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CONSULTING CIVIL & TRAFFIC ENGINEERS, RISK MANAGERS.

Project:	Transport Assessment for the Proposed Daliak Development Outline Development Plan. V2
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1 Summary

Shawmac Pty Ltd was commissioned by York Farm Holdings to undertake an assessment of the transportation impacts associated with the preparation of an Outline Development Plan and future intended subdivision and development of an area of land in Daliak, York.

Key transport issues focus on the following:

- The capacity of the local road network to accommodate the additional traffic generated by the proposal;
- The extent to which the additional traffic generated can be safely managed on the adjacent current and future road network;
- The provision of safe access to the proposed subdivision from the adjacent road network;
- The safety and efficiency of the site's internal road network and in particular the extent that the site is able to safely and efficiently accommodate alternative and sustainable transport modes including pedestrians and cyclists.

Analysis shows that Great Southern Highway, Morris Edwards Drive and Trews Road are likely to be the major traffic carrying routes adjacent to the development. With the exception of these roads and Connectors within the subdivision all of the other streets are predicted to carry relatively low traffic volumes generally less than 1,000 vehicles per day.

The proposed road network is generally permeable and the design of the streets will reinforce distribution of traffic onto the higher hierarchy roads.

It is concluded that the proposed street network will provide an acceptable range of choices for travel and ensure that traffic volumes on individual streets can be kept below threshold levels to ensure the amenity of the area is preserved and safe movement options exist for pedestrians, cyclists and local traffic.

2 Introduction and Background

York Farm Holdings has prepared an Outline Development Plan (ODP) of the Morris Edward Drive and Road Residential/Commercial development, known as the Daliak subdivision which is situated on the south west boundary of the York townsite within the municipality of the Shire of York (Shire). As part of the preparation of the ODP, the planners for the project (Whelans) commissioned Shawmac to prepare a Transport Assessment for the site.

The intent of this transport assessment is to clearly demonstrate to the approving authority that the

subdivision would:

- provide safe and efficient access for all modes;
- be well integrated with the surrounding land uses;
- not adversely impact on the surrounding area; and
- not adversely impact on the surrounding transport networks and the users of those networks.

2.1 Proposed Outline Development Plan

The Outline Development Plan is located as shown on Figure 1.

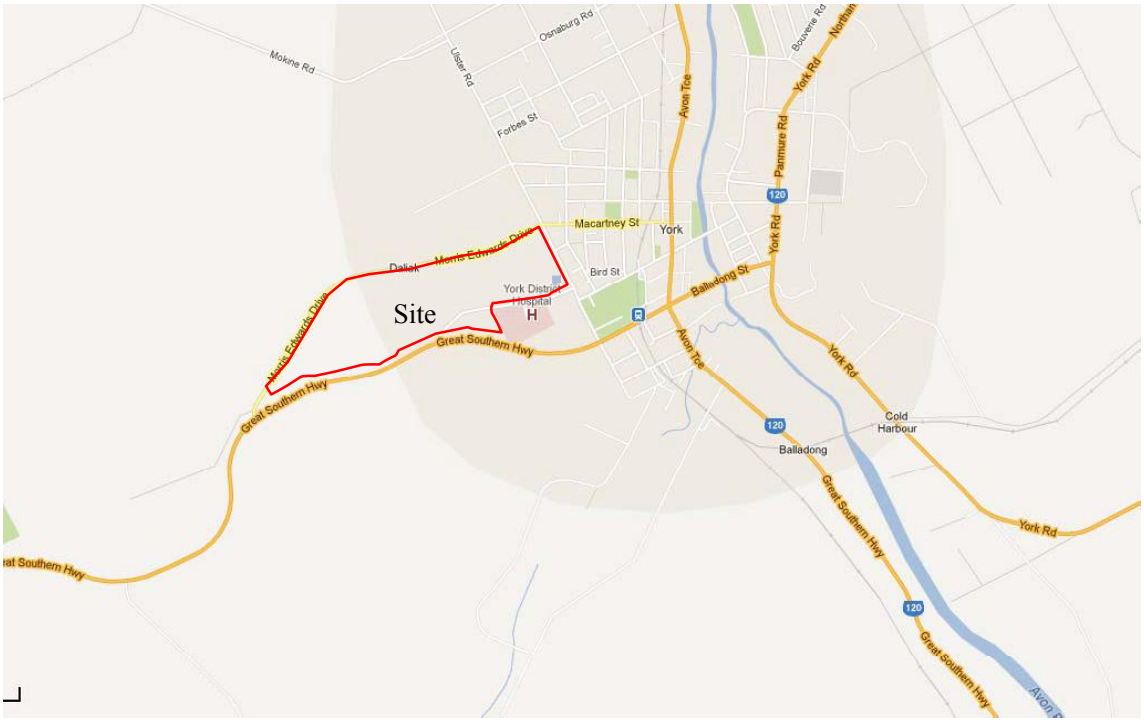

Figure 1. Location.

The proposed outline development plan is shown on Figure 2.

