Traffic and Transport Assessment

Section 96 Residential Subdivision, Davis Road Tarneit

CG120370

Prepared for
Stockland Pty Ltd

19 February 2013

Cardno
Shaping the Future

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Appendices

Tables

Figures

1 Introduction

Cardno was retained by Stockland Pty Ltd to undertake a traffic and transport assessment of the proposed residential subdivision located east of Davis Road in Tarneit.

A Section 96 application is being sought for the subdivision as the Precinct Structure Plan for the development area is not yet completed.

In the course of preparing this assessment, the subject site and its environs have been inspected, plans of the development examined, and all relevant traffic data collected and analysed.

2 Existing Conditions

2.1 Location and Land Use

The subject site is located east of Davis Road and North of Hogans Road, as shown in Figure 2-1. The site is generally irregular in shape bordered by Davis Creek and existing residential development to the north and east, Hogans Road to the south and Davis Road to the west.

Figure 2-1 Site Location

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The subject site is currently undeveloped rural land, with surrounding land use generally residential to the east and rural land to the west.

2.2 Road Network

2.2.1 Davis Road

Davis Road aligned north-south between Boundary Road to the north and Werribee River to the south. The continuation of Davis Road north of Boundary Road is Troups Road, which extends north to the Western Freeway

Davis Road is unsealed along the site frontage between Sayers Road and Hogans Raod as shown in Figure 2-5. North of Sayers Road, Davis Road has been sealed as far north as Isabella Drive as shown in Figure 2-3

Figure 2-2 Davis Road, looking south from Sayers Road

Figure 2-3 Davis Road, looking north from Sayers Road

2.2.2 Sayers Road

Sayers Road is aligned east west between Shanahans Road to the west and Old Geelong Road in Williams Landing to the east.

Between Davis Road and Tarneit Road, Sayers Road has a single sealed carriageway with one traffic lane in each direction. Between Tarneit Road and Derrimut Road, Sayers Road has been duplicated. East of Derrimut Road, Sayers Road is largely a single carriageway Declared Main Road, with some supplicated sections near key intersections.

Ultimately Sayers Road will upgraded and duplicated along its entire length.

To the west of Davis Road, Sayers Road is an unsealed rural standard gravel road.

Figure 2-4 Sayers Road, looking east adjacent to Davis Road

As shown in the preceding figure, the Davis Road / Sayers Road intersection is currently controlled by stop signs on the Davis Road approaches, giving priority to Sayers Road. A basic right turn treatment has been provided on Sayers Road for vehicles turning right into Davis Road from Sayers Road.

Figure 2-5 Sayers Road, looking west from Davis Road

2.2.3 Hogans Road

West of Davis Creek, Hogans Road is rural standard road aligned east west, as shown in Figure 2-6.

Between Davis Creek and Tarneit Road, Hogans Road has been along development frontages to include a single traffic lane in each direction.

East of Tarneit Road, Hogans Road has been duplicated and comprises of a divided carriageway with two lanes in each direction.

Figure 2-6 Hogans Road, looking east from Davis Road.

2.3 Sustainable Transport

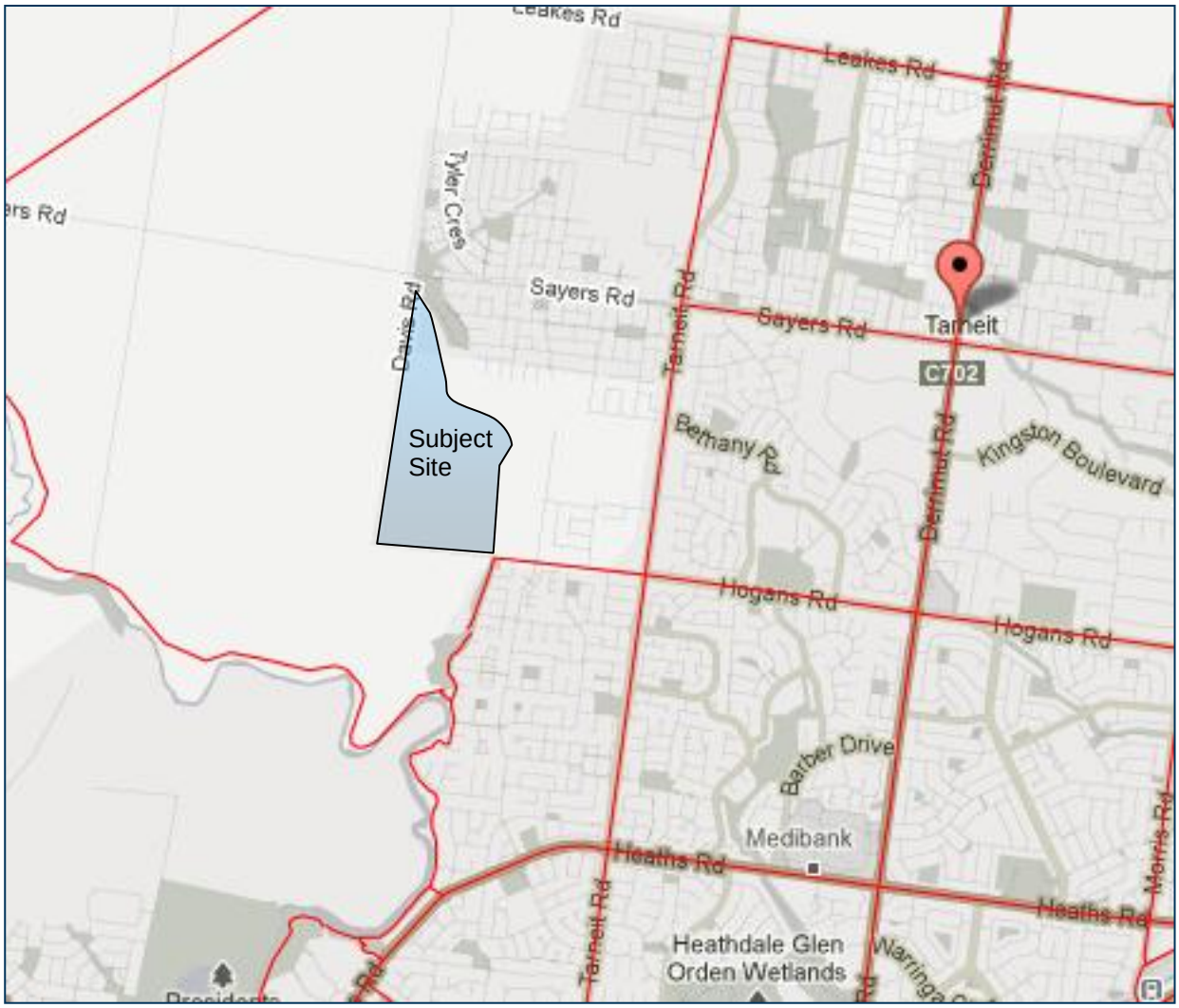
2.3.1 Public Transport

The subject site has limited access to public transport, with the closest bus service operating along Hogans Road up to Thames Boulevard. Two additional bus services are accessible at the intersection of Sayers Road and Tarneit Road. The closest train stations are Werribee and Hoppers Crossing approximately 4.5km to the south.

2.3.2 Bicycle Network

The Principle Bicycle Network (PBN) has been compiled by VicRoads in consultation with the metropolitan councils and relevant stakeholders to show existing and proposed bicycle transport routes throughout metropolitan Melbourne. The PBN maps show a network of cycle routes that provide access and connectivity between key destinations. The PBN in the vicinity of the subject site is shown in Figure 2-7.

