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Lot 311 Fifty Road, Baldivis
Transport Assessment
Allerding & Associates

7 June 2013

This report has been prepared from the office of Tarsc
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Acknowledgements and Recognition

Issue Date	Revision No	Author	Checked	Approved
08/07/2012	0	Rodney Ding	Alan Rimmer	R Ding
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Contents

1 Introduction

1.1 Purpose of This Report

This report was commissioned by Allerding & Associates to document a transport assessment for the proposed residential subdivision on Lot 311 Fifty Road in Baldivis.

1.2 Background

The proposed development in Baldivis is proposed to lie in the south west corner of Fifty Road and Eighty Road in Baldivis. This land is presently vacant except for trees across the majority of the site. This development is proposed to 191 residential lots of varying sizes. Refer to the proposed development site plan at **Appendix A.**

The area surrounding the proposed development is a mix of semi-rural, new residential development with a school just to the north of the site.

Refer to the locality plan in **Appendix B.**

2 Development Proposal

The proposed development provides for residential lots of mixed densities across the entire site.

The main access to the eastern portion of the site is proposed to be via Eighty Road from Fifty Road and via a North-South road, west of Nairn Drive for the western portion of the development. Nairn Drive splits the site into two parts with access via a left-in/left-out treatment for both sides of the development.

No direct access is proposed onto Nairn Drive with access onto lots provided by internal roads.

The essential traffic elements include:

- Total land area of 15.115Ha;
- 192 residential lots;
- Direct lot access onto Eighty Road via a CAP road; and,
- Connectivity to Nairn Drive via a left-in/left-out (LILO) intersection which bisects the lot into two sub lots at a roundabout.

3 Existing Situation, Integration & Changes to Surrounding Road Network

3.1 Current Road Network

The highest order road in the vicinity of the development is Fifty Road along the northern edge of the development site. This road is neither a red or blue road under the MRS but is classified as a Local Distributor under the Functional Road Hierarchy. This road is a two-way two-lane road with a 8.5 wide carriageway (comprising a single 3.2 wide lane in each direction and a 2m wide median) within a current 20m wide reserve. No recent traffic data was available from the City of Rockingham or Main Roads but current traffic volumes are estimated at approximately 2,000 to 3,000 vehicles per day (vpd) on this section of Fifty Road and is subject to a posted speed limit of 60km/h. It is understood that this reserve is to be widened to 24.5m to cater for a road of similar cross section to a Neighbourhood Connector A type road, being similar to that currently constructed, but to also allow embayed parking being in accordance with Liveable Neighbourhoods. This road cross section can carry volumes up to 7,000 vehicles per day in a residential context and up to 15,000 in a town centre context.

Along the eastern boundary of the proposed development is Eighty Road. Eighty Road is classified as a Local Access Road. Eighty Road is approximately 7.0m wide between kerbs and provides one lane in each direction within a 20m wide reserve. It is estimated that approximately 1,000 to 2,000 vpd currently use Eighty Road (1,900 vpd were recorded north of Sixty Eight Road in 2007/08). This road intersects with Fifty Road at a T-junction under Give Way control and it is subject to a posted speed limit of 70km/h.

3.2 Proposed Pedestrian and Cycle Network

The subdivision is proposed to incorporate a shared path and footpath network as shown in **Appendix A.** Most roads are expected to have traffic volumes of approximately 300 vpd and as such footpaths and shared paths are proposed on one side of roads that are wide enough to support the width of a footpath or shared path. Thus nearly all roads will have access to footpath of shared paths.

3.3 Changes to External Road Network

This area of Baldivis will undergo significant changes to the road network as it is modified to support the approved structure plan for the area. The major change impacting on this proposed development is the construction of Nairn Drive, a main north-south district distributor type road (and a MRS Blue Road) that will bisect the proposed subdivision. As a result of this, Eighty Road will be modified so that it runs down between Nairn Drive and Baldivis Road. This modified Eighty Road route will also support suggested bus route for the area, which would also use Fifty Road and Eighty Road. Refer to **Appendix C.**

The intersection of Nairn Road and Fifty Road is expected to be controlled by either a roundabout or traffic signals in the longer term. In the interim, until traffic volumes dictate, the intersection should operate as a Stop sign controlled

intersection, but designed for future signalisation or have a roundabout installed soon.

