

Annex C

Port Macquarie Outer Link
Road Options - Traffic
Assessment (SMEC 2006)

Document / Report Control Form

Project Name: **Port Macquarie Outer Link Road Options – Traffic Assessment**
Project number: **3002078**
Report for: **Port Macquarie Hastings Council**

PREPARATION, REVIEW AND AUTHORISATION

Revision #	Date	Prepared by	Reviewed by	Approved for Issue by
0	8/3/2006	Mick Lyons	Khaled Abbas	Mick Lyons
1	8/5/2006	Lindsay Jacobsen	Khaled Abbas	Mick Lyons
2	18/5/2006	Lindsay Jacobsen	Mick Lyons	Mick Lyons
3	29/6/2006	Lindsay Jacobsen	Khaled Abbas	Khaled Abbas
4	04/07/2006	Lindsay Jacobsen	Khaled Abbas	Khaled Abbas

ISSUE REGISTER

Distribution List	Date Issued	Number of Copies
Port Macquarie Hastings Council	04/07/2006	1
SMEC Canberra	04/07/2006	1

SMEC Australia
Ground Floor, 14 Wormald Street
SYMONSTON, ACT, 2906
PO BOX 1654, FYSHWICK, ACT, 2909

Tel: (02) 6126 1959
Fax: (02) 6126 1966
Email: khaled.abbas@smec.com.au
Web: <http://www.smec.com.au>

CONTENTS

1 Introduction2

2 Background2

3 Methodology.....4

4 Results5

 4.1 Impact on Traffic Flow5

 4.2 Impact on Travel Times6

5 Network Performance Indicators10

6 Conclusion11

APPENDICES

- Appendix A 2021 PM Peak Network Traffic Flows**
- Appendix B 2031 PM Peak Network Traffic Flows**

1 Introduction

SMEC was engaged by Port Macquarie – Hastings Council to undertake a traffic assessment of several alternative routes for the Outer Link Road identified in the Port Macquarie Outer Link Road Route Selection Study – Revised Preliminary Route Options Report (ERM 2005). The routes include seven north-south options, four east-west options and one combined option.

This report presents the findings of the assessment and includes attachments showing the traffic modelling outputs for each of the options investigated.

2 Background

The assessment is based on traffic modelling previously undertaken by SMEC as part of the Hastings Roads & Traffic Study (SMEC 2001) and subsequent studies conducted in 2003. The traffic modelling was performed for PM peak traffic flows in 2021 and 2031. Each of the options was modelled based on the routes identified for further assessment in the ERM report. The names of the modelled routes, number of lanes and description for each route are shown in **Table 1** while the routes are shown in **Figure 1**.