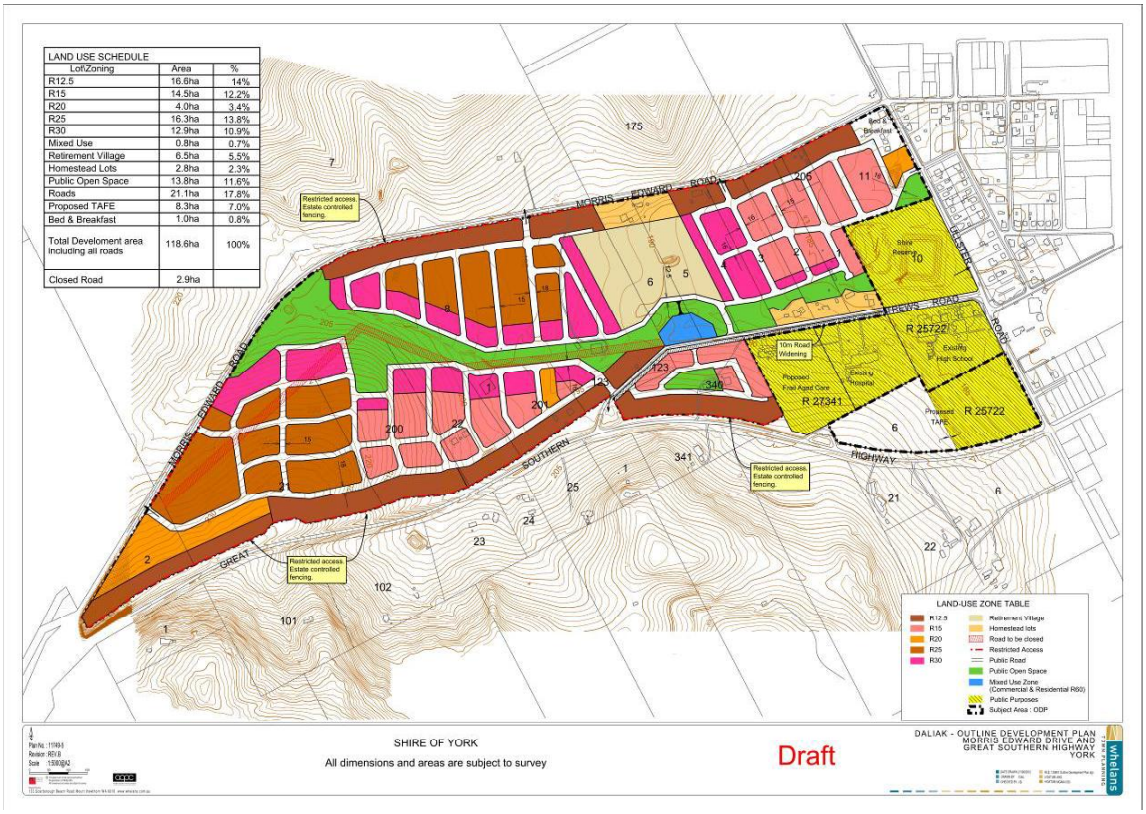

Figure 2. Proposed Outline Development Plan

Proposed land use has been estimated from the Outline Development Plan and is summarised in Table 1.

Land Use	Quantum
R12.5	16.6 Ha
R15	14.5 Ha
R20	4.0 Ha
R25	16.3 Ha
R30	12.9 Ha
Mixed Use	6.5 Ha
Residential (Retirement Living)	0.8 Ha
Homestead Lots	2.8 Ha
Public Open Space	13.8 Ha
Proposed TAFE	8.3 Ha
Bed and Breakfast	1.0 Ha

Table 1. Proposed Land Use.

Existing uses include:

- Rural holdings;
- Scattered Residential;
- Wetland and drainage.

Changes of use includes:

- Residential lots;
- Homestead lots;
- Mixed Use lot;
- Retirement Village;
- TAFE and,
- Public Open Space.

The site comprises two sections; a small 8ha development area located to the south east of the main site (TAFE site) and the larger 111ha development area (main site) bounded by Morris Edwards Drive to the north, Great Southern Highway to the south and Ulster Road to the east. The land is principally agricultural land with a small number of properties along the southern boundary and in the centre of the northern boundary. Bed and breakfast accommodation is located in the north east corner and will remain after the redevelopment.

The TAFE site is bound by agricultural land to the north, Forrest Street to the east and Great Southern Highway to the south and west. This land is entirely agricultural land with no development.

2.2 Issues.

No Issues were identified.

2.3 Subdivision proposal

2.3.1 Regional context

The site is currently zoned "Development" and Lots 1,2,52 and 102 as “Public Purpose” under the Town Planning Scheme (TPS) No. 2 (Shire of York, 2010).

2.3.2 Proposed land uses

Land Use	R12.5	R15	R20	R25	R30	Mixed Use	Retirement
Area (m^2)	166000	145000	40000	163000	129000		
Dwellings	208	218	80	408	267	21	100

Table 2. Proposed Land Use.

The quantum of each land use type is estimated from respective areas and is summarised on Table 2.

3 Existing situation

3.1 Land Use

Current land use of the study area is outlined in Section 2. Land use adjacent to the site is consistent with the zoning under TPS 2 part of which is shown on Figure 3.

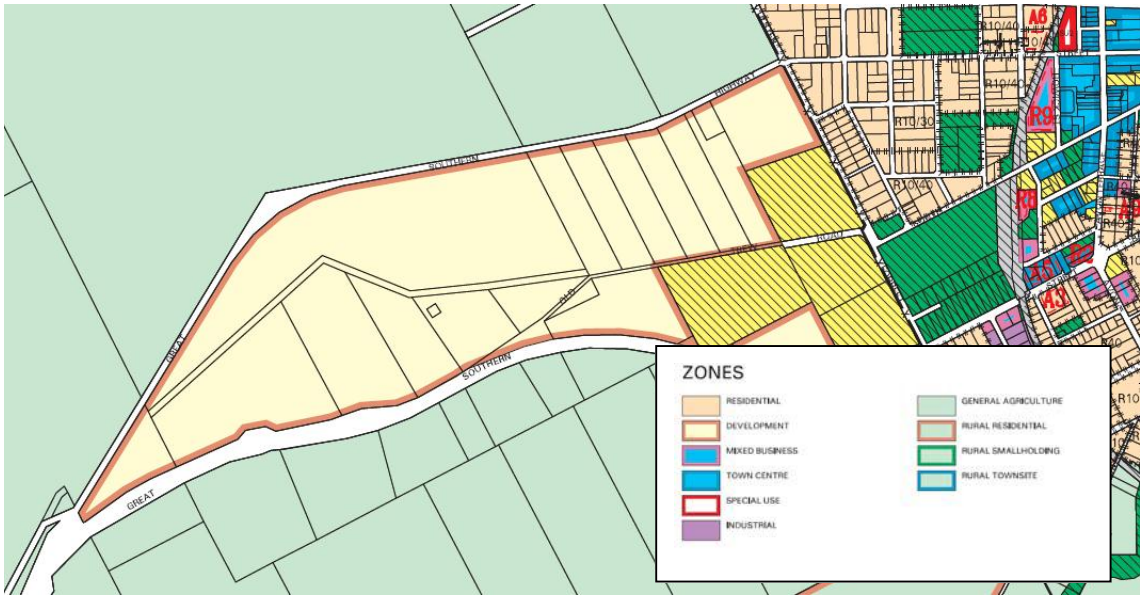

Figure 3. Site Zoning under TPS 2

3.2 Existing Road Network

Great Southern Highway (Chidlow York Road) forms the southern boundary to the site and provides the main connection between the Perth metropolitan area and the south eastern Wheatbelt (including York). It is an alternative to the Great Eastern Highway for eastbound high and wide loads and carries grain, fertiliser, general freight, commuter and tourist traffic.

Within the study area, the Chidlow York Road provides the western access to the York town site, becoming Henrietta Street, crossing the rail line and then terminating at Avon Terrace.

Prior to 1980 the main western access from Chidlow into York was via Morris Edwards Drive, which forms the northern boundary to the site, and Macartney Street.

The eastern boundary of the site is formed by Ulster Road. Within the site Trews Road provides a connection between Ulster Road and Great Southern Highway and provides access to the York Hospital and other existing properties.

There are no bus services within walking distance of the site and cycle and pedestrian facilities are not provided.

Road infrastructure adjoining the site is shown on Table 3.

Road	Carriageways	Paths	Zoned speed limit	Intersection details
Great Southern Highway	Unkerbed single carriageway – State road – Control of Access Road 2 X 3.5 m lanes.	None	110 – 90 - 60 km/h	Unchannelised 4 way intersection at Forrest Street.
Morris Edwards Drive	Unkerbed single carriageway 1 X 6.5m carriageway	None	90 – 60 - 50 km/h	Unchannelised four way intersection at Ulster Road. Partly channelised three way intersection at Great Southern Highway.
Road	Unkerbed single carriageway 1 X 7.45 m carriageway. Reducing to 1 X 6.0 m carriageway.	Partial path on south side west of Ulster Road	50 km/h	Unchannelised three way intersection at Ulster Road. Unchannelised three way intersection at Great Southern Highway.