Fifty Rd presently has a 20m wide road reserve, but this has been recommended to increase to 25m as part of the Baldivis Roads Needs Study, Worley Parson, 2005 and this will accommodate a Neighbourhood Connector A type road (Boulevard) with embayed parking on both sides of the road. Eighty Road has been proposed to have a 20m wide road reserve as per the Baldivis Roads Needs Study with a Neighbourhood Connector B type road.

The intersection of Eighty Road and Fifty Road has been assumed to be a simple intersection of a Neighbourhood Connector A (Fifty Road) with a median treatment and a Neighbourhood Connector B (Eighty Road) with a traffic island at the intersection. No special channelization has been assumed and this forms the basis of the subsequent assessment.

3.4 Crash Assessment

The safety of the intersections where most of the development traffic will flow through was checked utilising the Main Roads crash database. The only intersection with current crash data was the intersection of Fifty Road and Eighty Road, summarised below in **Table 3.1.**

Table 3.1 - Intersection of Abernethy Road/Soldiers Road

Freq. Rank	Cost Rank	Total	RE	SS	RA	RTT
5482	2552	2	0	0	0	0
Wet	**Night**	**Ped**	**Cycle**	**Truck**	**MC**	**Casualty**
1	2	0	0	0	0	0

The intersection Fifty Road and Eighty Road exhibits a very good safety record with a low number of crashes over the 5 year period to 31st December 2011.

4 Analysis of Transport Networks

4.1 Trip Generation Rate

The proposed development is to be a residential subdivision as advised by the client. The traffic generation for the site was based on the publication Land Use Traffic Generation Guidelines (Director General of Transport, SA, 1987).

The rate assumed was based on the daily rate for a detached dwelling occupied by families and children, which is 10 trips per day per dwelling.

4.2 Trip Generation of Site

Using the above generation rate for 192 dwellings (this being conservative as some of the R40 development would have generation rate somewhat less than 10 trips per day) there should be in the order of 1,920 trips per day generated by the proposed development with 960 entering and 960 exiting over an entire day. For the AM and PM peak there should be about 192 trips per hour with 144 exiting and 48 entering in the AM peak and 64 exiting and 128 entering in the PM peak.

This traffic generation of the site assumes that there is no traffic generated from the current land-uses on the site.

4.3 Trip Distribution

With the site bordered by three roads and the location of the centre the proposed distribution of trips are as shown by the sketch in **Appendix D** and summarised below.

- Fifty Road to the east – 50%;
- Nairn Drive to the north – 20%;
- Fifty Road to the west – 20%; and,
- Nairn Drive to the south – 10%.

Table 4.1 summarises the expected traffic flows on roads within the vicinity due to the development and the current flows on those roads and the above assumed directional flows to and from the proposed development.

The traffic volumes were assumed for both Fifty Road (10% of assumed 10,000 vpd, 5,000vpd less than maximum flow for a road of this nature, being an Integrator B town centre main street where volumes up to 15,000 can be accommodated) and Nairn Drive (10% of assumed 25,000 vpd maximum flow for a road of this nature, being the maximum volume for a road that could fit within the 40m reserve width, an Integrator A type road - centres). This is considered to represent the expected traffic flows 10 years after completion of the development.

Table 4.1 - Trip Distribution from Development (2031 Flows)

Road	Expected Traffic Volume (vpd, two-way)	Expected Development Traffic (vpd, two-way)
Fifty Road to west	10,000	380
Fifty Road to east	10,000	950
Nairn Drive to north	24,000	380
Nairn Drive to south	24,000	190
Eighty Road	1,200	1,200

4.4 Traffic Impact of Development

In general terms the roads surrounding the development will have traffic volumes that should not exceed their maximum traffic flows for similar roads of their type. The comparisons to maximum flows that these roads should carry are shown below in **Tables 4.2 and 4.3**. The maximum hourly flows are expected to be approximately 50% of the midblock carrying capacity of the roads, except fro Nairn Drive, whilst the daily flows are expected to within acceptable limits.