Figure 2-7 Principal Bicycle Network near Subject Site

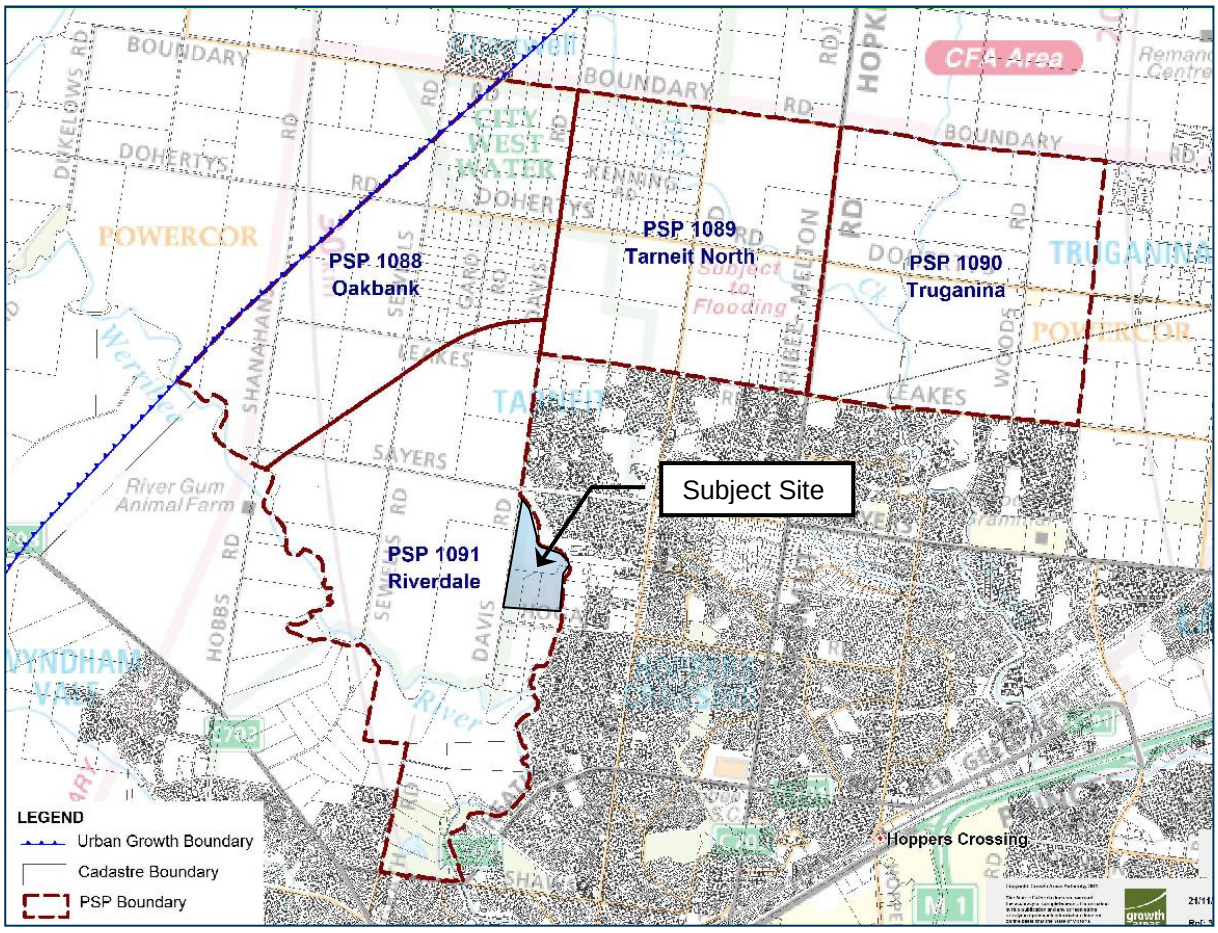


3 Background

3.1 Precinct Structure Plan

The subject site is located within the Precinct Structure Plan (PSP) area 1091 known as Riverdale, which is currently being prepared by the Growth Areas Authority (GAA). The Riverdale PSP area is shown in Figure 3-1.

Figure 3-1 Precinct Structure Plans



As shown in the preceding figure a number of precinct structure plans are being prepared in the Tarneit area. Riverdale and Truganina PSP's are in the preparation stage, whilst Tarneit North and Oakbank are in the pre-planning stage.

3.2 Traffic Modelling

Extensive future traffic modelling of the Wyndham North area has been undertaken by another traffic consultant for the GAA. The results of the modelling are for an Ultimate Development scenario, which is anticipated to occur around 2046.

A summary of the modelled future traffic volumes adjacent to the subject site are shown in Table 3-1 with the detailed output attached as Appendix A.

Table 3-1 GAA Ultimate Development Traffic Volumes

Road Segment	Daily Traffic Volumes (vpd)		
	Northbound / Eastbound	Southbound / Northbound	Two Way
Davis Rd, south of Sayers Rd	12000	12800	24800
Davis Rd, north of Hogans Rd	8500	7000	15500
Sayers Rd, west of Davis Rd	12200	11900	24100
Sayers Rd, east of Davis Rd	Not stated	11000	23000-24000 estimated
East West Connector Rd, west of Davis Rd	7400	6900	14300
East West Connector Rd, east of Davis Rd	1300	1500	2800
Hogans Rd, west of Davis Rd	11000	11100	22100
Hogans Rd, east of Davis Rd	14100	12700	26800

The East West Connector is located approximately midblock through the subject site, providing a connection between the future Neighbourhood Activity Centre west of Davis Road and the residential subdivision currently under construction on the eastern side of Davis Creek.

Through the subject site, the East West Connector is expected to carry 2,800 vehicles per day.

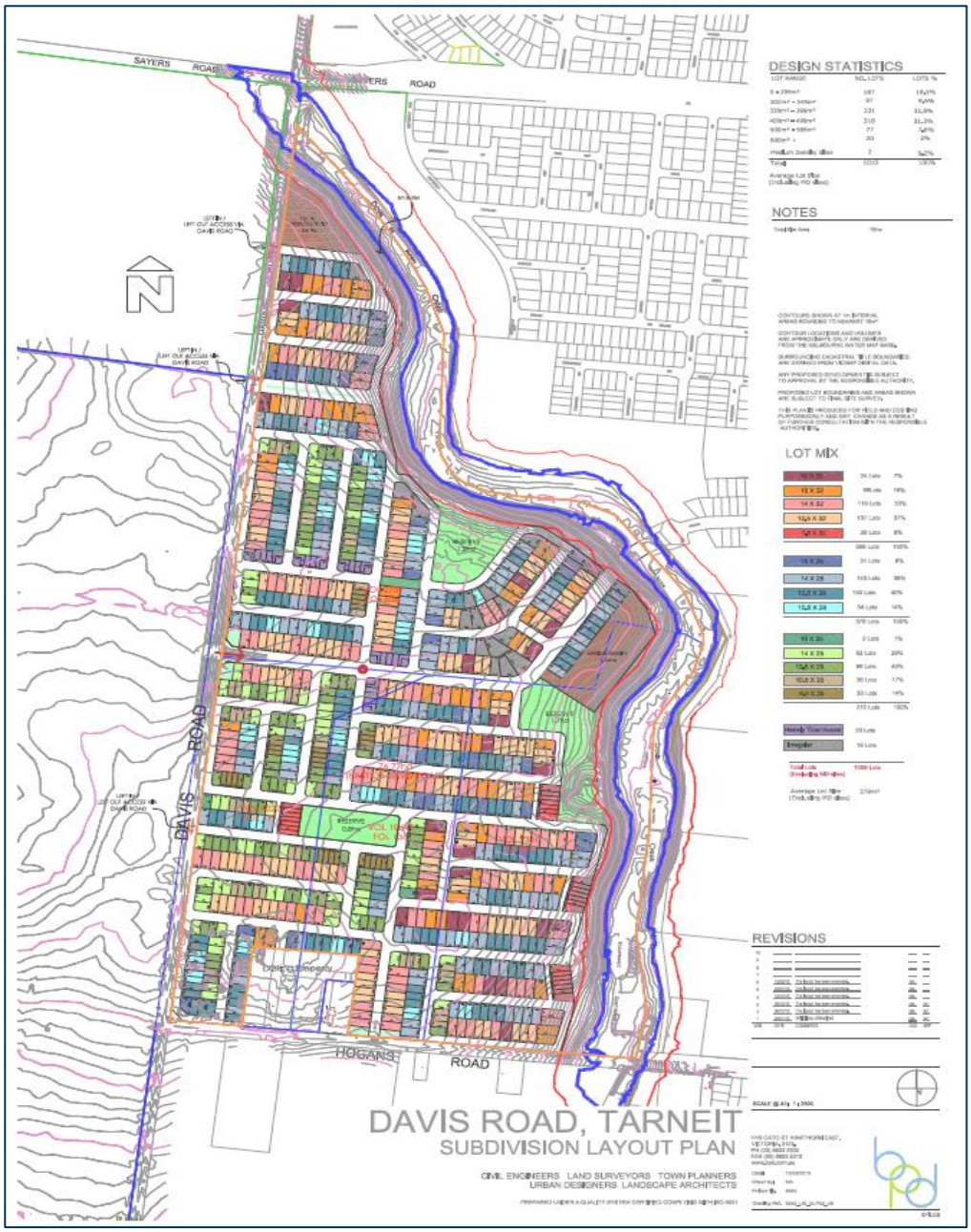
As shown in the preceding table, Davis Road adjacent to the northern portion of the subject site is ultimately expected to carry in the order of 15,500 vehicles per day (vpd) with an approximately 24,800 vpd on Davis Road adjacent to the southern portion of the site.

