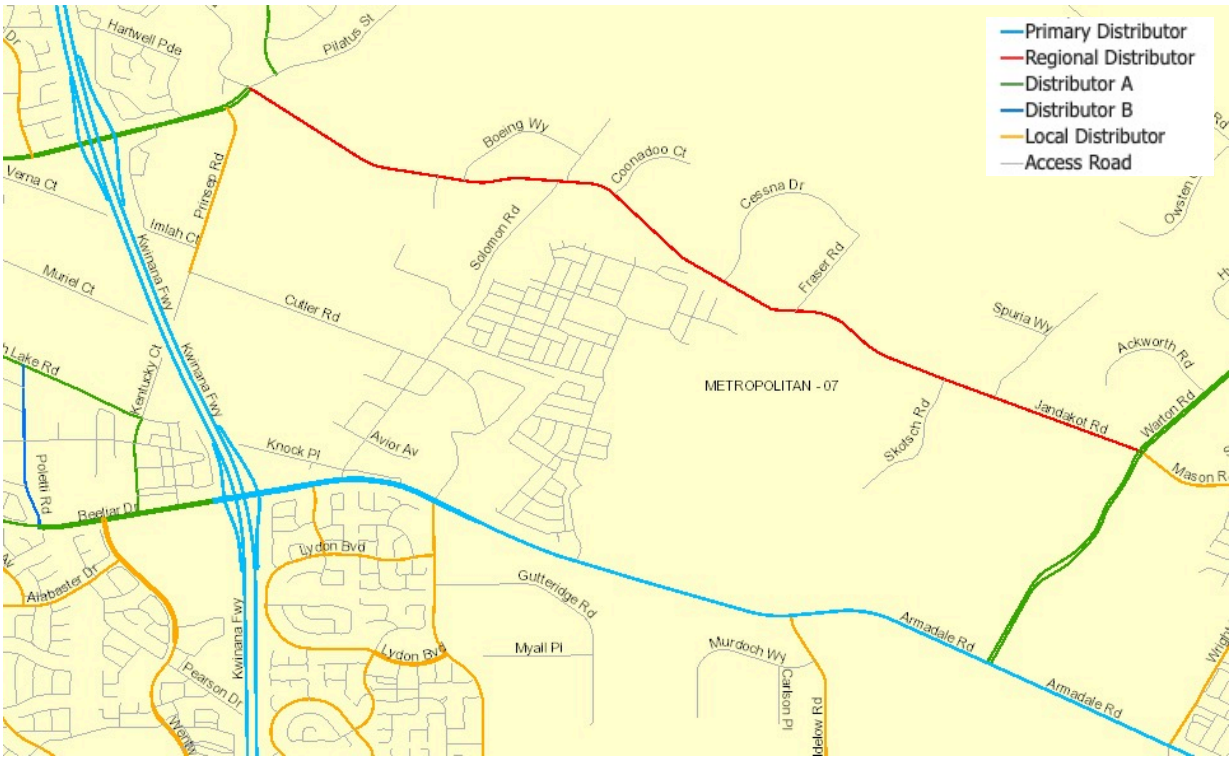
15.3. The forecast traffic demands are included in the district level structure planning and no changes to the local and district road network would be expected as a result of the development of Lot 703.

15.4. The traffic demands do not require higher order roads to be provided within the subject land. All roads will operate in a satisfactory manner as Access Road type C. However, the east west spine is classified as a neighbourhood connector type B cognisant of its function and the district structure plan.

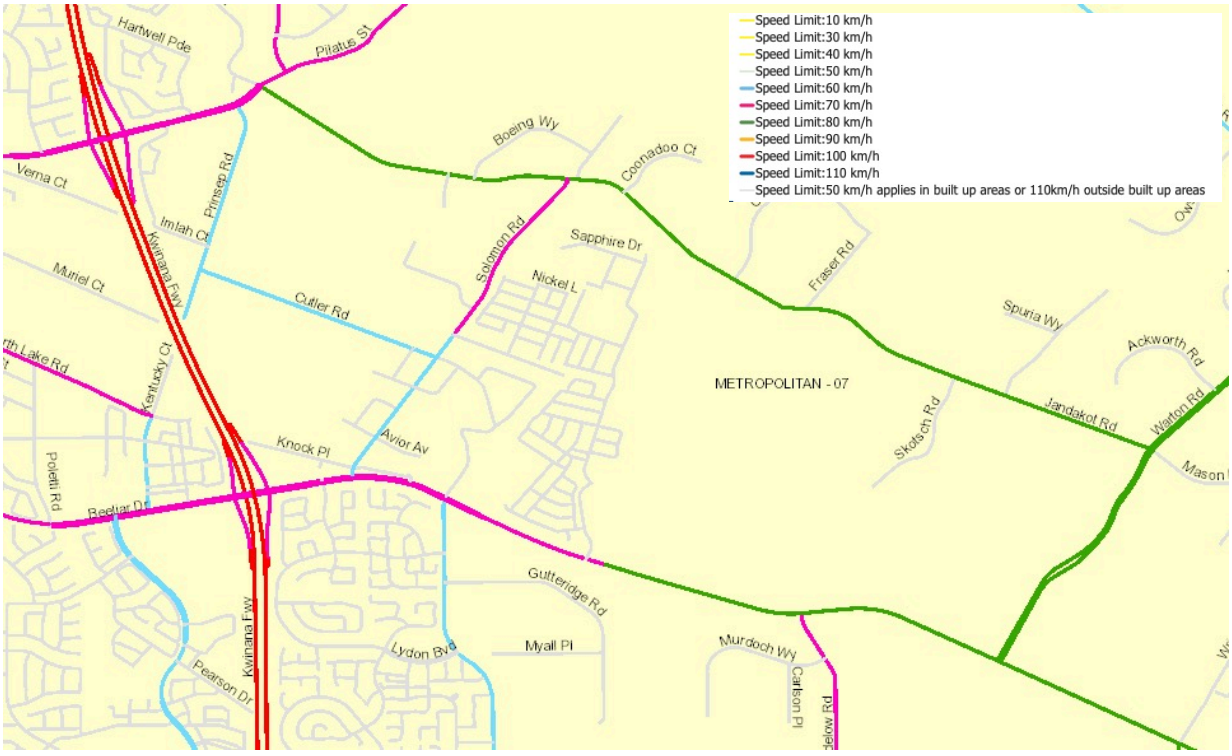
15.5. External to Lot 703 no significant traffic impact is shown. Forecast traffic demands using Jandakot Road are low and equate to less than 1% of the forecast daily demand.