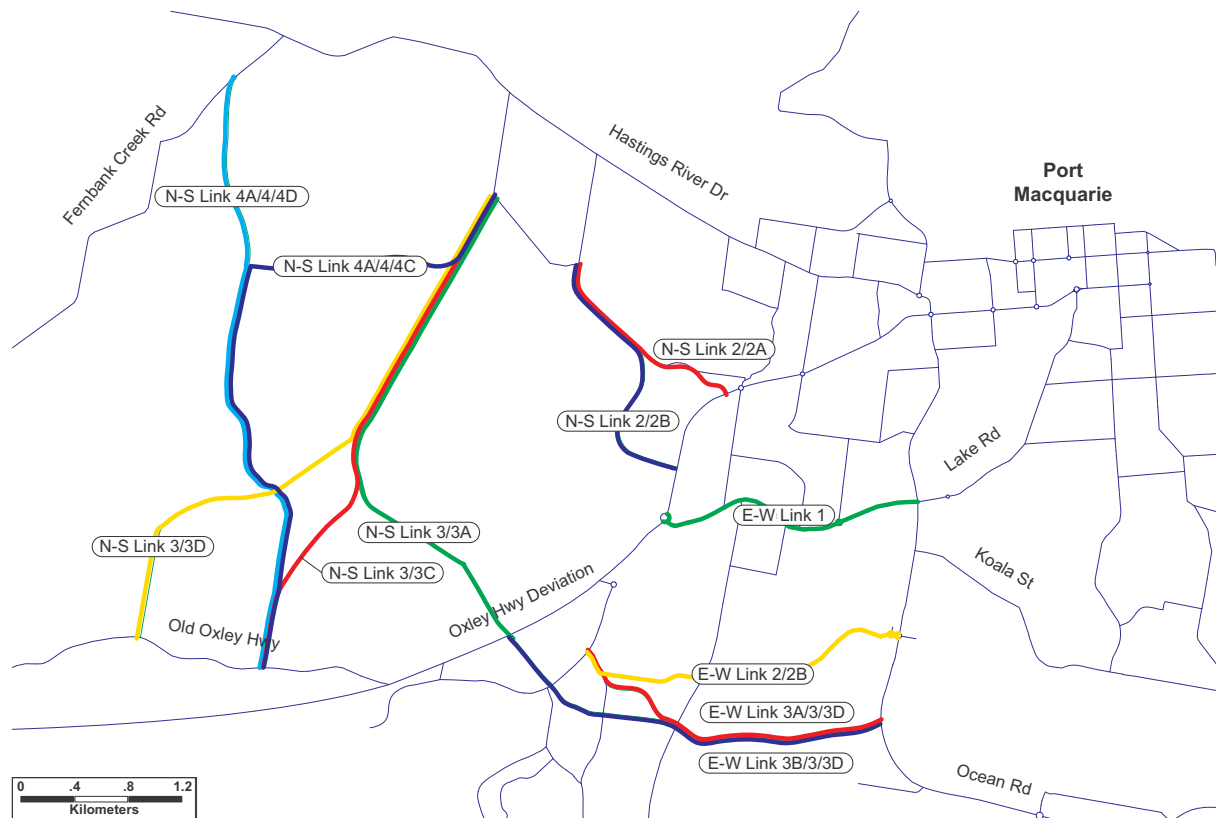


Figure 1 – Modelled Routes

Table 1 – Modelled Route Options

Option Name	Number of Lanes	Description
East-West Link 1	6	Widening of Lake Rd from four lanes to six lanes between Oxley Hwy and Ocean Dr
East-West Link 2/2B	4	Connects Ocean Dr at Greenmeadows Dr to the Old Oxley Hwy via Major Innes Rd
East-West Link 3A/3/3D	4	Connects Ocean Dr between Greenmeadows Dr and Yaluma Dr to the Old Oxley Hwy at Major Innes Rd.
East-West Link 3B/3/3D	4	Connects Ocean Dr between Greenmeadows Dr and Yaluma Dr to the Oxley Hwy Deviation, crossing the Old Oxley Hwy between Major Innes Rd and The Ruins Way
North-South Link 2/2A	2	Provides an alternative link between the town centre and the airport via Oxley Hwy attracting airport traffic off Hastings River Dr
North-South Link 2/2B	2	Connects to Oxley Hwy further to the south compared with 2A and therefore has less diversionary impact on traffic on Hastings River Dr
North-South Link 3/3A	2	Connects the Oxley Hwy Deviation at The Ruins Way (connecting to East-West Link 3B/3/3D) to Hastings River Dr at Tuffins Ln
North-South Link 3/3C	2	Connects the Old Oxley Hwy at Lindfield Park Rd to Hastings River Dr at Tuffins Ln
North-South Link 3/3D	2	Connects the Old Oxley Hwy at Thrumster St to Hastings River Dr at Tuffins Ln
North-South Link 4A/4/4C	2	Connects the Old Oxley Hwy at Lindfield Park Rd to Hastings River Dr at Tuffins Ln
North-South Link 4A/4/4D	2	Connects the Old Oxley Hwy at Lindfield Park Rd to Hastings River Dr at Fernbank Creek Rd
Northwest-Southeast Link 3	2/4	Includes both North-South Link 3/3A and East-West Link 3B/3/3D

3 Methodology

SMEC's TransCAD strategic model provides the basis for testing the impact of the various north-south and east-west Outer Link Road options. The 2021 model reflects the full development of Thrumster and includes recent employment data provided by Council.

Table 2 – Thrumster Land Use

Thrumster Precinct	Employment (No.)
South Oxley	200
North Oxley	600
Partridge Creek	400
West Lindfield	200
STP north of Partridge Creek	20

The options to be investigated were tested separately to determine changes in traffic flows on the network during the PM peak for year 2021 and 2031.

A 2.5% per annum growth rate was applied as the growth factor for the Hastings population from 2021 to 2031. This rate was taken from the Hastings Urban Growth Strategy 2001 (HUGS 2001) report and represents a relatively high growth rate in the range of growth scenarios reported in the HUGS 2001 report. Forecast traffic flows for 2031 were estimated in the model based on this assumed growth rate.