Table 3. Existing Network.

Figure 4. Morris Edwards Drive looking towards Ulster Road

Figure 5. Morris Edwards Drive looking towards Great Southern Highway

Figure 6. Great Southern Highway looking towards Morris Edwards Drive

Figure 7. Great Southern Highway looking towards Trews Road.

Figure 8. Great Southern Highway looking towards Forrest Street.

Figure 9. Trews Road looking towards Forrest Street.

4 Proposed internal transport networks

Figure 10 below indicates proposed internal transport routes and has been developed from predicted flows.

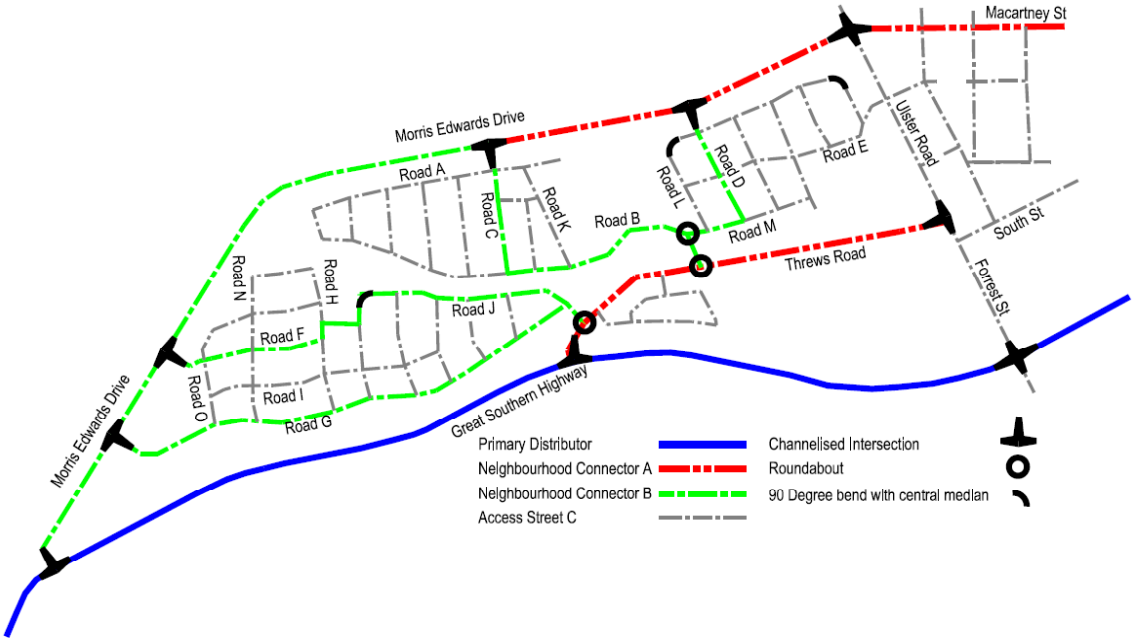

Figure 10. Proposed Infrastructure.

5 Changes to external transport networks

There are no known changes to the external road network in the immediate vicinity of the site.

Future changes within the immediate region include the construction of a heavy haulage bypass from Great Southern Highway to loop around Blandstown to the east.

6 Integration with surrounding area

6.1 Major attractors and generators

Major attractors and generators are shown on Figure 11.

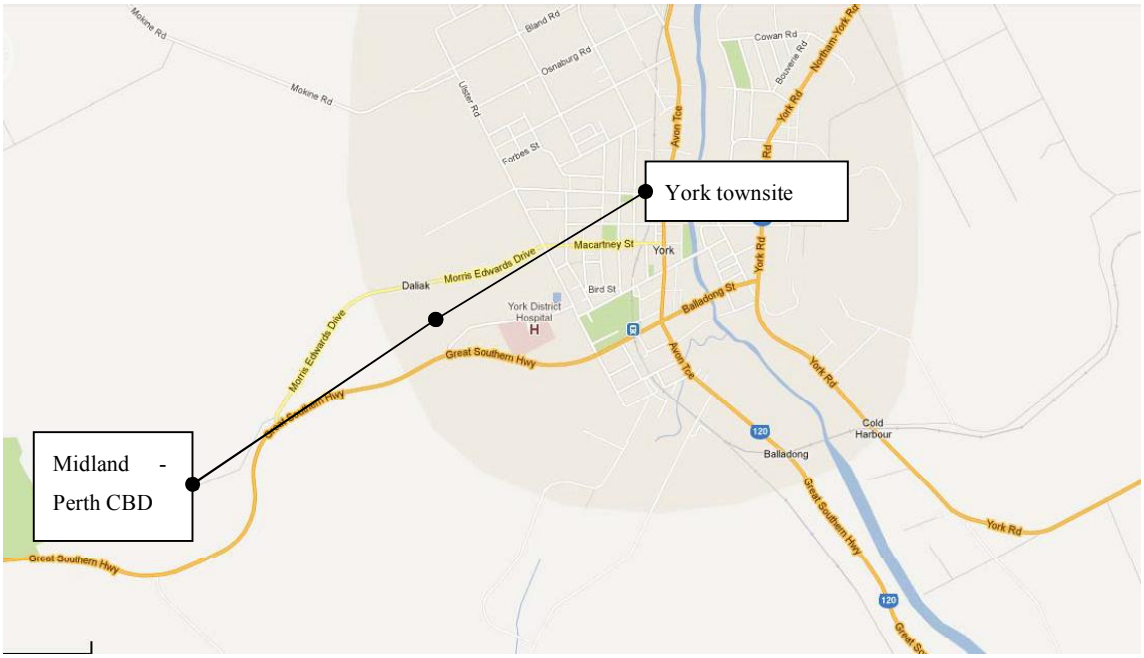

Figure 11. Attractors and Generators

Key attractors are likely to be:

- York Townsite;
- Midland;
- Perth CBD;
- Northam;
- Community and recreational facilities.

6.2 Main desire lines

Main desire lines are identified in section 6.1 with an assumed split shown on Figure 12.