Table 4.2 – Expected Daily Flows (two way) - 2031

Road	Indicative Maximum Daily Flow (vpd, two-way)	Expected Daily Flow (vpd, two-way)
Fifty Road to west	3,000[1] – 15,000[2]	10,380
Fifty Road to east	3,000 – 15,000	10,950
Nairn Drive to north	25,000[3]	24,380
Nairn Drive to south	25,000	24,190
Eighty Road	3,000[4]	2,400

[1] Based on Neighbourhood Connector A – 50km/h, Liveable Neighbourhoods, 2009
[2] Based on Integrator B – town centre main street – 40-50km/h, Liveable Neighbourhoods, 2009
[3] Based on Integrator A – Centres – 60km/h, Liveable Neighbourhoods, 2009
[4] Based on Neighbourhood Connector B – 50km/h, Liveable Neighbourhoods, 2009

Table 4.3 – Expected Hourly Flows (one way) - 2031

Road	Capacity (vph, one-way)[5]	Expected Flow (vph, one-way)
Fifty Road to west	900	380 (WB)
Fifty Road to east	900	420 (EB)
Nairn Drive to north	1,900	1,705 (NB)
Nairn Drive to south	1,900	1,730 (NB)
Eighty Road	900	150 (NB)

It can be seen that the traffic flows are not expected to exceed the indicative maximum acceptable daily flow rates on any of the roads bordering the proposed development. The critical factor in this instance is the peak hour flows and the intersection performance at the intersections of Nairn Drive with the internal east-west road and the intersection of Fifty Road and Eighty Road.

With regards to intersections, Austroads Guide to Traffic Engineering Practice Part 5 – Intersections at Grade provides advice as to intersection performance in peak flow conditions with regards to possible further analysis. This is summarised in **Table 4.4**.

Table 4.4 – Austroads Guidelines

Major Road Type	Major Road Flow (vph, two-way)	Minor Road Flow (vph, two-way)
Two-lane	400	250
	500	200
	650	100
Four-lane	1000	100
	1500	50
	2000	25

[5] Based on Table 7.1, Roadway Capacity, Guide to Traffic Engineering Practice, Austroads

Examining the expected traffic flows at each of the intersections around the proposed development **Table 4.5** is derived.

Table 4.5 – Comparison to Austroads Guidelines

Intersection	Major Road Flow (vph, two-way)	Minor Road Flow (vph, two-way)
Nairn Drive/EW LILO Road	**2,400**	**72**
Fifty Road/Eighty Road	**700**	**200**
Fifty Road/NS Road	740	30
Eighty Road/EW Road (typ)	80	20

From the above it can be seen that the subject intersections highlighted red should be above the above values given in **Table 4.5**. Thus, these intersections should be examined in further detail.

4.5 Sidra Assessments

To further assess the performance of these intersections during peak periods a computer program called Sidra Intersection (Version 5) was utilised to assess all of the above intersections.

The AM peak was chosen as the most appropriate period as this period has the most traffic exiting the development area entering onto roadways. This will produce the better assessment as there would be less traffic exiting the development in the PM peak.

4.5.1 Intersection of Nairn Drive/EW Road

This LILO intersection was assessed using the AM peak flows of the development and the AM peak flows expected on the road network. The results are shown below in **Table 4.6.** Overall, the intersection should perform satisfactorily levels of being consistently A/B. The queues on the western approach are expected to be 13m/2 vehicles at worst, this being acceptable.