15.6. Analysis of the existing roundabout on Ghostgum Avenue / Clementine Boulevard indicates the roundabout will operate at Levels of Service A with all Lot 703 traffic and full development of the district structure plan area.

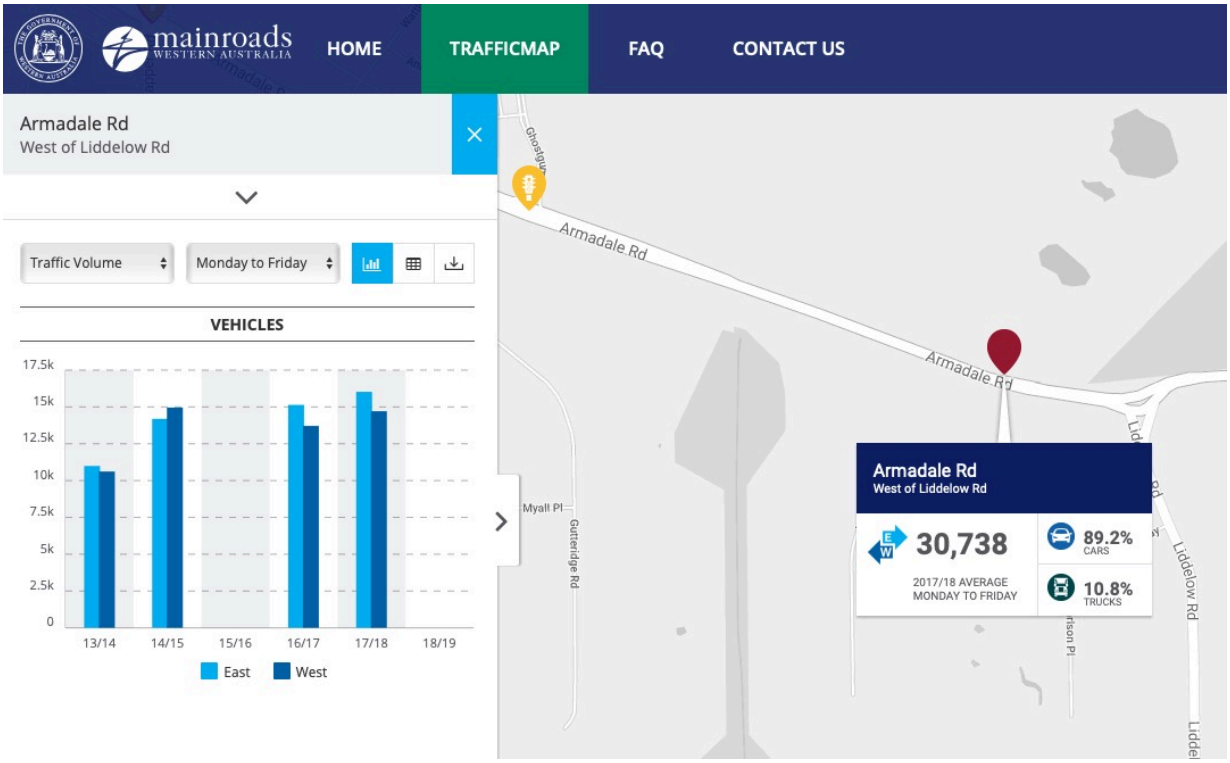
APPENDIX A ROAD HIERARCHY, SPEEDS AND TRAFFIC DATA

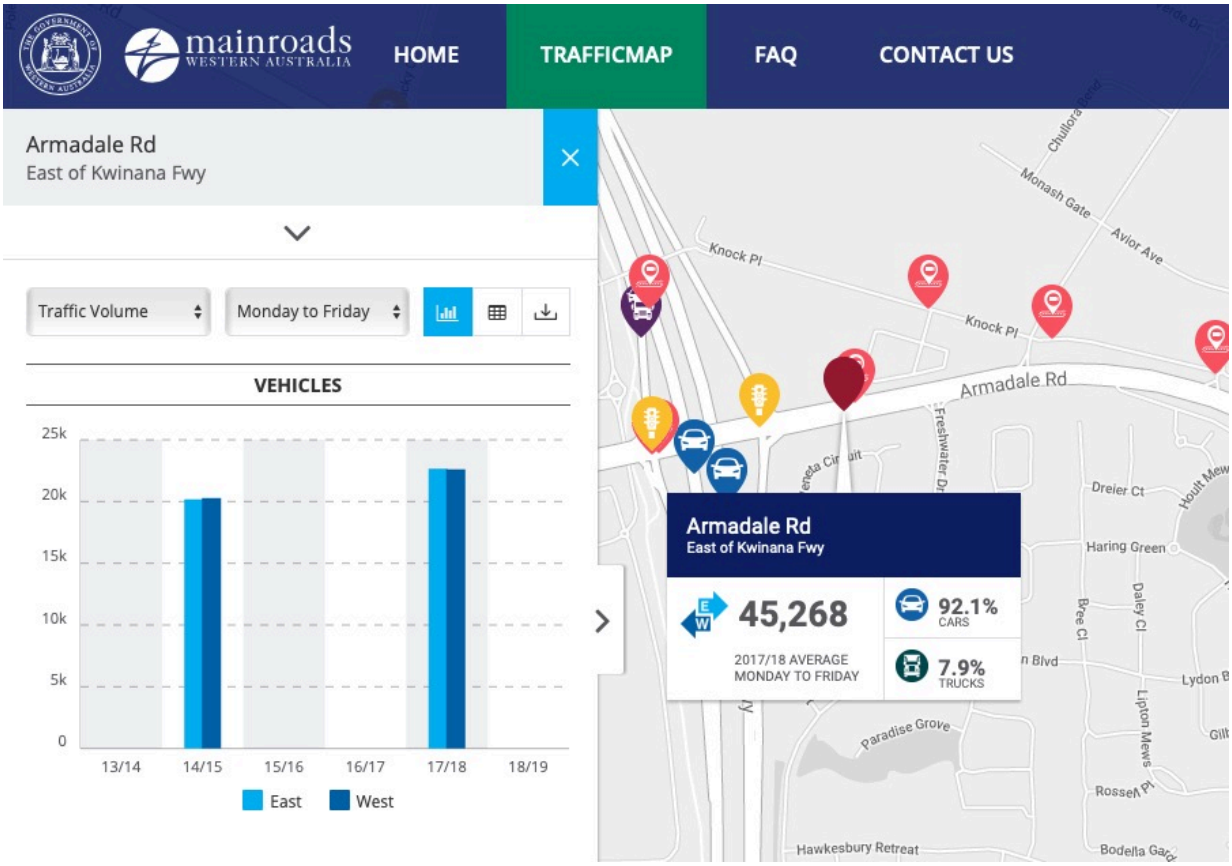


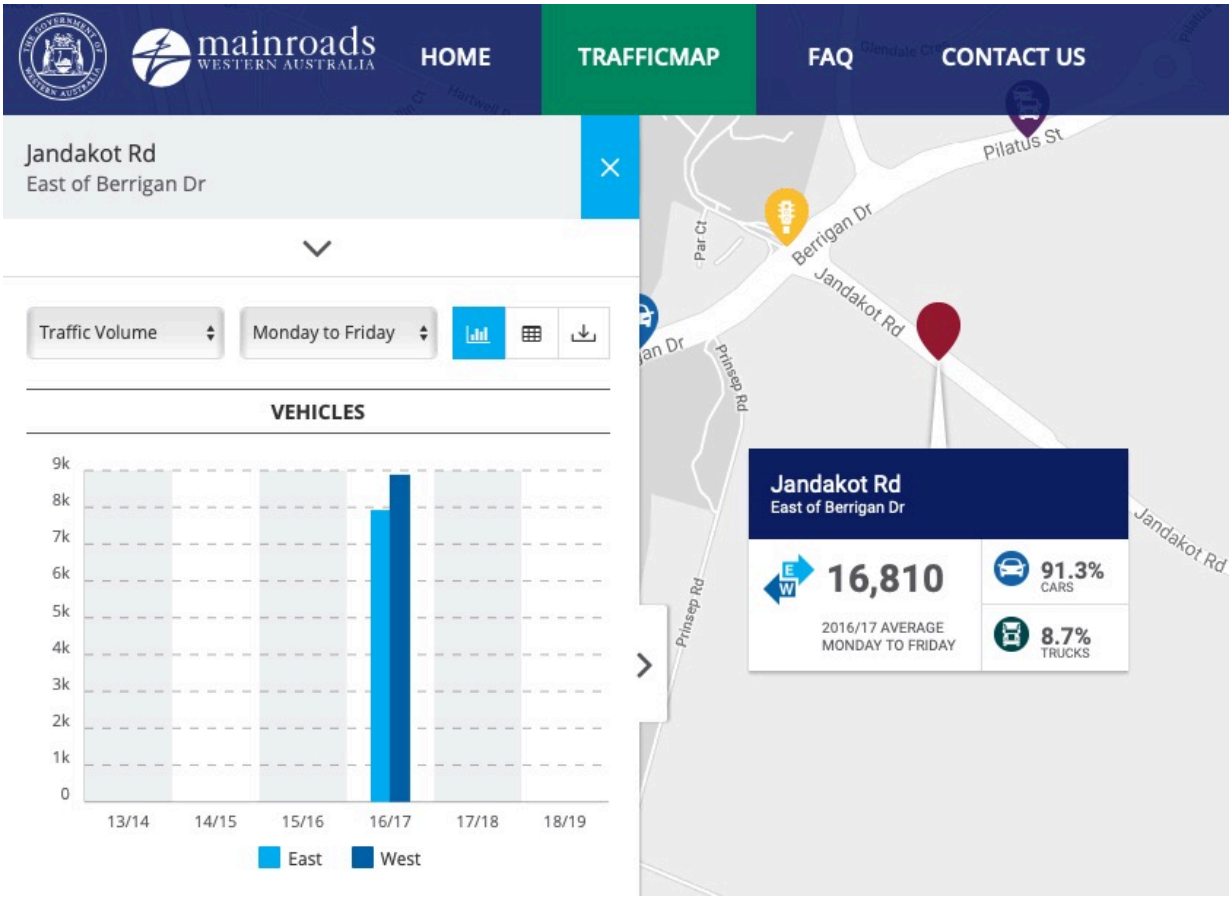
MRWA Functional Road Hierarchy



MRWA Speed Limits


mainroads
WESTERN AUSTRALIA
HOME
TRAFFICMAP
FAQ
CONTACT US
Armadale Rd
West of Liddelow Rd
Traffic Volume
Monday to Friday
VEHICLES
17.5k
15k
12.5k
10k
7.5k
5k
2.5k
0
13/14
14/15
15/16
16/17
17/18
18/19
East
West
Armadale Rd
Myall Pl
Gutteridge Rd
Liddelow Rd
Armadale Rd
West of Liddelow Rd
30,738
2017/18 AVERAGE
MONDAY TO FRIDAY
89.2%