4 Proposed Development

4.1 General

It is proposed to develop the site with residential subdivision including standard and medium density dwellings and associated open space. It is anticipated that the site will contain in the order of 998 lots, including two medium density sites containing approximately 58 dwellings, giving a total yield of approximately 1054 dwellings as shown in Figure 4-1.

Figure 4-1 Proposed Development Plan



4.2 Development Staging

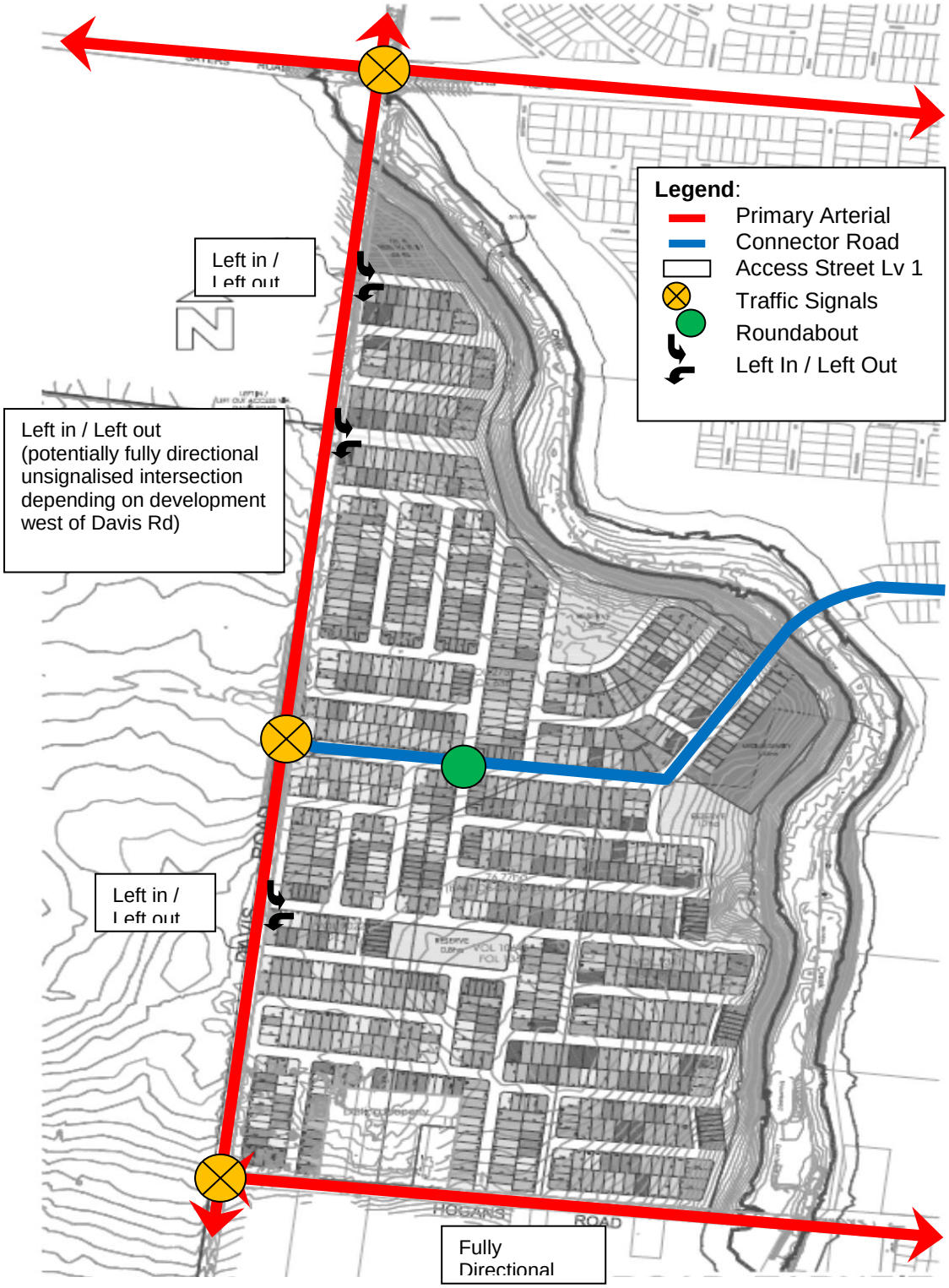
It is anticipated that the development will be constructed in stages, commencing at the northern end and proceeding south. An application for early works has also been submitted for the purpose of constructing a display village, sales and information office and associated car parking at the northern end of the subject site.

4.3 Road Network

The proposed road network for the ultimate development scenario is shown in **Error! Reference source not found.**, which includes traffic signals at the following intersections:

- Davis Road / Sawyers Road
- Hogans Road / Davis Road
- Davis Road / Midblock subdivision access