PM peak traffic flows were prepared for each of the Outer Link Road options tested. The impact of each of the options on the road network was assessed by observing the extent of diversion of traffic from congested routes.

Travel times were also synthesised from the model for a number of specific travel routes. These were used to enable a comparison and assessment of the effect of each of the options on travel times on a number of key routes.

4 Results

4.1 Impact on Traffic Flow

Traffic flow plots showing PM peak hour flows for the Base Case and for each of the twelve options are included for 2021 in **Appendix A** and for 2031 in **Appendix B**.

East-West Link 1

The upgrade appears to cause only minor changes in traffic flows on roads in the study area.

East-West Link 2/2B

This proposal attracts traffic from Lake Road ranging from 30% to 60%. It also reduces traffic flows significantly on Jindalee Road. The inclusion of this link does not significantly affect traffic flows on Lake Road east of Ocean Drive or on Old Oxley Highway north of Lake Road. However traffic flows on old Oxley Highway west of Lake Road increase significantly.

East-West Link 3A/3/3D

This link has a similar effect as *E-W Link 2/2B*. The reduction in traffic on Ocean Rd between *E-W Link 3B/3/3D* and Lake Rd is greater than the reduction observed for *2/2B*, but the reduction in Lake Road traffic is not as great.

East-West Link 3B/3/3D

This link option has similar impacts to *E-W Link 3A/3/3D*.

North-South Link 2/2A

This link has a greater impact on east-west traffic than on north-south traffic. Traffic is diverted from roads linking Hastings River Drive and Oxley Highway such as Clifton Drive and Widderson Street. There is no significant impact on traffic levels for Oxley Highway or Hastings River Drive west of the airport.

North-South Link 2/2B

This link option has similar impacts to *N-S Link 2/2A*.

North-South Link 3/3A

This link carries less than 300 vehicles in each direction in the 2021 PM peak and around 500 vehicles in each direction in the 2031 PM peak. There is a resultant reduction of about 300 vehicles in each direction on Oxley Highway west of Lake Road.

North-South Link 3/3C

This link intersects Oxley Highway further to the west and results in slightly greater diversion of traffic than *N-S Link 3/3A*. It carries between 300 and 400 vehicles in each direction during the 2021 PM peak, increasing to 500-600 vehicles in each direction in the 2031 PM peak.

North-South Link 3/3D

This link carries as much traffic as *N-S Link 3/3C*, and has similar traffic impacts.

North-South Link 4A/4/4C

This link joins the existing network at the same points as *N-S Link 3/3C*, but follows a more circuitous route. The peak traffic volumes are less than 200vph in each direction in 2021 and between 250 and 350 vehicles in 2031. It reduces traffic flows on Oxley Highway north of Lake Road by a similar amount.

North-South Link 4A/4/4D

This link joins Fernbank Creek Road near Hastings River Drive and is farther west than any of the other *N-S Link* options, and therefore is less attractive. In 2021 it carries just over 100vph in total, increasing to under 400vph total in 2031. Its effect on surrounding roads and routes is minimal.

Northwest-Southeast Link 3

This link combines the benefits of both *E-W Link 3B/3/3D* and *N-S Link 3/3A* in terms of attracting traffic and relieving existing relatively congested roads. There is no significant change in impact due to the combination of these link options.

4.2 Impact on Travel Times

Three Test Routes were selected as a basis for evaluating the impact on travel times of the various outer link road proposals. The Test Routes are:

Test Route 1: Oxley Highway (at Thrumster Street) – Clifton Drive – Hastings River Drive (at Hibbard Drive East)

Test Route 2: Oxley Highway (at Thrumster Street) – Pacific Highway – Fernbank Creek Road – Hastings River Drive (Hibbard Drive East);

Test Route 3: Oxley Highway (at Wrights Road) – Lake Road – Ocean Drive (at Greenmeadows Drive)

The Test Routes are shown below.