CARS
10.8%
TRUCKS


mainroads
WESTERN AUSTRALIA
HOME
TRAFFICMAP
FAQ
CONTACT US
Armadale Rd
East of Kwinana Fwy
Traffic Volume
Monday to Friday
VEHICLES
25k
20k
15k
10k
5k
0
13/14
14/15
15/16
16/17
17/18
18/19
East
West
Knock Pl
Monash Gate
Avior Ave
Armadale Rd
Freshwater Dr
Dreier Ct
Haring Green
Paradise Grove
Hawkesbury Retreat
Armadale Rd
East of Kwinana Fwy
45,268
2017/18 AVERAGE
MONDAY TO FRIDAY
92.1%
CARS
7.9%
TRUCKS


mainroads
WESTERN AUSTRALIA
HOME
TRAFFICMAP
FAQ
CONTACT US
Jandakot Rd
East of Berrigan Dr
Traffic Volume
Monday to Friday
VEHICLES
9k
8k
7k
6k
5k
4k
3k
2k
1k
0
13/14
14/15
15/16
16/17
17/18
18/19
East
West
Pilatus St
Par Ct
Berrigan Dr
Jandakot Rd
Prinsep Rd
Jandakot Rd
Jandakot Rd
East of Berrigan Dr
16,810
2016/17 AVERAGE
MONDAY TO FRIDAY
91.3%
CARS
8.7%
TRUCKS