Table 4.6 –– Expected AM Performance

Lane Use and Performance	Demand Flows				HV	Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Length	SL Type	Cap. Adj.	Prob. Block.
	L	T	R	Total							Vehicles	Distance				
	veh/h	veh/h	veh/h	veh/h	%	veh/h	v/c	%	sec		veh	m	m		%	%
South: Nairn Road																
Lane 1	50	868	0	918	5.0	1883	0.488	100	0.5	LOS A	0.0	0.0	500	–	0.0	0.0
Lane 2	0	921	0	921	5.0	1889	0.488	100	0.0	LOS A	0.0	0.0	500	–	0.0	0.0
Approach	50	1789	0	1839	5.0		0.488		0.2	NA	0.0	0.0				
East: EW Road																
Lane 1	9	0	0	9	5.0	567	0.017	100	12.6	LOS B	0.1	0.4	500	–	0.0	0.0
Approach	9	0	0	9	5.0		0.017		12.6	LOS B	0.1	0.4				
North: Nairn Road																
Lane 1	14	361	0	375	5.0	1885	0.199	100	0.3	LOS A	0.0	0.0	500	–	0.0	0.0
Lane 2	0	376	0	376	5.0	1889	0.199	100	0.0	LOS A	0.0	0.0	500	–	0.0	0.0
Approach	14	737	0	751	5.0		0.199		0.2	NA	0.0	0.0				
West: EW Road																
Lane 1	53	0	0	53	5.0	101	0.519	100	59.9	LOS F	1.8	12.9	500	–	0.0	0.0
Approach	53	0	0	53	5.0		0.519		59.9	LOS F	1.8	12.9				
Intersection				2652	5.0		0.519		1.4	NA	1.8	12.9				

4.5.2 Intersection of Fifty Road/Eighty Road

This intersection was also assessed using the AM peak flows of the development and the AM peak flows expected on the road network, with results shown below in **Table 4.7**.

Table 4.7 –– Expected AM Performance

Lane Use and Performance	Demand Flows				HV	Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Length	SL Type	Cap. Adj.	Prob. Block.
	L	T	R	Total							Vehicles	Distance				
	veh/h	veh/h	veh/h	veh/h	%	veh/h	v/c	%	sec		veh	m	m		%	%
South: Eighty Road																
Lane 1	100	0	0	100	0.0	3341	0.299	100	12.2	LOS B	0.6	4.4	7	Turn Bay	0.0	0.0
Lane 2	0	0	124	124	0.0	205	0.605	100	37.7	LOS E	3.1	21.7	500	–	0.0	0.0
Approach	100	0	124	224	0.0		0.605		26.3	LOS D	3.1	21.7				
East: Fifty Road																
Lane 1	63	500	0	563	0.0	1939	0.290	100	0.9	LOS A	0.0	0.0	500	–	0.0	0.0
Approach	63	500	0	563	0.0		0.290		0.9	NA	0.0	0.0				
West: Fifty Road																
Lane 1	0	500	0	500	0.0	1950	0.256	100	0.0	LOS A	0.0	0.0	500	–	0.0	0.0
Lane 2	0	0	12	12	0.0	3751	0.032	100	10.9	LOS B	0.1	0.4	7	Turn Bay	0.0	0.0
Approach	0	500	12	512	0.0		0.256		0.3	NA	0.1	0.4				
Intersection				1299	0.0		0.605		5.0	NA	3.1	21.7				

The intersection is expected to operate at a level of service B/E on the Eighty Road approach with vehicles able to undertake right turns through the intersection in a single stage through an assumed 2m wide median incurring a 28s delay and queue lengths of about 3 vehicles.

4.5.3 Performance Assessment Concept Parameters

The level of service concept describes the quality of traffic service in terms of six levels, designated A to F, with level of service A (LOS A) representing the best

operating condition (i.e. at or close to free flow), and level of service F (LOS F) the worst (i.e. forced flow). More specifically:

- *LOS A*: Individual drivers are virtually unaffected by others in the traffic stream. Their freedom to select their own desired speed and to manoeuvre in the traffic stream is extremely high, and the general level of comfort and convenience is excellent;
- *LOS B*: Individual drivers still have reasonable freedom to select their desired speed and to manoeuvre in the traffic stream, although the general level of comfort and convenience is less than at LOS A;
- *LOS C*: Most drivers are restricted to some extent in their freedom to select their desired speed and to manoeuvre in the traffic stream;
- *LOS D*: All drivers are severely restricted in their freedom to select their desired speed and to manoeuvre in the traffic stream. Traffic is close to the upper limit of stable flow, the general level of comfort and convenience is poor, and small increases in traffic flow will usually cause operational problems;
- *LOS E:* Traffic volumes are at, or close to capacity, and drivers have virtually no freedom to select their desired speed or to manoeuvre. Traffic flow is unstable and minor disturbances will result in stop-start conditions; and,
- *LOS F*: Flow is forced and the amount of traffic approaching the point under consideration exceeds that which it can handle. Stop-start conditions apply and queuing and delays result.