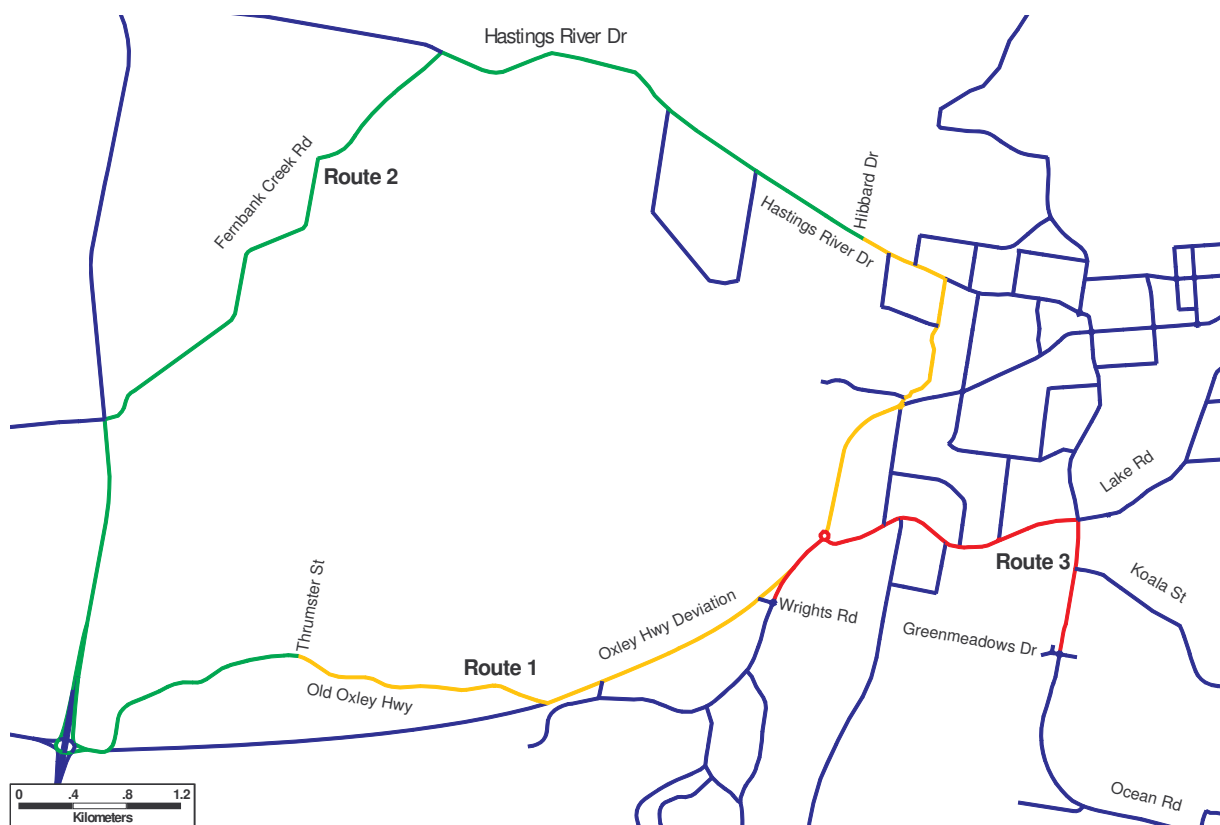


Figure 2 – Travel Time Survey – Test Routes

Travel speed is a function of the volume/capacity ratio for a particular road which in turn is a measure of the level of service of a road. Each of the outer link road proposals was tested in the model to estimate the change in travel speed for the three Test Routes relative to the Base Case. Travel times are calculated from modelled travel speeds and represent a total of the calculated travel times for each individual link along the route, therefore representing an expected travel time for a vehicle travelling along the entire route.

Average Levels of Service for each test route are shown below 2021 in **Table 3** and for 2031 in **Table 6**. Estimated travel times in seconds for the Test Routes are summarised for 2021 in **Table 4** and for 2031 in **Table 7**. A comparison of each of the options with the Base Case for each travel time survey Test Route is included for 2021 in **Table 5** and for 2031 in **Table 8**.