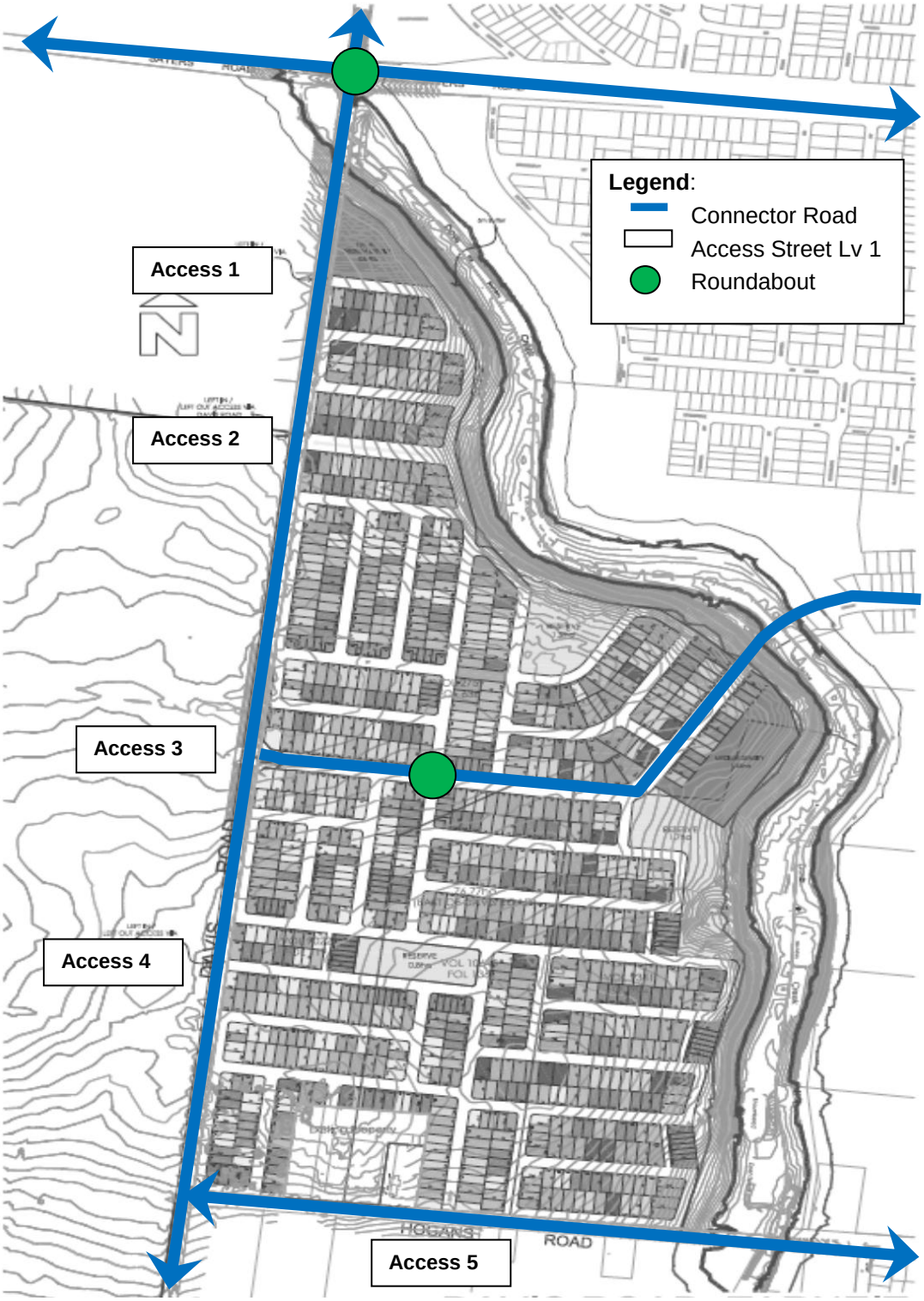
Figure 4-2 Road Network for Ultimate Development



As shown in the preceding figure a number of the access points to the subject site will ultimately be restricted to left in / left out movements only. However as there is currently no development west of the subject site, it is anticipated that the proposed access points can operate as fully directional unsignalised access points until such time as development on the western side of Davis Road requires the left in / left out restrictions to be introduced.

The proposed Interim road network is shown in Figure 4-3.

Figure 4-3 Interim Road Network



4.4 Road Hierarchy

As shown in the road network plan the road hierarchy will consist of Connector Roads, Access Street Level 1 and Access Places. The proposed cross sections are summarised in Table 4-1.

Table 4-1 Proposed Cross-Sections

Road Hierarchy	Ultimate Road Reserve	Carriageway	Indicative Vehicles per Day (vpd)	Speed Limit km/hr	Cycle Path
Davis Road	34m	2 x 7.0m + 2.0m bike lane	12,000-40,000 vpd	60-70	2 x 2.0m bike lane on road
Hogans Road	34m	2 x 7.0m + 2.0m bike lane	12,000-40,000 vpd	60-70	2 x 2.0m bike lane on road
Connector Road	25m	7.0m + 1.7m bike lanes + 2.3m parallel parking both sides	3,000-7,000	50	2 x 1.7m bike lane on road
Access Street Level 1	16m	7.3m	2,000 vpd	50	On Road
Access Street Level 1 adjacent to reserve	14m	7.3m	2,000 vpd	50	On Road
Access Place	12m	5.5m	1,000	50	On Road

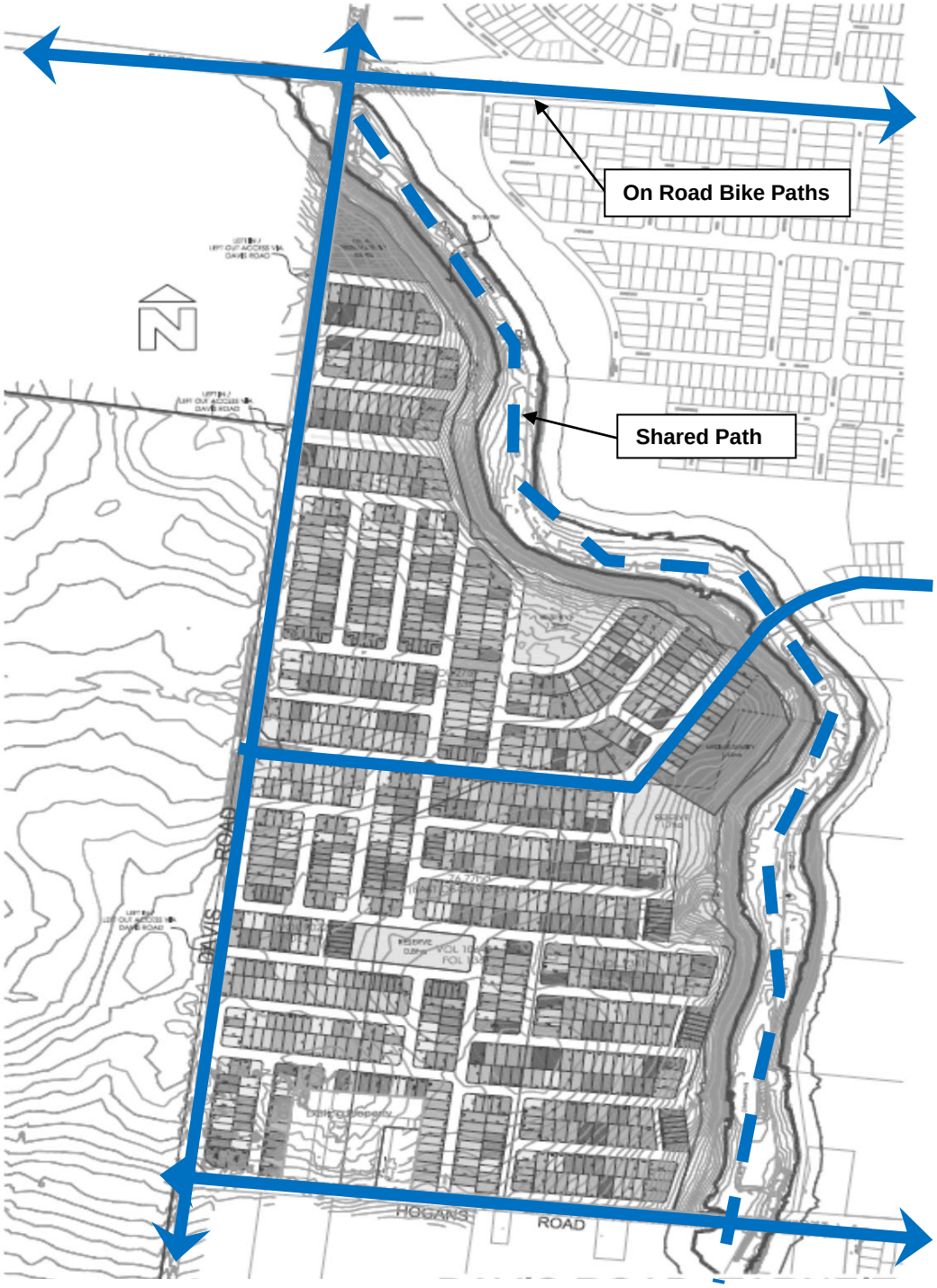
4.5 Pedestrians and Cyclists

The VicRoads Principle Bicycle Network (PBN) does not extend past the subject site, however it is anticipated that the shared path beside Davis Creek south of Hogans Road will extend north adjacent to the subject site.