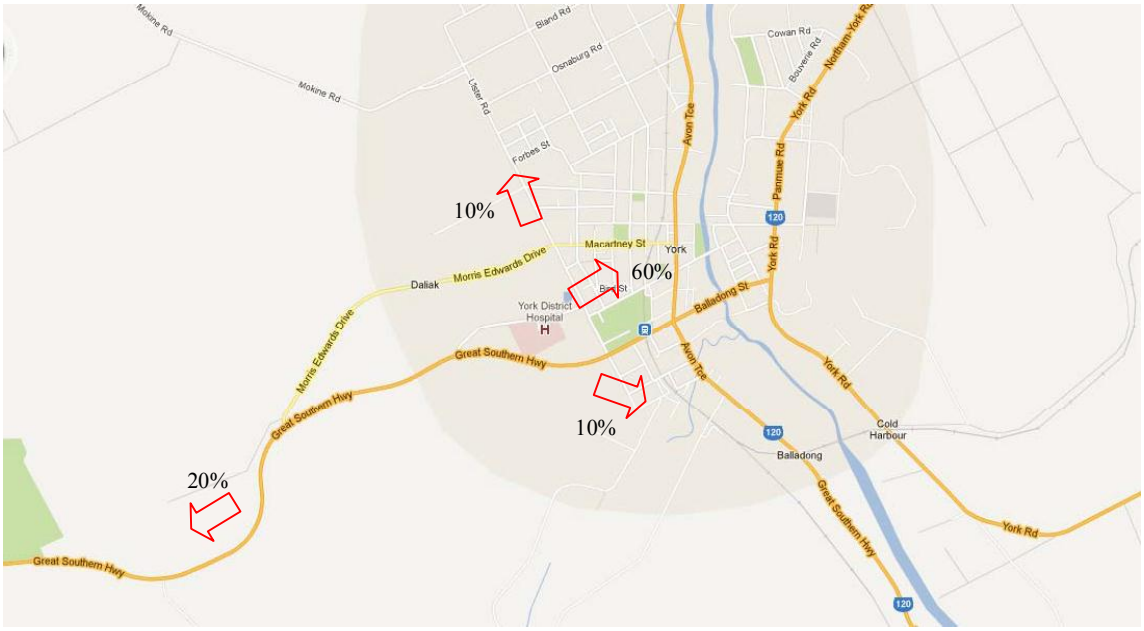

Figure 12. Assumed Traffic Split.

6.3 Gap analysis.

Assessment was carried out to determine whether or not the existing transport networks, plus any proposed changes, would adequately match predicted desire lines, particularly for pedestrians, cyclists and public transport. Identified deficiencies included lack of dedicated pedestrian facilities, lack of dedicated cyclist facilities, lack of public transport and substandard existing road widths.

7 Analysis of transport networks

7.1 Introduction

Section 2 of the assessment provides a description and an inventory of the proposal and surrounding area with respect to land uses and transport networks. The following sections provide a more detailed quantitative analysis of the proposed internal and external transport networks to demonstrate that they will provide a high level of accessibility and safety for all modes.

7.2 Assessment years

Assessment is based on the full development of the site and is taken as being 2020.

7.3 Time periods for assessment

The assessment is based on analysis of the following peaks:

PM peak period(s) on the surrounding road network;

PM peak period(s) for the site.

8 Analysis of internal transport networks

8.1 Subdivision generated traffic

Vehicle trip generation rates are based on the following recognised land use traffic generation databases:

- Land Use Traffic Generation Guidelines, March 1987 - Director General of Transport, South Australia;
- Guide to Traffic Generating Developments Version 2.2, October 2002 – Roads and Traffic Authority, New South Wales; and
- Trip Generation 7th edition, 2003 - Institute of Transportation Engineers, Washington, USA.

Assessed generation is shown on Table 4 based on Traffic Assessment Zones (TAZ's) shown on Figure 13.

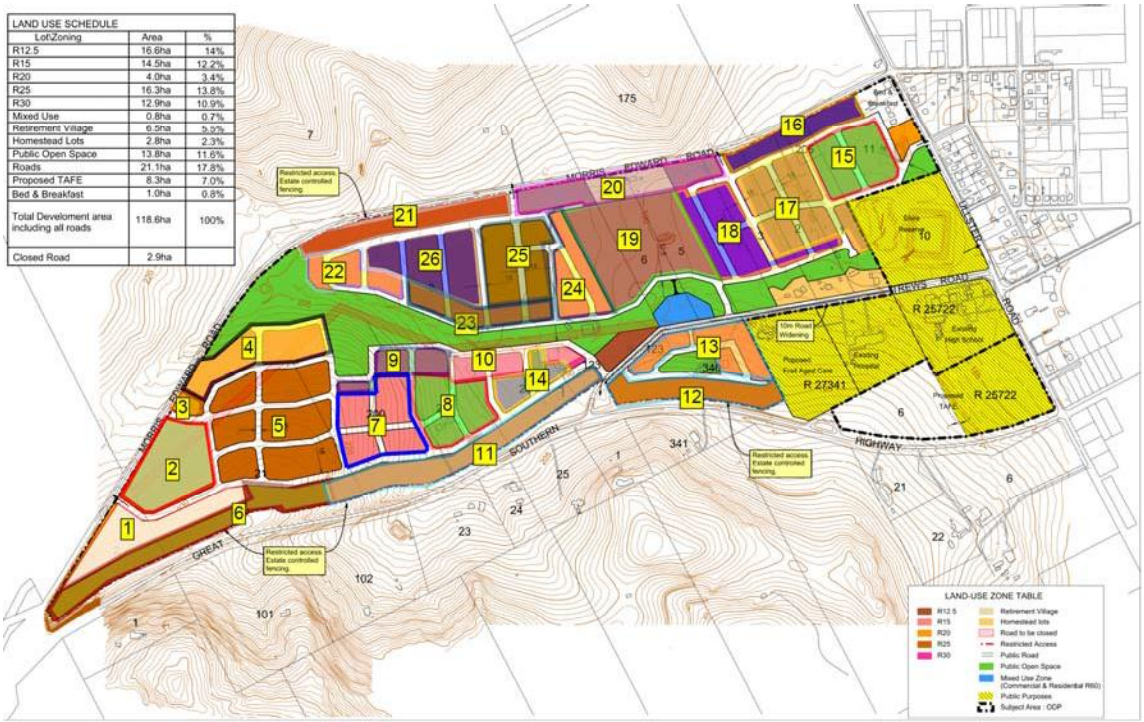

Figure 13. TAZ's

Note that the peak hour volumes for the High School will occur at different times to peaks generated

by other land uses, particularly in the afternoon. However assessment has been made on a conservative basis with afternoon peaks assumed to occur simultaneously.

	Estimated area	R12.5 Estimated area	R15 Estimated area	R20 Estimated area	R25 Estimated area	R30 Estimated area	Estimated dwelling units	Trips
Area 1:				32000			64	512
Area 2		25000					31	250
Area 3					5000		13	100
Area 4						25000	75	600
Area 5					84000		210	1680
Area 6		27000					34	270
Area 7			32000				48	384
Area 8			23000				35	276
Area 9						11000	33	264
Area 10						12000	36	288
Area 11		32000					40	320
Area 12		22000					28	220
Area 13			21000				32	252
Area 14			9000	4000			22	172
Area 15			23000	4000			43	340
Area 16		12000					15	120
Area 17			37000				56	444
Area 18						31000	93	744
Area 19 (Retirement)	63402						99	396
Area 20		25000					31	250
Area 21		23000					29	230
Area 22						12000	36	288
Area 23						17000	51	408
Area 24						21000	63	504
Area 25					36000		90	720
Area 26					38000		95	760
Mixed use	7761						23	186
Mixed use								300
Hospital								500
High School								500

Table 4. Estimated Daily Traffic

Using the QRS II software, flows were assigned to the network as shown on Figure 14.