Table 3 – Levels of Service for 2021 PM

Option	Test Route 1		Test Route 2		TestRoute 3	
	N/B	S/B	N/B	S/B	E/B	W/B
Base Case	E	E	B	B	E	D
East-West Link 1	E	E	B	B	E	C
East-West Link 2/2B	E	E	B	B	D	C
East-West Link 3A/3/3D	E	E	B	B	D	C
East-West Link 3B/3/3D	E	E	B	B	D	C
North-South Link 2/2A	E	E	B	B	E	D
North-South Link 2/2B	E	E	B	B	E	D
North-South Link 3/3A	E	E	B	B	E	D
North-South Link 3/3C	E	E	B	B	E	D
North-South Link 3/3D	E	E	B	B	E	D
North-South Link 4A/4/4C	E	E	B	B	E	D
North-South Link 4A/4/4D	E	E	B	B	E	D
Northwest-Southeast Link 3	E	E	B	B	D	C

Table 4 – 2021 PM Peak Average Travel Times (secs)

Option	Test Route 1		Test Route 2		TestRoute 3	
	N/B	S/B	N/B	S/B	E/B	W/B
Base Case	460	483	622	627	300	258
East-West Link 1	460	477	622	627	268	231
East-West Link 2/2B	441	465	622	625	252	229
East-West Link 3A/3/3D	445	467	622	624	254	228
East-West Link 3B/3/3D	456	479	622	623	253	229
North-South Link 2/2A	442	462	614	622	303	260
North-South Link 2/2B	432	456	616	620	305	261
North-South Link 3/3A	444	471	615	624	302	257
North-South Link 3/3C	443	474	623	624	300	257
North-South Link 3/3D	442	469	625	625	300	259
North-South Link 4A/4/4C	451	477	618	623	303	258
North-South Link 4A/4/4D	404	408	622	626	302	258
Northwest-Southeast Link 3	440	466	614	618	251	230

Table 5 – 2021 PM Peak Average Travel Time Savings (secs)

Option	Test Route 1		Test Route 2		Test Route 3	
	N/B	S/B	N/B	S/B	E/B	W/B
Base Case	-	-	-	-	-	-
East-West Link 1	0	7	0	1	33	27
East-West Link 2/2B	19	18	0	2	49	29
East-West Link 3A/3/3D	15	17	0	4	46	30
East-West Link 3B/3/3D	4	5	0	4	48	29
North-South Link 2/2A	18	21	8	5	-3	-2
North-South Link 2/2B	28	27	6	7	-5	-3
North-South Link 3/3A	16	12	7	4	-2	1
North-South Link 3/3C	17	10	0	4	0	1
North-South Link 3/3D	18	15	-3	3	0	-1
North-South Link 4A/4/4C	9	6	4	4	-2	0
North-South Link 4A/4/4D	56	75	0	1	-2	0
Northwest-Southeast Link 3	20	18	8	9	50	28

Table 6 – Levels of Service for 2031 PM

Option	Test Route 1		Test Route 2		TestRoute 3	
	N/B	S/B	N/B	S/B	E/B	W/B
Base Case	F	F	C	C	F	E
East-West Link 1	F	F	C	C	E	D
East-West Link 2/2B	E	F	C	C	E	D
East-West Link 3A/3/3D	E	F	C	C	E	D
East-West Link 3B/3/3D	E	F	C	C	E	D
North-South Link 2/2A	E	F	C	C	F	E
North-South Link 2/2B	E	F	C	C	F	E
North-South Link 3/3A	E	F	C	C	F	E
North-South Link 3/3C	E	F	C	C	F	E
North-South Link 3/3D	E	F	C	C	F	E
North-South Link 4A/4/4C	F	F	C	C	F	E
North-South Link 4A/4/4D	F	F	C	C	F	E
Northwest-Southeast Link 3	E	E	C	C	E	D

Table 7 – 2031 PM Peak Average Travel Times (secs)

Option	Test Route 1		Test Route 2		Test Route 3	
	N/B	S/B	N/B	S/B	E/B	W/B
Base Case	516	548	642	656	304	286
East-West Link 1	519	543	643	656	294	253
East-West Link 2/2B	498	525	641	652	277	247
East-West Link 3A/3/3D	497	524	640	653	279	249
East-West Link 3B/3/3D	502	529	640	654	275	249
North-South Link 2/2A	498	513	634	651	303	288
North-South Link 2/2B	484	508	635	650	300	290
North-South Link 3/3A	496	523	637	653	306	285
North-South Link 3/3C	494	532	641	651	308	284
North-South Link 3/3D	488	518	641	651	307	285
North-South Link 4A/4/4C	509	538	639	654	304	287
North-South Link 4A/4/4D	510	548	645	657	306	286
Northwest-Southeast Link 3	484	506	634	647	272	248

Table 8 – 2031 PM Peak Average Travel Time Savings (secs)