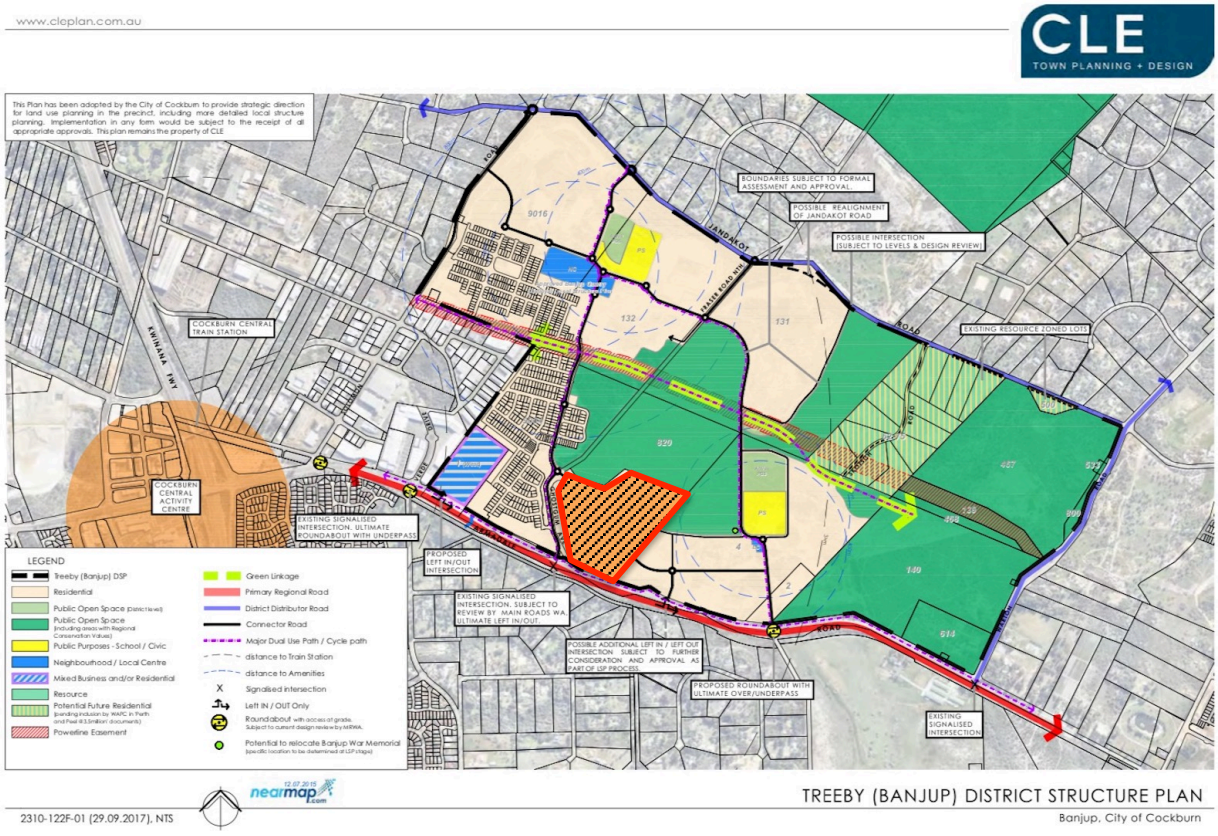
APPENDIX B Levels of Service by Road Type

LOS	Single Carriageway[1]	2-Lane Boulevard[2]	Dual Carriageway (4-Lanes)[3]	Dual Carriageway (4-lane Clearway)[3]
A	2,400vpd	2,600vpd	24,000vpd	27,000vpd
B	4,800vpd	5,300vpd	28,000vpd	31,500vpd
C	7,900vpd	8,700vpd	32,000vpd	36,000vpd
D	13,500vpd	15,000vpd	36,000vpd	40,500vpd
E	22,900vpd	25,200vpd[4]	40,000vpd	45,000vpd
F	>22,900vpd	>25,200vpd[4]	>40,000vpd	>45,000vpd

[1] Based on Table 3.9 Austroads - Guide to Traffic Engineering Practice Part 2