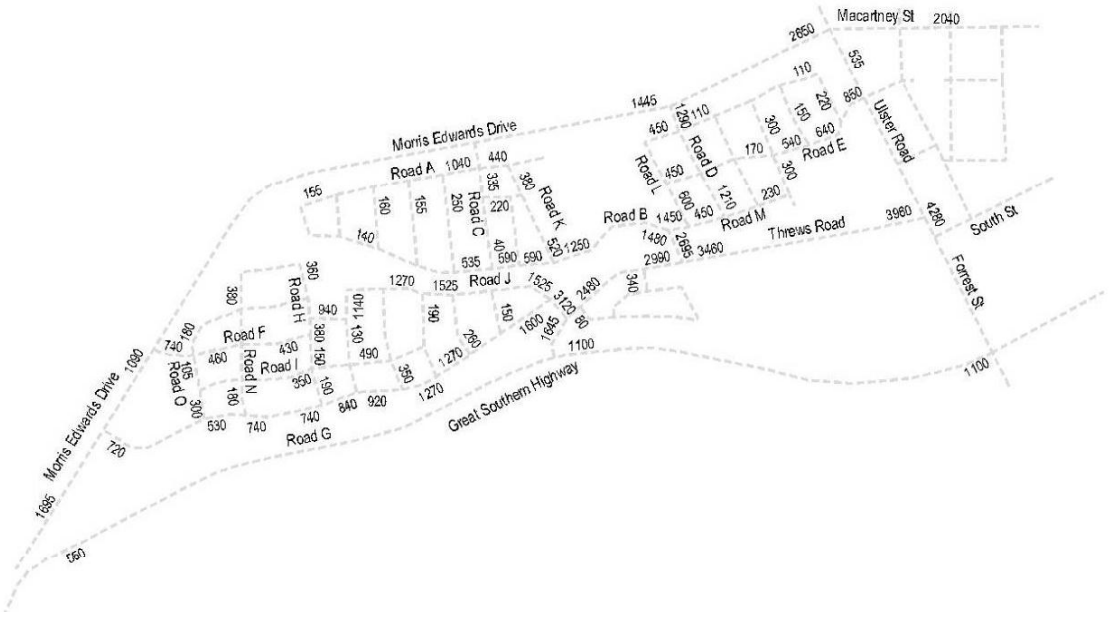

Figure 14. Subdivision Generated Traffic.

8.2 Non subdivision traffic

Given the nature of the existing site and poor connectivity, non subdivision traffic is expected to be light. Great Southern Highway records daily volumes of about 1,700 vehicles per day; no traffic count information is available for Morris Edwards Drive adjacent to study site but existing traffic flows are expected to be low and in the order of 300 to 500 vpd.

Volumes on Trews Road and Ulster Road are similarly expected to be in the order of 1,200 to 1,500 vpd.

8.3 Design traffic flows

Design traffic flows have been estimated by adding non subdivisional traffic to the subdivision generated traffic and the results are shown on Figure 15. Non subdivision traffic has been factored by an annual growth rate of 1% through to the assessment year (2020).

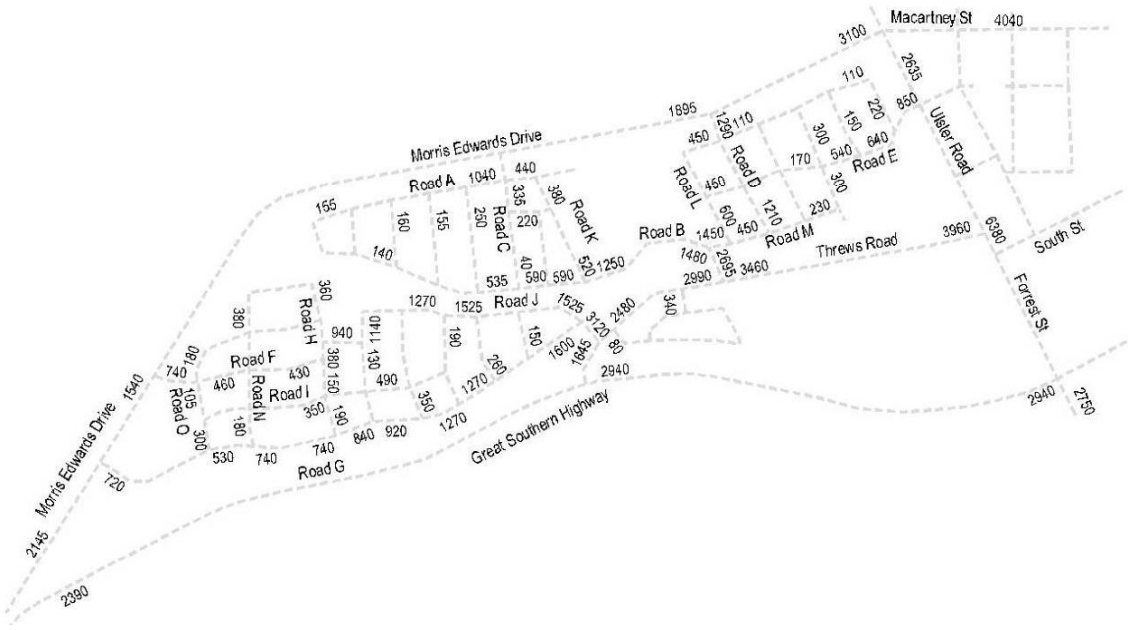

Figure 15. Design Traffic Flows

8.4 Roads and intersections

8.4.1 Mid Block Cross Sections

Where volumes are not shown on roads in Figure 16, they are predicted to be less than 1,000 vehicles per day. Requirements for road cross sections have been based on recommendations contained within Liveable Neighborhoods and the Austroads Guide to Traffic Engineering Practice which requires the following:

Indicative volume.			**Indicative Carriageway Width.**
50,000.			Determined by Main Roads WA
35,000.			Determined by Main Roads WA
15,000 to 35,000.			2 X 8.2 metre carriageways including bike lane and 2 X 5.5 metre service roads containing parking.
<25,000			2 X 10.7 metre carriageways including combined on street parking and bike lane.
7,000 to 15,000.			2 X 7.5 metre carriageways with on street parking and bike lane.
15,000.			2 X 7.5 metre carriageways with on street parking.
7,000.			2 X 7.1 metres including parking, on street bike lane, median plus shared path on one verge.
3,000.	Neighborhood Connector B.	19.4 metres	11.2 metres including parking plus shared path on one verge.

Indicative volume.			Indicative Carriageway Width.
3,000.			2 x 3.5 metre lanes plus indented parking.
3,000.			9.7 metre lane.
3,000.			7.2 (7.0 – 7.5) metre lane.
1,000.			5.5 – 6.0 metre lane.
150			3.5 metre lane plus parking indents.
3,000.	Access Street D (Wider street).	16.5 - 18 metres.	9.7 metre lane.