In addition to the above:

- Average Delay: is the average of all travel time delays for vehicles through the intersection; and,
- Queue: is the queue length below which 95% of all observed queue lengths fall.

4.6 Impact of Development on Local Area

Based on the above assessment it is concluded that the development will have an acceptable impact on the surrounding roads and intersections.

5 Internal Traffic Flows and Road Reserves

Traffic flows on internal roads within the development site are shown in **Appendix D.** Most traffic flows on roads are in the order of 100 to 400 vehicles per day, with the only exception near the commercial centre development site where volumes are expected higher due to the commercial development.

Under these conditions, most roads are 14.2m wide reserves representing Access Street D (allowing 6.0m wide roadway and 4.1m wide verges each side). These 13.2m wide reserves narrow by 1m along the Nairn Road frontage, with the verge adjacent to Nairn Road narrowed to 3.1m. Adjacent to POS and development sites the reserve widens to 15.2m to allow a wider 5.1m verge adjacent to these POS/development sites incorporating 2.1m wide embayed parking within the 5.1m wide verge.

This plan also shows the location of footpaths within the development located on both sides of Fifty Road and Nairn Drive, but otherwise generally on one side of the road (again except near the commercial centre).

Road priority is generally reinforced by the use of coloured pavement at T-junction intersections and further enforced by the use of Stop/Give Way signage at two intersections on the western portion of the site.

6 Summary

As a result of the analysis undertaken for the proposed new shopping centre at Lot 311 Fifty Road in Baldivis, the following findings were made:

- The proposed development will generate approximately 1,920 vehicular trips per day;
- There are good pedestrian footpaths currently and proposed on all sides of the proposed development with access to public transport; and,
- The impact of the traffic volumes associated with the development are considered acceptable in the longer term with increases in traffic flows to 2031.

Appendix A Site Plan

PROPOSED STRUCTURE PLAN

LOT 311 FIFTY ROAD
BALDIVIS

CITY OF ROCKINGHAM

0 25 50 75 100 125m

SCALE: 1:2500
ORIGINAL PLAN SIZE: A3

JOB CODE:
LIL BAL GE

DATE:
31.05.2013

LEGEND:

SUBJECT LAND -
RESIDENTIAL R20 -
RESIDENTIAL R25 -
RESIDENTIAL R30 -
DEVELOPMENT SITE (R40) -
COMMERCIAL (MIXED USE) -
PUBLIC OPEN SPACE -