[2] Based on single carriageway +10% (supported by Table 3.1 Austroads - Guide to Traffic Engineering Practice Part 3) – Boulevard or division by medians.
[3] Based on RRR Table 3.5 - mid-block service flow rates (SF.) for urban arterial roads with interrupted flow. Using 60/40 peak split.
[4] Note James Street Guildford passes 28,000vpd.

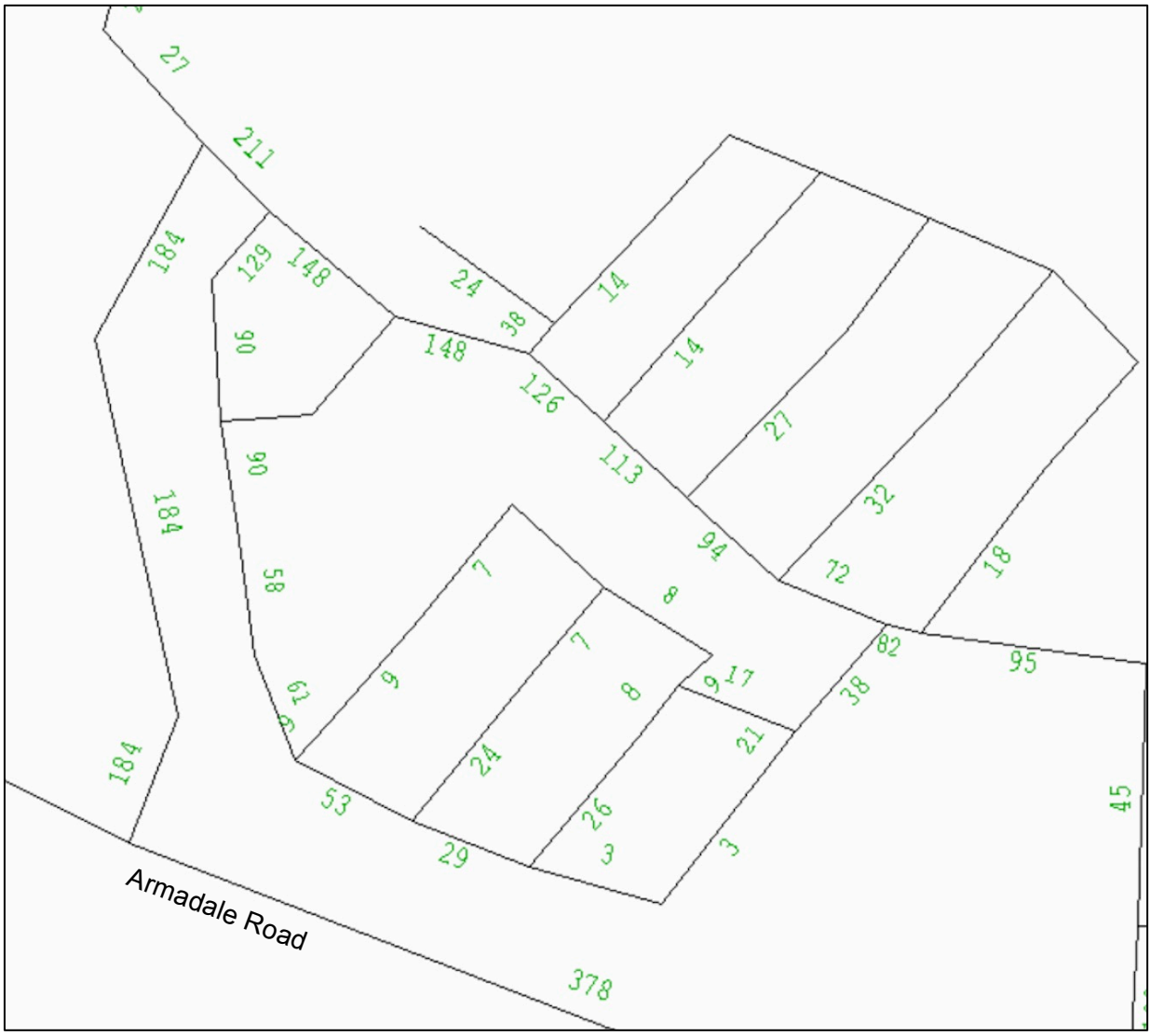
For the purposes of planning, the capacity of a road can be taken as the value between Level of Service E and F. However, a Level of Service D is the lowest preferred operational Level of Service.