Option	Test Route 1		Test Route 2		Test Route 3	
	N/B	S/B	N/B	S/B	E/B	W/B
Base Case	-	-	-	-	-	-
East-West Link 1	-3	5	-1	0	9	33
East-West Link 2/2B	18	23	2	4	27	39
East-West Link 3A/3/3D	19	25	2	3	25	37
East-West Link 3B/3/3D	14	19	2	2	29	38
North-South Link 2/2A	18	35	8	5	1	-2
North-South Link 2/2B	33	40	7	6	4	-3
North-South Link 3/3A	20	25	6	3	-2	1
North-South Link 3/3C	22	16	2	5	-4	2
North-South Link 3/3D	28	30	2	5	-3	1
North-South Link 4A/4/4C	7	11	4	2	-1	0
North-South Link 4A/4/4D	6	1	-2	-1	-2	0
Northwest-Southeast Link 3	32	42	8	9	32	38

The results show that in the 2021 and 2031 PM peak periods the most significant travel time saving is achieved by the construction of the combination of *East-West Link 3B/3/3D* and *North-South Link 3/3A*. However, taken separately, the most effective route in reducing travel time is *East-West Link 3A/3/3D*.

5 Network Performance Indicators

Several indicators of travel can be synthesised as output of the Transcad runs for the considered north-south and east-west link options. These include the number of Vehicle Kilometres Travelled (VKT), the number of Vehicle Hours Travelled (VHT). These are obtained for the PM peak, for the years 2021 and 2031, see table 9. The table shows the total number of trip accommodated in the network. Other indicators can be also computed using this output, such as average journey distance, average journey speed for each of the base case and the considered options.

Table 9 – Network Traffic Performance Indicators (PM Peak)

Option	2021 PM			2031 PM		
	Trips	VKT	VHT	Trips	VKT	VHT
Base Case	59698	328525.3	13763.3	76414	425750.3	19155.5
East-West Link 1	59698	328597.7	13718.5	76414	425811.6	19084.8
East-West Link 2/2B	59698	325410.0	13343.4	76414	420766.3	18361.8
East-West Link 3A/3/3D	59698	326063.3	13352.4	76414	421932.8	18395.3
East-West Link 3B/3/3D	59698	324803.2	13554.7	76414	420307.6	18332.0
North-South Link 2/2A	59698	328447.7	13691.9	76414	424604.2	19004.9
North-South Link 2/2B	59698	327078.7	13637.6	76414	424420.2	18995.3
North-South Link 3/3A	59698	327411.0	13684.5	76414	425714.4	19037.0
North-South Link 3/3C	59698	327608.1	13675.1	76414	424453.3	18972.4
North-South Link 3/3D	59698	327929.1	13700.1	76414	424311.7	19005.3
North-South Link 4A/4/4C	59698	327670.0	13694.7	76414	425737.8	19092.8
North-South Link 4A/4/4D	59698	328529.8	13744.6	76414	425999.9	19127.4
Northwest-Southeast Link 3	59698	324572.5	13281.5	76414	419657.6	18240.3

6 Conclusion

6.1.1 East-West Options

The assessment of the east-west route options shows that:

East-West Link 1 has similar peak traffic flows compared to the Base Case, however the proposed additional lanes do have a significant effect on average travel speeds and therefore result in a substantial reduction in travel times on Test Route 3.

East-West Link 2/2B provides attractive east-west alternative routes to Lake Road, avoiding the need for costly widening on Lake Road and improving accessibility through reduced traffic congestion at intersections along Lake Road. It is expected to attract about 1,000 vehicles in each direction from Lake Road in 2031, resulting in improved level of service on Lake Road and a good level of service on the proposed link.

East-West Links 3A/3/3D and *3/3B/3D* also provide attractive east-west alternative routes to Lake Road, avoiding the need for widening on Lake Road. They do not divert as much traffic as *East-West Link 2/2B*, but *Link 3B/3/3D* provides a potential connection to *North-South Link 3/3A*. They also connect to Ocean Drive further south than the other *East-West* options, and thereby provide relief to more of the length of this and other affected North-South roads.

6.1.2 North-South Options

The provision of *North South Link 2/2A* and *2/2B* reduces traffic flows on Hastings River Drive east of Hibbard Drive by providing alternative routes to the airport. Both routes result in significant savings in travel times for the two North-South survey Test Routes, with *2/2B* providing the better performance.