DUAL USE PATH -
LOCAL FOOTPATH -

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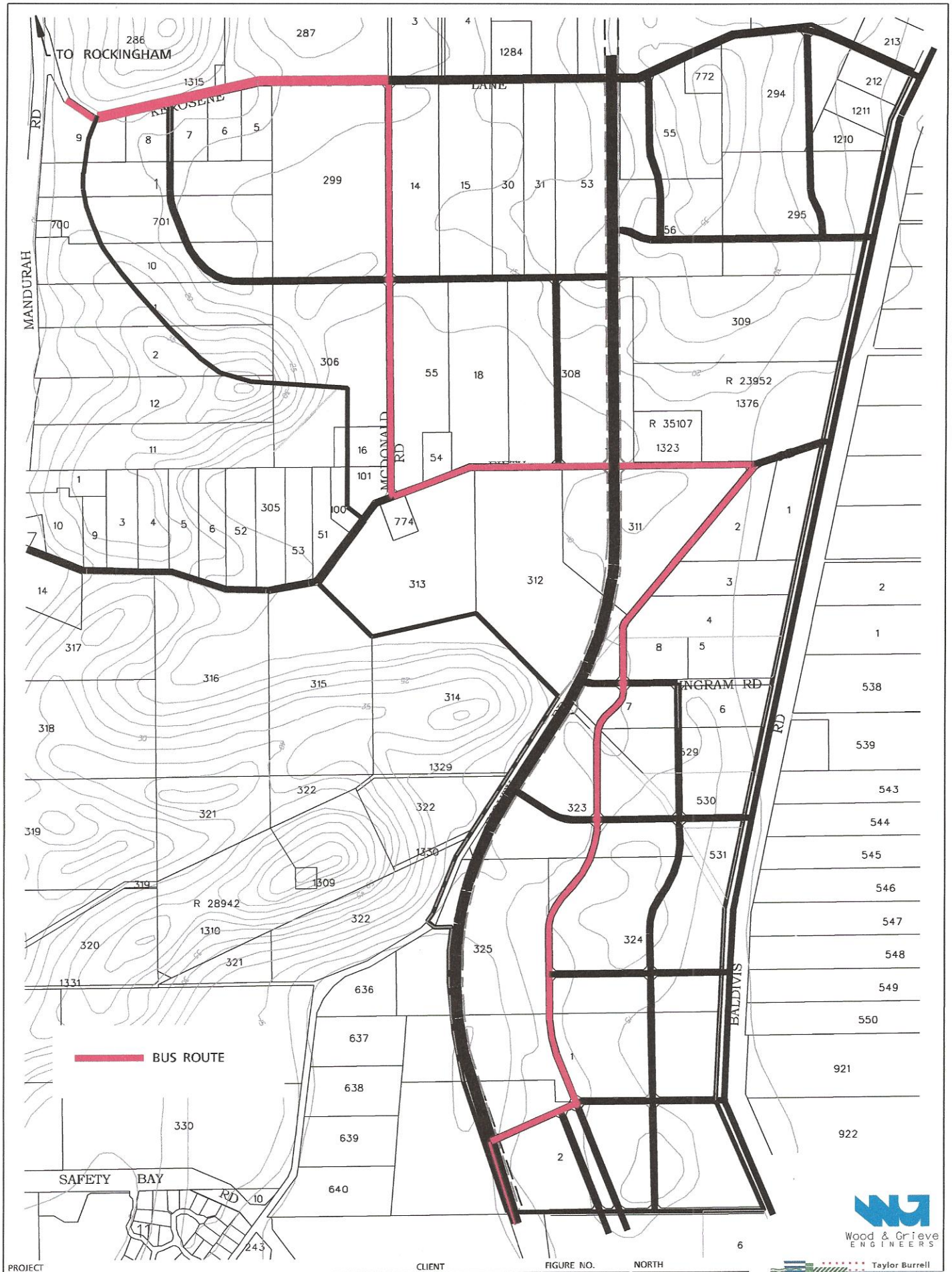
Appendix B Locality Plan

311 FIFTY RD ,BALDIVIS
LOT 9000
NAIRN DR
LOT 2
364
363
392
409
121
122
61
28
178
16

Appendix C DSP Road Structure



PROJECT

STUDY AREA - SUGGESTED LOCAL BUS ROUTE
BALDIVIS (NORTH) DISTRICT STRUCTURE PLAN

CLIENT
City of Rockingham

FIGURE NO.
17

NORTH

Wood & Grieve ENGINEERS

Taylor Burrell
Town planning and design

Appendix D Trip Distribution

PROPOSED STRUCTURE PLAN

TRIP DISTRIBUTION + TRAFFIC VOLUMES

LOT 311 FIFTY ROAD
BALDIVIS

CITY OF ROCKINGHAM

0 25 50 75 100 125m

SCALE: 1:2500
ORIGINAL PLAN SIZE: A3

JOB CODE:
LIL BAL GE

DATE:
31.05.2013

LEGEND:

SUBJECT LAND -
RESIDENTIAL R20 -
RESIDENTIAL R25 -
RESIDENTIAL R30 -
DEVELOPMENT SITE (R40) -
COMMERCIAL (MIXED USE) -
PUBLIC OPEN SPACE -

DUAL USE PATH -
LOCAL FOOTPATH -

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