Table 5. Road Hierarchy Criteria.

Based on these criteria, road requirements are as shown on Table 7. Note the cross sections have been modified from the indicative widths shown on Table 5; however the capacity and provision for parking has been maintained consistent with the intent of the Liveable Neighbourhoods Criteria.

Road[1]	Predicted Volume (vpd).	Reserve Requirement.	Carriageway Requirement.
Morris Edwards Drive east of Road C	Up to 1,575	Neighborhood Connector A. 20.0m	2 X 3.5 metres plus shared path on one verge.
Morris Edwards Drive west of Road C		Neighborhood Connector B. 20.0m	2 X 3.5 metres plus shared path on one verge.
Trews Road	Up to 3,330	Neighborhood Connector A. 20.0 / 18.0m	2 X 3.5 metres plus shared path on one verge. 2 X 7.0 metres including parking, on street bike lane, median plus shared path on both verges adjacent to Mixed use zoning.
Road B	Up to 2,860	Neighborhood Connector B. 18.0m	7.4 metres including parking plus shared path on one verge.
Road B east of Road C	Up to 2,695	Neighborhood Connector B. 18.0m	7.4 metres including parking plus shared path on one verge.
Road C	Up to 1,600	Neighborhood Connector B. 18.0m	7.4 metres including parking plus shared path on one verge.
Road D	Up to 1,290	Neighborhood Connector B. 18.0m	7.4 metres including parking plus shared path on one verge.

[1] Road designations as shown on figure 4.

Road[1]	Predicted Volume (vpd).	Reserve Requirement.	Carriageway Requirement.
Road F	Up to 940	Neighborhood Connector B. 18.0m	7.4 metres including parking plus shared path on one verge.
Road G	Up to 1,600	Neighborhood Connector B. 18.0m	7.4 metres including parking plus shared path on one verge.
Road J north of Road G	Up to 1,525	Neighborhood Connector B. 18.0m	7.4 metres including parking plus shared path on one verge.
Road J south of Road G	Up to 3,120	Neighborhood Connector B. 18.0m	10.0 metres including parking plus shared path on one verge.
Road M west of Road D	Up to 1,450	Neighborhood Connector B. 18.0m	7.4 metres including parking plus shared path on one verge.
All other roads	Varies	Access Street C (Yield or give way street). 16.0m.	5.5 – 6.0 metre lane.

Table 6. Road Cross Sections.

8.4.2 Intersections

Internal peak hour traffic volumes within the subdivision are generally small and as such negligible impacts are predicted. However as analysis warrants are met at a number of intersections and these were modelled using the SIDRA software. Turning movements were predicted from peak hour flows. The predictions also assume an even directional split for midblock flows.

Practical absorption capacity for the intersections were calculated from major flow and compared to predicted minor flow. Where capacity appeared to be adequate the intersections where modelled as unsignalised intersections.

Where shown on Figure 4, intersections will be designed as channelised intersections with central medians to regulate turning movements and to provide an opportunity to double up on regulatory signage.

Warrants as shown in Table 8.1 of Austroads Guide to Engineering Practice Part 2, Roadway Capacity were applied to determine which intersections required capacity analysis. Peak hour traffic volumes were assumed to be approximately 10% of predicted daily traffic, and while peak traffic volumes are expected to exceed 10%, the peak period is expected to be longer than 1 hour in the morning and be spread over two distinct periods in the afternoon.

Intersection	Hourly volume major road	Hourly volume minor road	Comment.
Warrants as per Table 8.1 of Austroads Guide to Engineering Practice Part 2, Roadway Capacity - Two Lane Major Road Cross Road	400 vph 500 vph 650 vph	250 vph 200 vph 100 vph	Table details flows that initiate intersection analysis. As major flows increase, there is reduced capacity to accept minor flows.
Great Southern Highway – Morris Edwards Drive	240	110	3 way intersection – Analysis not required.
Road G – Morris Edwards Drive	210	35	3 way intersection – Analysis not required.
Road F – Morris Edwards Drive	150	35	3 way intersection – Analysis not required.
Road C – Morris Edwards Drive	150	75	3 way intersection – Analysis not required.
Road D – Morris Edwards Drive	250	65	3 way intersection – Analysis not required.
Ulster Road – Morris Edwards Drive	350	260	4 way intersection – Analysis required.
Ulster Road – Trews Road	650	250	3 way intersection – Analysis required.
Ulster Road – Great Southern Highway	450	300	4 way intersection – Analysis required.
Road B – Trews Road	320	135	3 way intersection – Analysis not required.
Road J – Trews Road	200	160	3 way intersection – Analysis not required.
Road J – Road G	230	80	3 way intersection – Analysis not required.
All others intersections	<100	<100	Analysis not required.

Table 7. Analysis Warrants

8.4.3 Ulster Road – Morris Edwards Drive.

The Ulster Road – Morris Edwards Drive intersection was modelled using the Sidra Intersection 5 software and predicted flows and gave the following results.

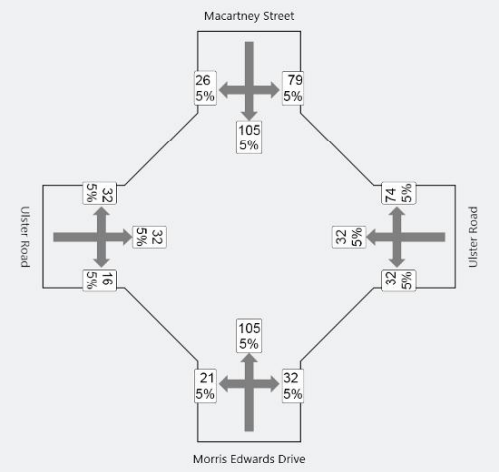

Figure 16. Modelled flows – Ulster Road – Morris Edwards Drive intersection.

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Morris Edwards Drive											
1	L	21	5.0	0.214	13.2	LOS B	1.0	7.0	0.33	0.79	44.8
2	T	105	5.0	0.214	12.8	LOS B	1.0	7.0	0.33	0.90	45.1
3	R	32	5.0	0.214	13.0	LOS B	1.0	7.0	0.33	1.00	45.0
Approach		158	5.0	0.214	12.9	LOS B	1.0	7.0	0.33	0.91	45.1
East: Ulster Road											
4	L	32	5.0	0.089	8.6	LOS A	0.4	3.1	0.18	0.58	48.3
5	T	32	5.0	0.089	0.2	LOS A	0.4	3.1	0.18	0.00	55.6
6	R	74	5.0	0.089	8.9	LOS A	0.4	3.1	0.18	0.71	48.1
Approach		137	5.0	0.089	6.8	NA	0.4	3.1	0.18	0.52	49.7
North: Macartney Street											
7	L	79	5.0	0.251	12.6	LOS B	1.2	8.4	0.24	0.85	45.2
8	T	105	5.0	0.251	12.2	LOS B	1.2	8.4	0.24	0.93	45.6
9	R	26	5.0	0.251	12.4	LOS B	1.2	8.4	0.24	1.00	45.4
Approach		211	5.0	0.251	12.4	LOS B	1.2	8.4	0.24	0.91	45.4
West: Ulster Road											
10	L	32	5.0	0.046	8.6	LOS A	0.2	1.7	0.20	0.62	48.4
11	T	32	5.0	0.046	0.2	LOS A	0.2	1.7	0.20	0.00	55.4
12	R	16	5.0	0.046	8.9	LOS A	0.2	1.7	0.20	0.75	48.3
Approach		79	5.0	0.046	5.3	NA	0.2	1.7	0.20	0.40	51.0
All Vehicles		584	5.0	0.251	10.3	NA	1.2	8.4	0.25	0.75	47.0

Figure 17. Modelled Performance– Ulster Road – Morris Edward Drive intersection

8.4.4 Ulster Road – Trews Road.

The Ulster Road – Trews Road intersection was modelled using the Sidra Intersection 5 software and predicted flow and gave the following results.