A good level of pedestrian connectivity has been provided throughout the site, with footpaths proposed along both sides of Connector Roads and Access Streets, with the exception of Access Streets adjacent to Davis Creek or reserve land, which will have a footpath adjacent to dwellings but not the reserve land. In addition to footpaths throughout the estate, residents will have access to a shared path along Davis Creek providing recreational walking paths.

The on road and shared path bicycle paths are shown in Figure 4-4.

Figure 4-4 Proposed Bicycle Routes



4.6 Public Transport

The PSP will outline potential bus routes throughout the PSP area, which has not been undertaken at this stage however it is anticipated that bus services will most likely be provided along Davis Road, Hogans Road, Sayers Road and potentially the East West Connector Road.

Bus services along Davis Road and Hogans Road would provide a good level of public transport for the subject site, with the majority of lots within 400 metres walking distance. An additional bus service along the East West Connector would ensure that all lots had convenient access to public transport.

5 Residential Subdivision Design

5.1 Growth Areas Authority Standards

The Growth Area Authority has published the Engineering Design and Construction Manual, which documents various standards for the design and construction of residential subdivisions, including the standard road cross-sections shown in Table 5-1.

Table 5-1 Standard Cross-Sections

	Access Lane	Access Place	Access Street 1	Access Street 2	Connector Street	Truck Collector	Arterial
Traffic Volume	300 vpd	300-1000 vpd	1000-2000 vpd	2000-3000 vpd	3000-7000 vpd	7000-12000 vpd	12000-60000 vpd
Target Operating Speed	10 km/h	15 km/h	30 km/h	40 km/h	50 km/h	60 km/h	60-80 km/h
Carriageway Width	6m	5.5m	7.3m	6m	7m	2 x 3.5m lanes each way	2 x 10.5m (6 lane) 2 x 7.0m (4 lane)
Parking Within Street	None	Unmarked	Unmarked	2.3m marked both sides	2.3m marked both sides	2.3m marked both sides	None
Verge Width	As required for services	4.5 / 4.2m	4.5 / 4.2m	4.7m min each side	5m min each side	5.25m min each side	5m min
Footpath Provision	None	2 x 1.5m	2 x 1.5m	2 x 1.5m	2 x 1.5m	2 x 1.5m	2 x 1.5m min
Cycle Provision	None	None	None	Optional	2 x 1.7m	2 x 1.7m	2 x 2.0m

As discussed in Section 4.4, the proposed road hierarchy of the subject iste has been designed in accordance with the GAA guidelines.

6 Traffic Considerations

6.1 Traffic Generation Rates

It is anticipated that the subject site will generate in the order of 8.7 vehicle movements per lot per day. This rate is based on case study data undertaken by Cardno at the Westleigh Gardens Estate on the Princes Highway, to the west of the Werribee Town Centre in April 2010.

The Westleigh Gardens estate includes 486 dwellings, and whilst serviced by a local bus route, does not have any local facilities such as shops or schools within walking distance, and therefore many residents are dependent on car travel for such activities.

Residential traffic generation during road network peak times, is typically equal to 10 per cent of the daily traffic generation, however a conservative rate of 1 vehicle movement per lot during the peak hours has been adopted.

6.2 Traffic Distribution

6.2.1 VISTA 07

The Victorian Integrated Survey of Travel and Activity 2007 (VISTA 07) is a survey of personal travel by residents of Melbourne, Geelong and the regional centres of Ballarat, Bendigo, Shepparton and Latrobe, undertaken by the Department of Transport in 2007 and 2008.

To assist in the distribution of residential traffic, VISTA 07 survey results were sourced for the outer metropolitan areas of Melbourne, to determine the distribution of vehicle trips (as a driver or in a taxi) by trip purpose. The results of the VISTA 07 surveys are shown in Table 6-1.

Table 6-1 VISTA 07 Trip Purpose Distribution – Outer Metropolitan Melbourne

Trip Purpose	AM Peak	PM Peak	Daily
Shopping	6%	18%	20%
Education	28%	11%	9%
Work	52%	45%	40%
Recreation	2%	5%	6%
Other	12%	21%	25%
Total	**100%**	**100%**	**100%**

Shopping and Education facilities are currently biased towards the south east of the subject site, however there are a number of proposed shopping centres and schools to the north east along Leakes Road that are anticipated to be in operation by the time the subdivision is complete or shortly thereafter.

Likewise recreational facilities are fairly evenly spread to the east of the subject site. Work trips are anticipated to be primarily to the east, with some trips south to Werribee and the Princes Freeway.

6.2.2 General

The Werribee River currently creates a barrier to the west, with limited opportunities to cross it in the vicinity of the subject site. It is anticipated that until the Outer Metropolitan Ring Road (OMRR) and the Regional Rail Link are constructed west of the site that the vast majority of traffic movements from the subject site will be to the east.

Future residents will be able to access the surrounding road network as follows:

- North on Davis Road to Leakes Road
- East on Sayers Road
- East on Hogans Road

- Tarneit Road via the East West Connector Road

Based on a review of employment, retail, education and other key facilities, it is anticipated that traffic will be distributed over the surround road network as follows:

Table 6-2 Interim Directional Traffic Distribution

Direction	Percentage
Davis Road North to Leakes Rd	20%
Sayers Road East	20%
Hogans Road East	40%
East West Connector	20%
Total	100%

The following percentage of inbound and outbound traffic during the AM and PM peak hours is shown in Table 6-3.

Table 6-3 Residential Subdivisions Traffic Distribution

Peak Period	Outbound	Inbound
AM Peak Hour	80%	20%
PM Peak Hour	40%	60%

6.3 Generated Traffic Volumes

Applying the preceding traffic generation rates and distribution assumptions to the proposed subdivision, results in in the daily and peak hour traffic volumes shown in Table 6-4.