Options 3A, 3C, 3D, 4C and 4D provide direct connections between Oxley Highway and the airport and Hastings River Drive but attract relatively low volumes of traffic. In all five options there is not a significant change in travel time for Test Routes 1 and 2.

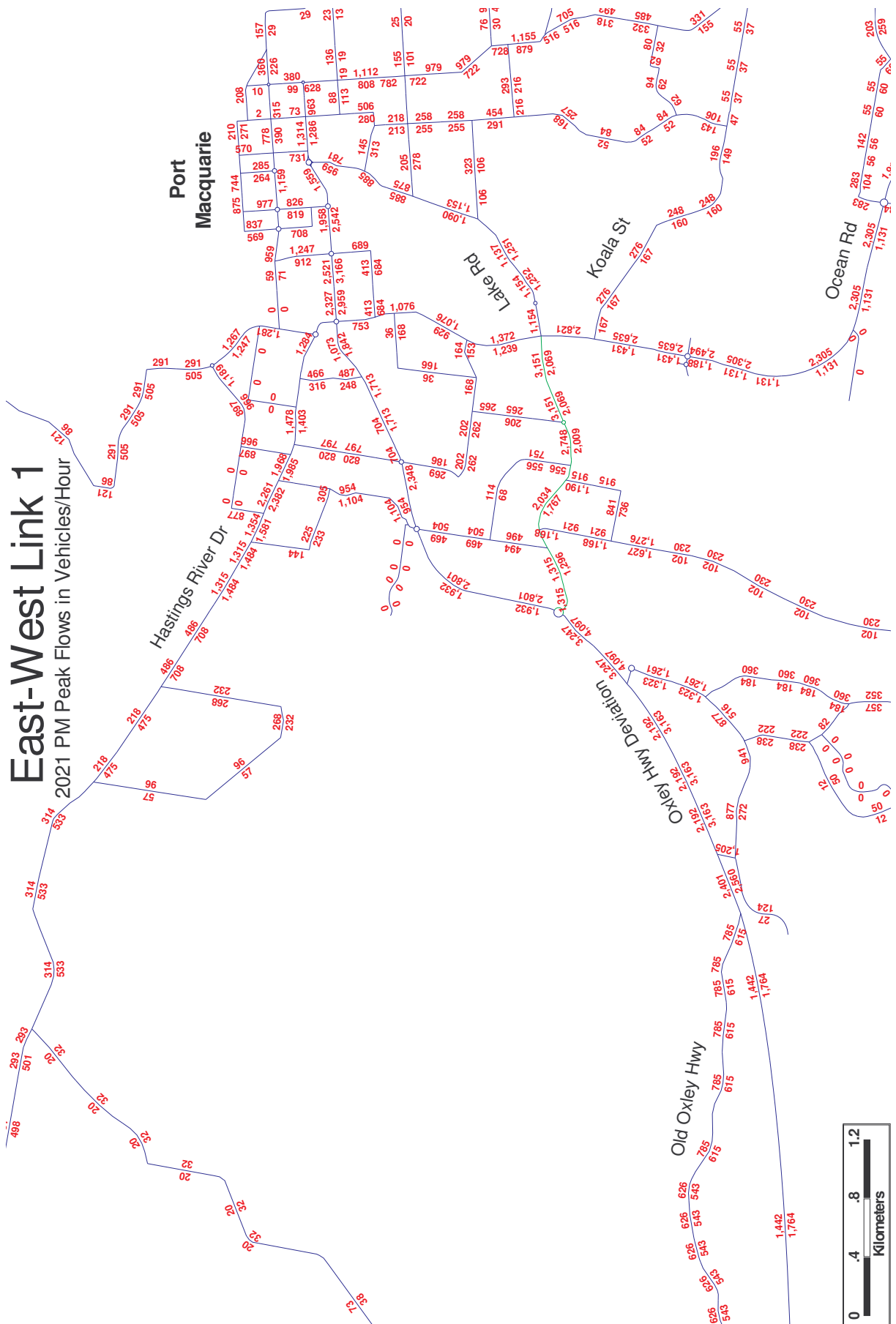
6.1.3 Combined Options

Although *North-South Link 3/3A* in isolation does not attract significant levels of traffic, the provision of this link together with *E-W Link 3B/3/3D* to form *Northwest-Southeast Option 3* results in the greatest travel time savings for all three test routes.