APPENDIX C BANJUP DISTRICT STRUCTURE PLAN



Lot 703 shown hatched

APPENDIX D SATURN MODEL TRAFFIC DEMANDS



Daily demand x 10. Includes adjacent development

APPENDIX E STRUCTURE PLAN TRAFFIC DEMANDS

Roads Carrying Less than 1000vpd



Roads Carrying 1000vpd - 3000vpd

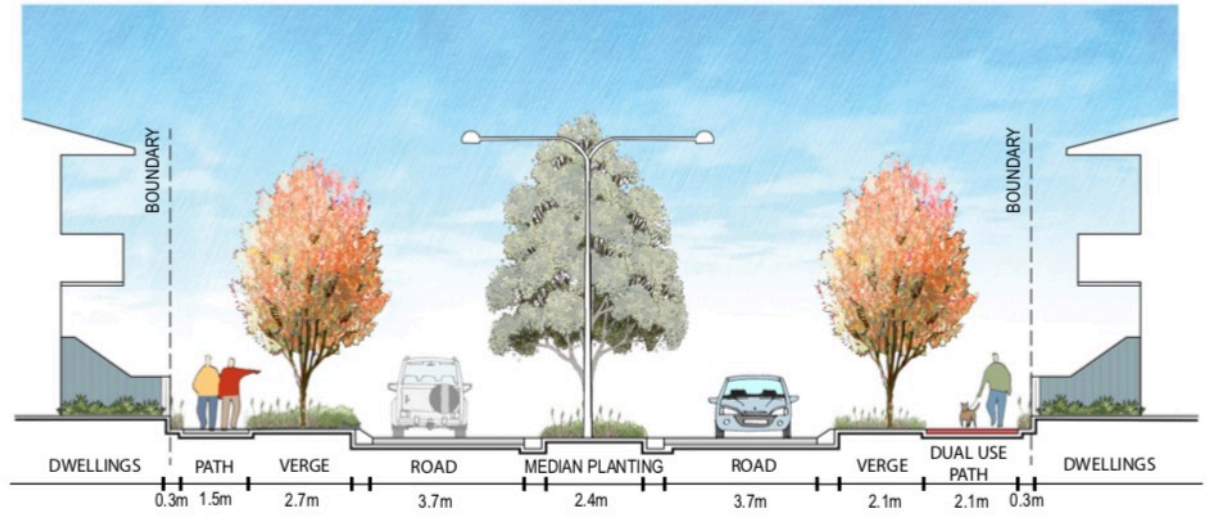


Roads Carrying more than 3000vpd

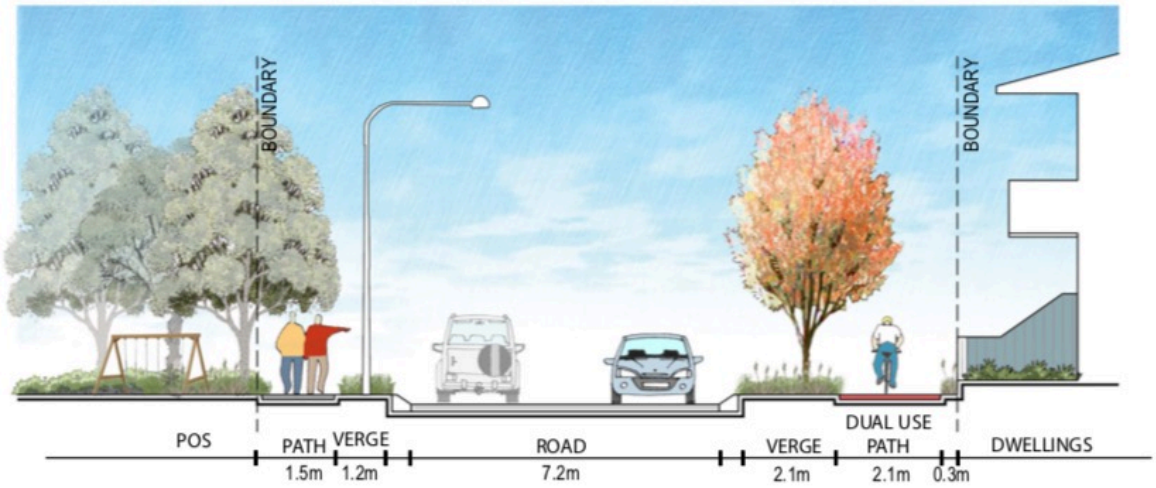


APPENDIX F INDICATIVE ROAD CROSS SECTIONS

NEIGHBOURHOOD CONNECTOR



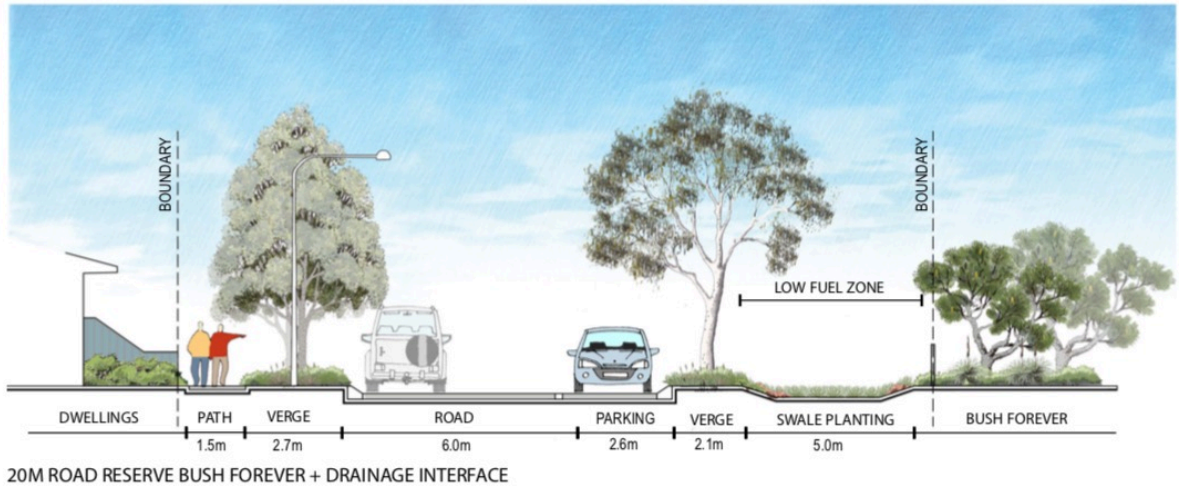
20M BOULEVARD ENTRY ROAD



15M ROAD RESERVE INTERFACE TO PUBLIC OPEN SPACE

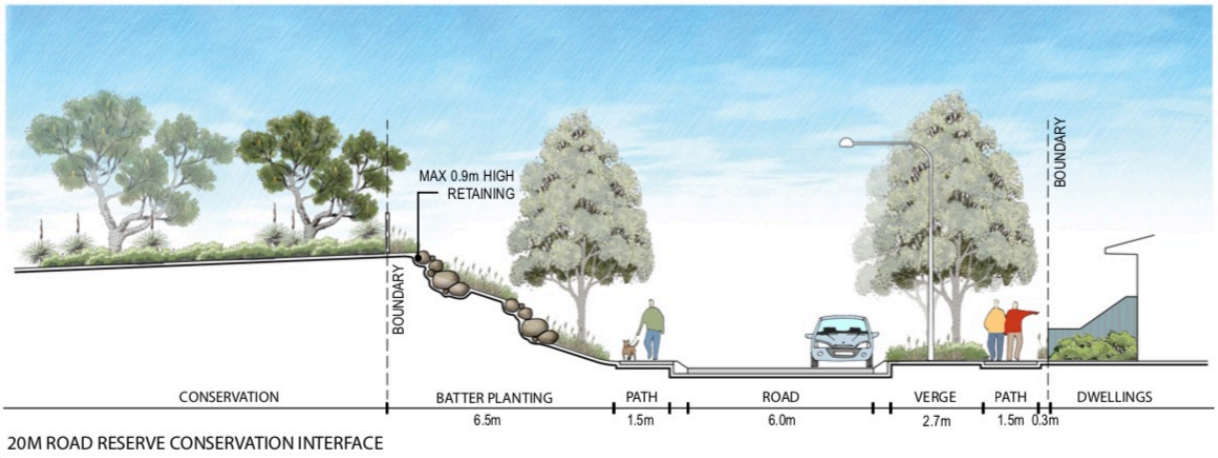