Table 6-4 Peak Hour Traffic Generation – Vehicle Trips Per Hour

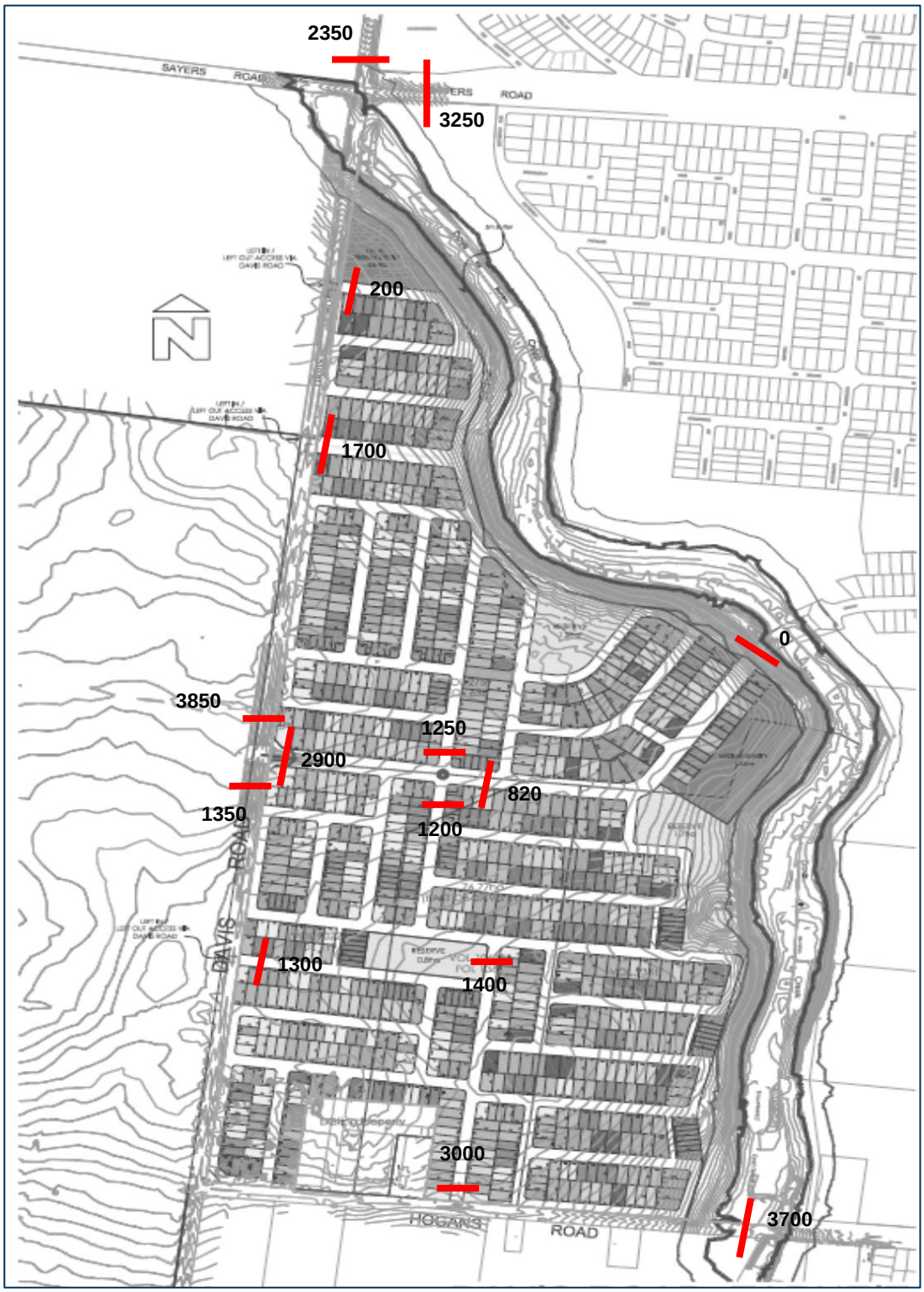
Peak Period	Number of dwellings/ lots	Total	Outbound	Inbound
AM Peak Hour	1054	1054 vph	843	210
PM Peak Hour	1054	1054 vph	422	632
Daily	1054	9170 vpd	4585	4585

As shown in the preceding table the subject site is anticipated to generate in the order of 9170 vehicle movements per day, with 1054 vehicle movements during the AM and PM peak hours.

6.4 Daily Traffic Volumes

Based on the preceding distribution assumptions the daily traffic volumes generated by the subject site were modelled, with the results shown in Figure 6-1.

Figure 6-1 Anticipated Interim Daily Traffic Volumes



As shown in the preceding figure all Level 1 Access Street are anticipated to carry less than 2,000 vehicles per day, with the exception of the access to Hogans Road, which is expected to carry in the order of 3,000 vehicles per day at the southern end. The traffic volumes at this access will decrease once services such as the proposed Neighbourhood Activity Centre, schools and additional road connections are provided to the west. Ultimately this access will carry in the order of 1500-2000 vehicles per day, and therefore it has been designed as an Access Street Level 1.

The interim scenario has been modelled without a connection over Davis Creek on the East West Connector. Once the creek connection is in place it is anticipated that it will carry in the order of 2000

vehicles per day from the proposed development, primarily reducing the volumes generated to Sayers Road by a similar proportion.

6.5 Surrounding Development

Stocklands have provided information in regards to potential other Section 96 developments to the north and west of the subject site. Based on the information provided, it is anticipated that approximately 2,450 lots may be developed over the next 8 years.

Until road connections are constructed to the west, the primary access to the majority of these dwellings will be along Sayers Road.

An interim intersection analysis was undertaken for the Sayers Road / Davis Road intersection as a roundabout. The analysis is summarised in the following section.

6.6 Intersection Analysis

The operation of the Sayers Road / Davis Road intersection was analysed using SIDRA Intersection. This computer package, originally developed by the Australian Road Research Board, provides information about the capacity of an intersection in terms of a range of parameters, as described below:

Degree of Saturation (D.O.S.) is the ratio of the volume of traffic observed making a particular movement compared to the maximum capacity for that movement. Various values of degree of saturation and their rating are shown in Table 6-5.

Table 6-5 Rating of Degrees of Saturation

D.O.S.	Rating
Up to 0.6	Excellent
0.6 to 0.7	Very Good
0.7 to 0.8	Good
0.8 to 0.9	Fair
0.9 to 1.0	Poor
Above 1.0	Very Poor

It is considered acceptable for some critical movements in an intersection to operate in the range of 0.9 to 1.0 during the high peak periods, reflecting actual conditions in a significant proportion of suburban signalised intersections.

The ***95th Percentile (95%ile) Queue*** represents the maximum queue length, in metres, that can be expected in 95% of observed queue lengths in the peak hour; and

Average Delay is the delay time, in seconds, which can be expected over all vehicles making a particular movement in the peak hour.

The results of the SIDRA Intersection analysis are attached as Appendix B and summarised in Table 6-6.

Table 6-6 SIDRA Intersection Analysis Summary – Davis Road / Sayers Road

	Approach	Degree of Saturation	95th%ile Queue (m)	Average Delay (sec)
AM Peak	Davis Road (S)	0.33	16	10
	Sayers Road (E)	0.22	10	9
	Davis Road (N)	0.73	69	24
	Sayers Road (W)	0.88	141	21
	Intersection DOS	**0.88**		
PM Peak	Davis Road (S)	0.48	30	15
	Sayers Road (E)	0.73	72	14
	Davis Road (N)	0.49	28	11
	Sayers Road (W)	0.46	25	9
	Intersection DOS	**0.73**		

As shown in the preceding table the proposed roundabout is anticipated to operate with 'fair' operating conditions in both the AM peak and 'good' conditions in the PM peak hour.

A detailed summary of the Sidra analysis is provided in Appendix B.

7 Conclusions

Based on the preceding discussion it is concluded that;

> The proposed subdivision will include both standard and medium density dwellings as well as open space.

> The development will include approximately 1054 residential dwellings.

> The proposed road hierarchy has been designed in accordance with the guidelines prepared by the Growth Areas Authority (GAA).

> Access to the estate will be provided from Davis Road, Hogans Road and eventually the East West Connector Road. Four access locations are proposed on Davis Road including traffic signals approximately midway between Sayers Road and Hogans Road. The unsignalised intersections on Davis Road will initially be fully directional and converted to left in / left out once Davis Road is duplicated. A single unsignalised fully directional access is proposed on Hogan Road.

> The subject site is anticipated to generate in the order of 1054 vehicle movements in the peak hours and 9170 vehicle movements per day.

> The Davis Road / Sayers Road intersection will ultimately be signalised as development progresses to the west. In the interim it is proposed to construct a roundabout at this intersection.

> A SIDRA analysis of the proposed Davis Road / Sayers Road intersection indicates that it will have very good operating conditions in both the AM and PM peak hours.