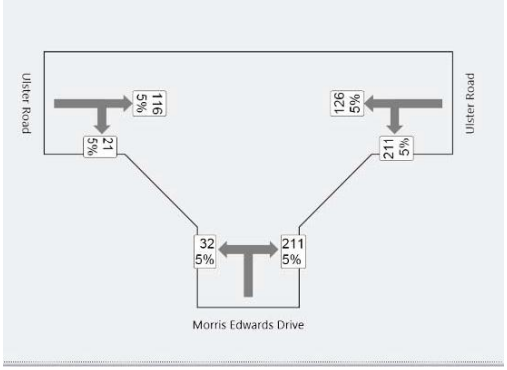

Figure 18. Modelled Flows– Ulster Road – Trews Road intersection

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Trews Road											
1	L	32	5.0	0.451	17.8	LOS C	2.8	20.6	0.62	0.94	41.2
3	R	211	5.0	0.451	17.6	LOS C	2.8	20.6	0.62	1.09	41.4
Approach		242	5.0	0.451	17.7	LOS C	2.8	20.6	0.62	1.07	41.4
East: Ulster Road											
4	L	211	5.0	0.184	8.4	LOS A	0.0	0.0	0.00	0.78	49.0
5	T	126	5.0	0.184	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		337	5.0	0.184	5.2	NA	0.0	0.0	0.00	0.49	52.6
West: Ulster Road											
11	T	116	5.0	0.082	1.6	LOS A	0.5	3.9	0.45	0.00	51.8
12	R	21	5.0	0.082	10.3	LOS B	0.5	3.9	0.45	0.93	48.8
Approach		137	5.0	0.082	2.9	NA	0.5	3.9	0.45	0.14	51.3
All Vehicles		716	5.0	0.451	9.0	NA	2.8	20.6	0.30	0.62	48.0

Figure 19. Modelled Performance – Ulster Road – Trews Road intersection

The intersection is predicted to perform satisfactorily.

8.4.5 Ulster Road – Great Southern Highway.

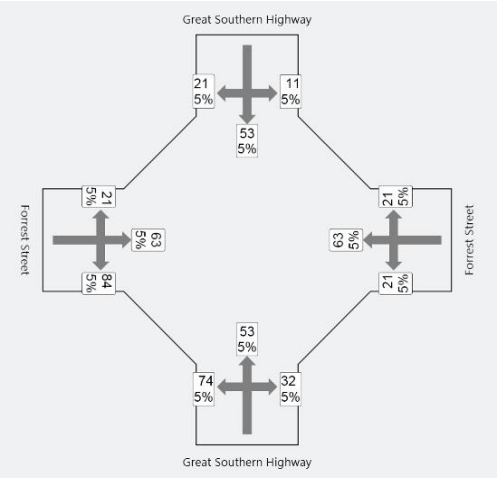

Figure 20. Modelled Flows - Ulster Road – Great Southern Highway intersection

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Great Southern Highway											
1	L	74	5.0	0.197	12.8	LOS B	0.8	6.1	0.27	0.84	45.1
2	T	53	5.0	0.197	12.4	LOS B	0.8	6.1	0.27	0.94	45.4
3	R	32	5.0	0.197	12.6	LOS B	0.8	6.1	0.27	0.99	45.3
Approach		158	5.0	0.197	12.6	LOS B	0.8	6.1	0.27	0.91	45.3
East: Forrest Street											
4	L	21	5.0	0.061	8.7	LOS A	0.3	2.4	0.22	0.67	48.6
5	T	63	5.0	0.061	0.3	LOS A	0.3	2.4	0.22	0.00	55.4
6	R	21	5.0	0.061	9.0	LOS A	0.3	2.4	0.22	0.83	48.5
Approach		105	5.0	0.061	3.7	NA	0.3	2.4	0.22	0.30	52.4
North: Great Southern Highway											
7	L	11	5.0	0.125	13.7	LOS B	0.5	3.7	0.39	0.77	44.5
8	T	53	5.0	0.125	13.3	LOS B	0.5	3.7	0.39	0.90	44.8
9	R	21	5.0	0.125	13.5	LOS B	0.5	3.7	0.39	0.98	44.7
Approach		84	5.0	0.125	13.4	LOS B	0.5	3.7	0.39	0.90	44.8
West: Forrest Street											
10	L	21	5.0	0.109	8.7	LOS A	0.5	4.0	0.21	0.60	48.4
11	T	63	5.0	0.109	0.3	LOS A	0.5	4.0	0.21	0.00	55.2
12	R	84	5.0	0.109	9.0	LOS A	0.5	4.0	0.21	0.75	48.2
Approach		168	5.0	0.109	5.7	NA	0.5	4.0	0.21	0.45	50.6
All Vehicles		516	5.0	0.197	8.7	NA	0.8	6.1	0.26	0.63	48.2

Figure 21. Modelled Performance - Ulster Road – Great Southern Highway intersection

The intersection is predicted to perform satisfactorily.

Modelling confirms that with the development of Daliak and allowing for traffic growth, intersection modifications are not likely to be required to accommodate flows. Notwithstanding this, channelisation of the intersections is recommended to address potential safety issues and to provide clearly defined intersection definition.

8.4.6 Staggered Intersections

Liveable Neighbourhoods recommends that staggered junctions should be spaced according to the following guidelines:

Access Roads	Left/Right stagger – 20 metre
	Right/Left stagger – 20 metres
Neighbourhood Connector	Left/Right stagger – 40 metres
	Right/Left stagger – 40 metres
Integrator B	Left/Right stagger – 60 metres
	Right/Left stagger – 40 metres

The ODP layout incorporates a number of staggered intersections on access roads which comply with the above mentioned guidelines.

8.4.7 Access to frontage properties

Liveable Neighbourhoods allows access from connector status roads and permits traffic to exit where flows are less than 5,000 vpd. As all predicted flows in the study area are less than 5,000 vpd, no control on vehicular access is required. Notwithstanding this, access is restricted from Great Southern Highway which is a designated control of access road and from Morris Edwards Drive.