Plan provided by Emerge

ACCESS STREET TYPE C



20M ROAD RESERVE BUSH FOREVER + DRAINAGE INTERFACE

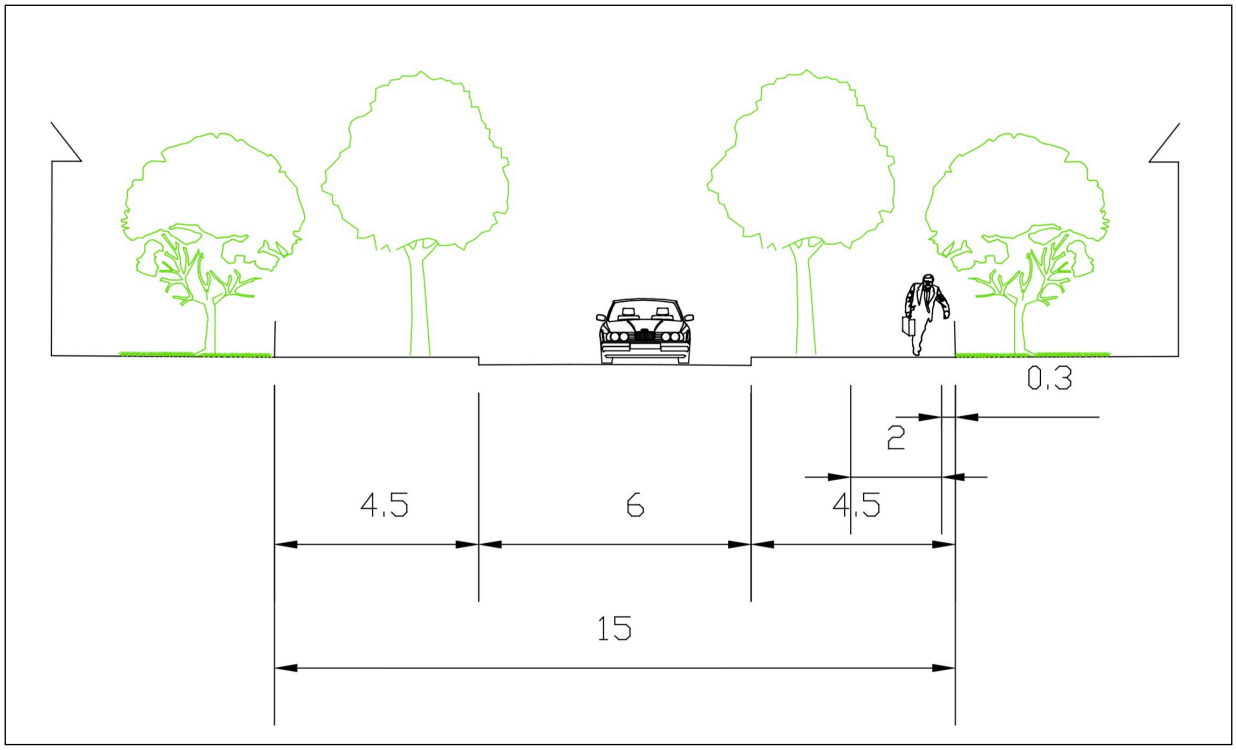
Plan provided by Emerge



20M ROAD RESERVE CONSERVATION INTERFACE

Plan provided by Emerge

ACCESS STREET TYPE D



APPENDIX G SIDRA ANALYSIS OF GHOSTGUM AVENUE ROUNDABOUT

MOVEMENT SUMMARY

Site: 101 [Site1]

Lot 821 Treeby
Site Access / Ghostgum Avenue
AM Peak Full Developmemt
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	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 per veh	Average Speed km/h
SouthEast: Lot 821 Access											
21	L2	194	0.0	0.192	4.9	LOS A	1.0	7.2	0.42	0.53	54.5
22	T1	34	0.0	0.192	5.1	LOS A	1.0	7.2	0.42	0.53	56.0
Approach		227	0.0	0.192	5.0	LOS A	1.0	7.2	0.42	0.53	54.7
NorthWest: Clementine Boulevard											
28	T1	51	0.0	0.180	3.9	LOS A	1.0	6.9	0.05	0.61	54.0
29	R2	253	0.0	0.180	9.0	LOS A	1.0	6.9	0.05	0.61	54.1
Approach		303	0.0	0.180	8.1	LOS A	1.0	6.9	0.05	0.61	54.1
SouthWest: Ghostgum Avenue											
30	L2	63	0.0	0.049	3.8	LOS A	0.3	1.8	0.14	0.46	55.2
32	R2	7	0.0	0.049	9.1	LOS A	0.3	1.8	0.14	0.46	56.8
Approach		71	0.0	0.049	4.4	LOS A	0.3	1.8	0.14	0.46	55.3
All Vehicles		601	0.0	0.192	6.5	LOS A	1.0	7.2	0.20	0.56	54.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.