Section 96 Residential Subdivision,
Davis Road Tarneit

APPENDIX A

GAA ULTIMATE TRAFFIC VOLUME MODELLING

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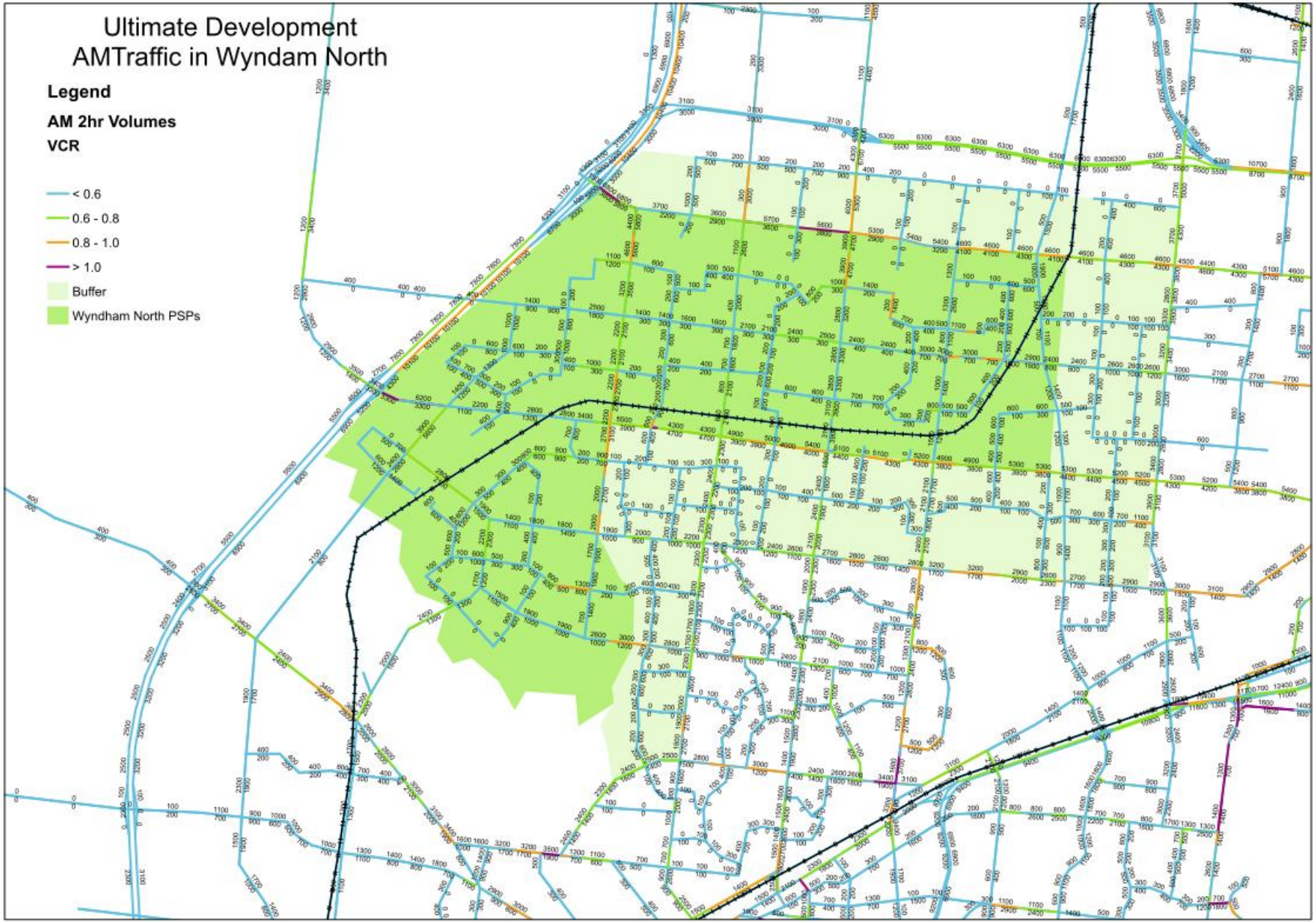
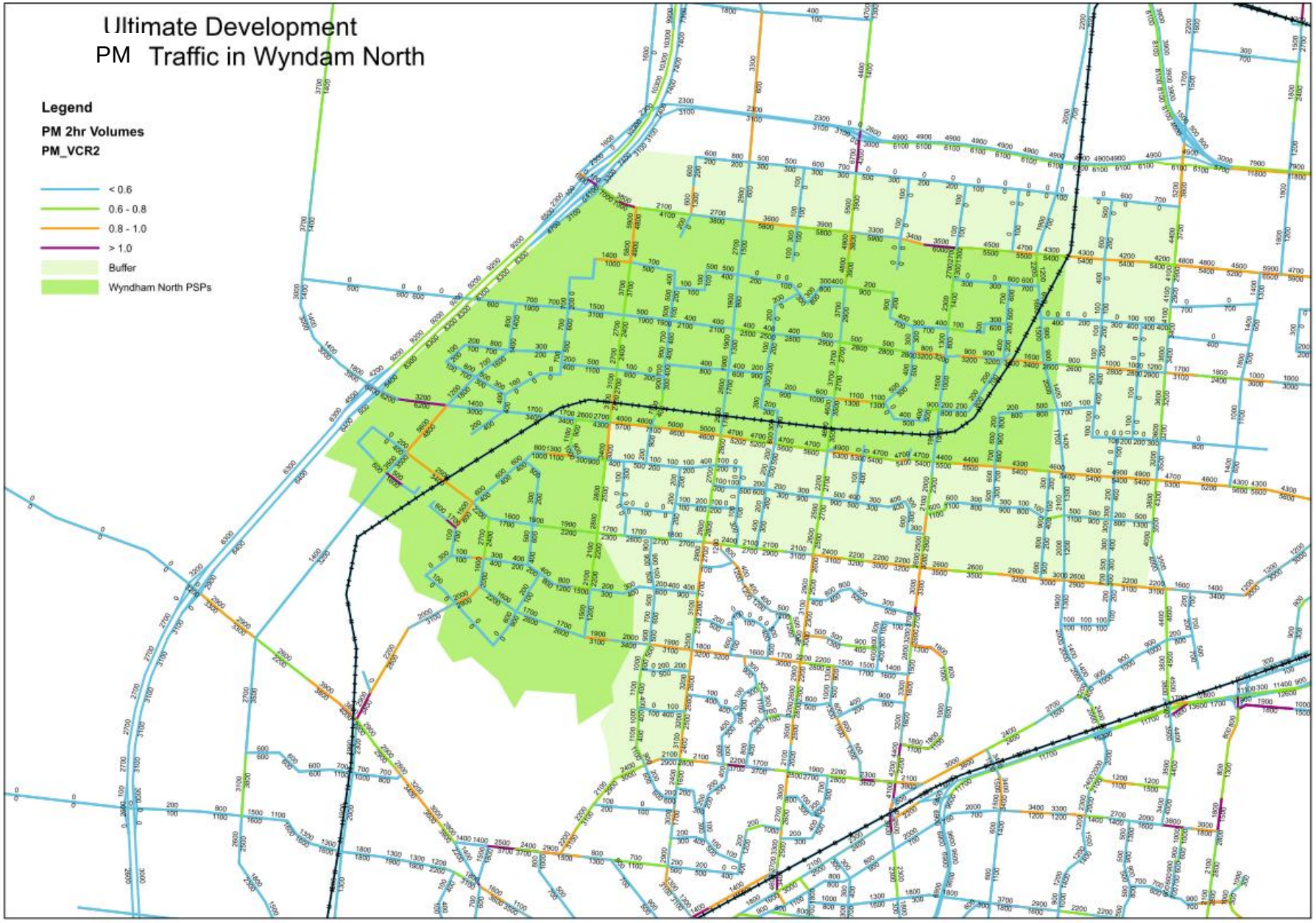

Ultimate Development
AMTraffic in Wyndam North
Legend
AM 2hr Volumes
VCR
< 0.6
0.6 - 0.8
0.8 - 1.0
> 1.0
Buffer
Wyndham North PSPs