8.5 Pedestrian / cycle networks

In keeping with the recommendations of Liveable Neighbourhoods it is recommended that the paths shown on Figure 22 be provided.

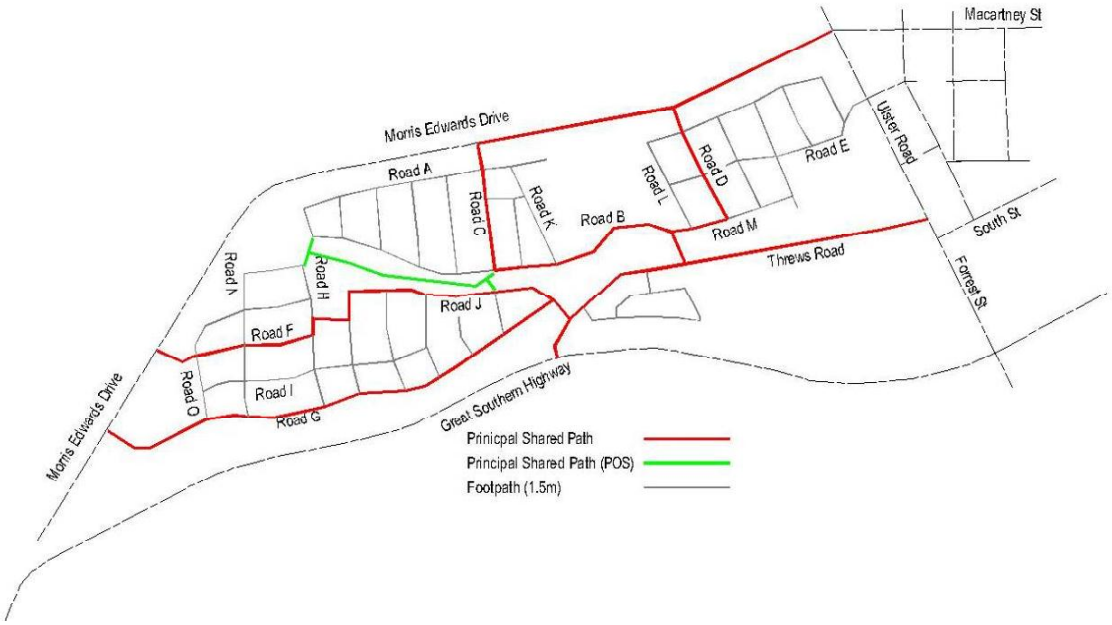

Figure 22. Proposed Path Network

8.6 Access to public transport

There is no planned access to public transport.

9 Analysis of external transport networks

9.1 Design traffic flows on external road network

Design traffic flows on the external network as affected by the proposal are covered in section 8.

9.2 Impact on external roads

The impacts of design traffic flows on the external network as affected by the proposal are covered in section 8.

9.3 Impact on external intersections

The impacts of design traffic flows on external intersections as affected by the proposal are covered in section 8.

9.4 Pedestrian / cycle networks

The impacts of design traffic flows on external pedestrian and cycle networks as affected by the proposal are covered in section 8.

10 Safety issues

A review of the overall transport proposals for the subdivision did not identify any specific issues that present unacceptable risks to the road user or that cannot be managed through appropriate design protocols.

Road hazards are typically present at intersections and may be manifest through inadequate sight distance, inappropriate geometry or substandard capacity that promotes undesirable and potentially hazardous movements.

For new roads, the allocation of adequate road reservation width and truncation of corners will allow sight distance requirements to be accommodated in the detailed design phase of the project. Geometric standards prescribed by Austroads and Main Roads WA guidelines will ensure that no unacceptable risk is introduced into the road environment. Assessment of the operational performance of intersections undertaken in this study prescribes appropriate geometry and lane allocation to minimise delay and optimise performance.

Pedestrian and cyclist movements are provided for by on road and off road facilities, thereby addressing potential safety issues.

11 Noise

Given the proximity of the southern side of the site to Great Southern Highway and the potential for noise impact from highway traffic, it is proposed to provide a vegetated buffer along the southern boundary to assist in reducing noise.

12 Conclusions

On the basis of the assessment undertaken, it is concluded that the proposed street network will provide an acceptable range of choices for travel and ensure that traffic volumes on individual streets can be kept below threshold levels to ensure the amenity of the area is preserved and safe movement options exist for pedestrians, cyclists and local traffic.

13 Appendix A Checklist

Item	Section	Comments/Proposals
Summary	1	
Introduction/Background	2	
name of applicant and consultant	2.1	
subdivision location and context	2.1	
brief description of subdivision	2.3	
key issues	2.2	
background information	3	
Subdivision proposal	2.3	
regional context	2.3.1	
proposed land uses	2.3.2	
table of land uses and quantities	2.3.2	
major attractors/generators	6.1	
any specific issues		
Existing situation	3	
existing land uses within structure plan	3.1	
existing land uses surrounding the subdivision	3.1	
existing road network within subdivision	3.2	
existing road network surrounding the subdivision	3.2	
traffic flows on roads within subdivision (AM and PM peak hours)	3.2	
traffic flows on roads surrounding the subdivision (AM and PM peak hours)	3.2	
existing pedestrian/cycle networks within the subdivision	3.2	
existing pedestrian/cycle networks surrounding the subdivision	3.3	
existing public transport services within the subdivision	3.3	
existing public transport services surrounding the subdivision	3.3	
Proposed internal transport networks	4	
changes/additions to existing road network	5	
road reservation widths	8.5.1	
road cross-sections & speed limits	8.5.2	
intersection controls	8.5.3 to 8.5.9	
pedestrian/cycle networks and crossing facilities	8.6	
public transport routes	8.7	

Item	Section	Comments/Proposals
Changes to external transport networks	5	
road network	5	
intersection controls	5	
pedestrian/cycle networks and crossing facilities	5	
public transport services	5	
Integration with surrounding area	6	
surrounding attractors/generators	6.1	
proposed changes to surrounding land uses	6.2	
travel desire lines from subdivision to these attractors/generators	6.3	
adequacy of existing transport networks	7	
deficiencies in existing transport networks	7	
remedial measures to address deficiencies	7	
Analysis of internal transport networks	8	
assessment years and time periods	8.1	
subdivision generated traffic	8.2	
extraneous (through) traffic	8.3	
design traffic flows	8.4	
road cross-sections	8.5	
intersection sight distances	8.5.3	
intersection operation and method of control	8.5.3	
frontage access strategy	8.5.9	
pedestrian / cycle networks	8.6	
safe walk/cycle to school		
pedestrian permeability & efficiency		
access to public transport	8.7	
Analysis of external transport networks	9	
base flows for assessment years	9	
total traffic flows	-	
road cross-sections	-	
intersection operation	-	
pedestrian/cycle networks	-	
Safety issues	-	
identify issues	-	
remedial measures	-	
Conclusions	-	

Proponent's name; tpg Signature Date

Transport assessor's name; Tony Shaw Company; Shawmac Signature Date