Ultimate Development
PM Traffic in Wyndam North
Legend
PM 2hr Volumes
PM_VCR2
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0.8 - 1.0
> 1.0
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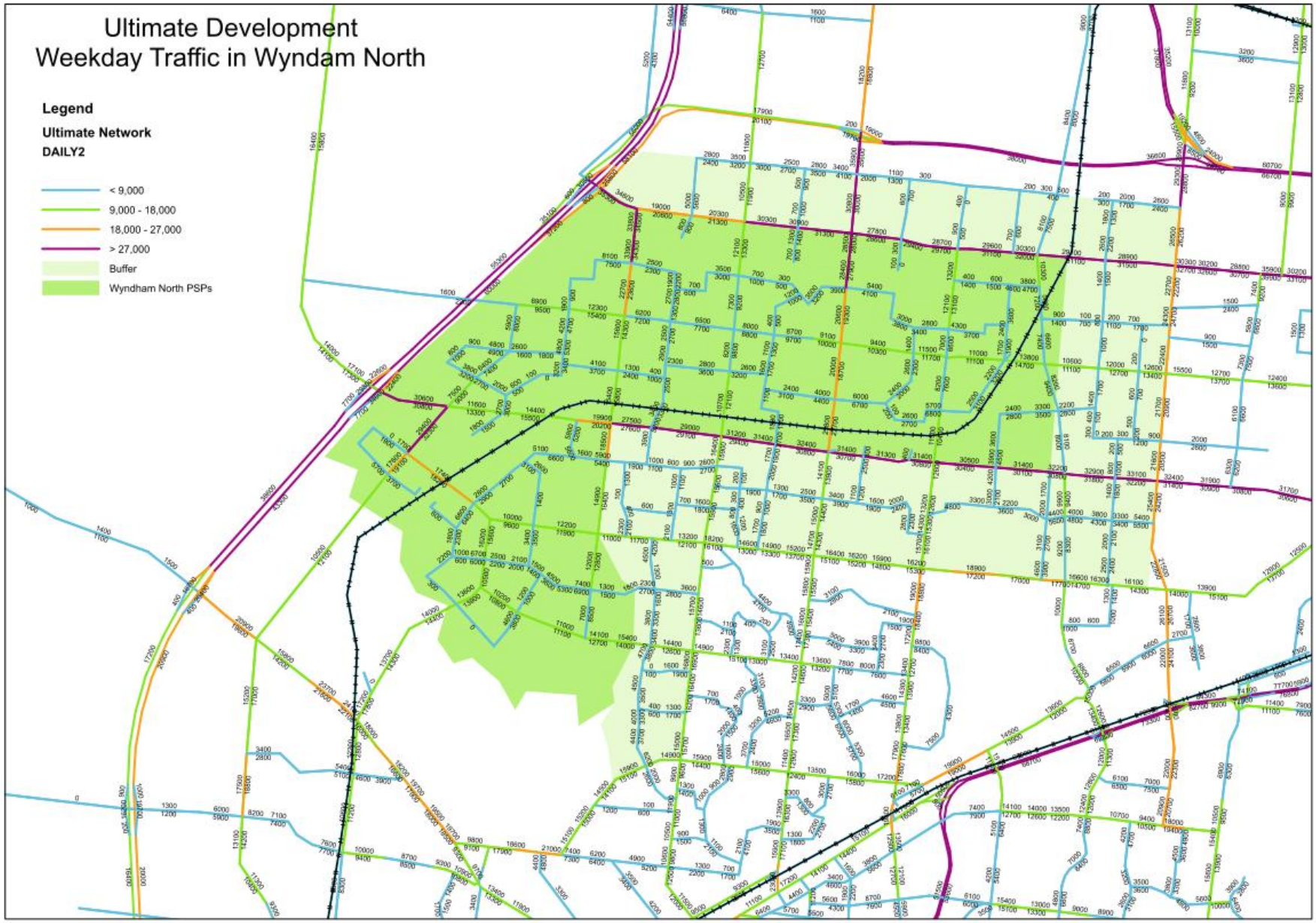
Wyndham North PSPs


Ultimate Development
Weekday Traffic in Wyndam North
Legend
Ultimate Network
DAILY2
< 9,000
9,000 - 18,000
18,000 - 27,000
> 27,000
Buffer
Wyndham North PSPs

Section 96 Residential Subdivision,
Davis Road Tarneit

APPENDIX B

DAVIS ROAD / SAYERS ROAD SIDRA

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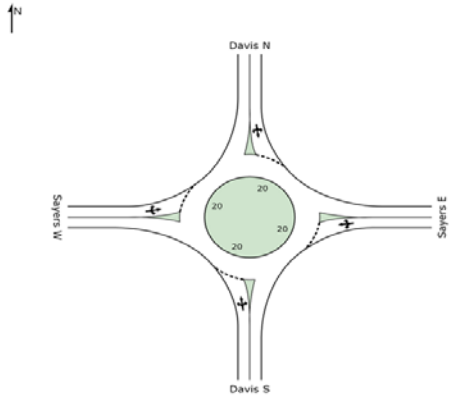
Figure 1: Intersection Geometry



Total Flows: 1924 vehicles

Figure 2: Summary Results

Davis N

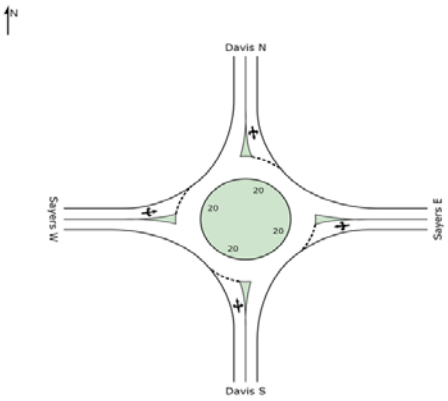
						App	***R***	***T***	***L***										
						23.8	28.3	22.6	23.2										
						69	69	69	69										
						0.733	0.733	0.733	0.733										
							64	110	266										
Sayers W							*0*	*0*	*0*										
							64	110	266										
L	20.5	141	0.876	256	*0*	256									0.219	10.4	8.7	***App***
T	19.9	141	0.876	539	*0*	539				66	*0*	66			0.219	10.4	12.8	***R***
R	25.6	141	0.876	94	*0*	94				135	*0*	135			0.219	10.4	7.0	***T***
App	20.7	141	0.876							39	*0*	39			0.219	10.4	7.7	***L***
							24	174	157				***LV****						
							0	*0*	*0*				***HV****						
							24	174	157				***Total****						
			0.876				0.330	0.330	0.330	0.330			***D.o.S.***						
			141				16.4	16.4	16.4	16.4			***95th%ile Back of Queue (m)***						
			17.9				8.1	7.3	13.1	9.9			***Average Delay (sec)***						
			Int.				***L***	***T***	***R***	***App***									

Sayers E

**Output volumes*

Davis S

Figure 1: Intersection Geometry



Total Flows: 1924 vehicles

Figure 2: Summary Results

Davis N

			App	R	T	L							
			11.0	14.3	8.6	9.2							
			28	28	28	28							
			0.489	0.489	0.489	0.489							
				192	153	133							
Sayers W				*0*	*0*	*0*							
				192	153	133							
L	9.2	25	0.457	128	*0*	128					0.728	71.7	14.2	***App***
T	8.6	25	0.457	270	*0*	270	199	*0*	199		0.728	71.7	18.3	***R***
R	14.3	25	0.457	47	*0*	47	404	*0*	404		0.728	71.7	12.5	***T***
App	9.4	25	0.457				118	*0*	118		0.728	71.7	13.2	***L***
				71	131	78		***LV****						
				0	*0*	*0*		***HV****						
				71	131	78		***Total****						
0.728			0.481	0.481	0.481	0.481		***D.o.S.***						
71.7			29.6	29.6	29.6	29.6		***95th%ile Back of Queue (m)***						
12.6			15.0	14.2	20.0	16.0		***Average Delay (sec)***						
Int.			***L***	***T***	***R***	***App***							

Sayers E

**Output volumes*

Davis S