Appendix A 2021 PM Peak Network Traffic Flows

East-West Link 1

2021 PM Peak Flows in Vehicles/Hour



Port Macquarie

Hastings River Dr

Lake Rd

Koala St

Ocean Rd

Old Oxley Hwy

Oxley Hwy Deviation



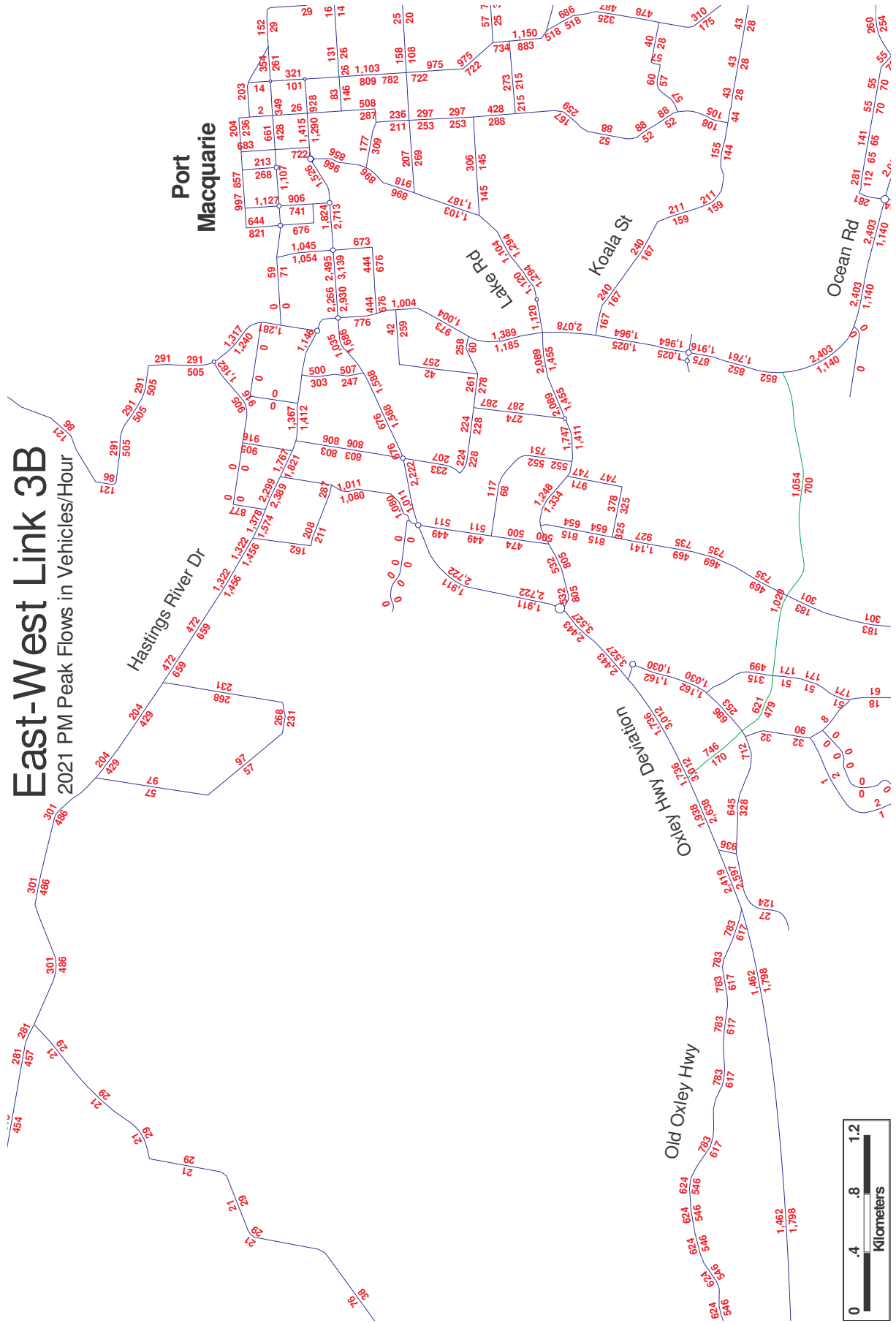
East-West Link 3A

2021 PM Peak Flows in Vehicles/Hour



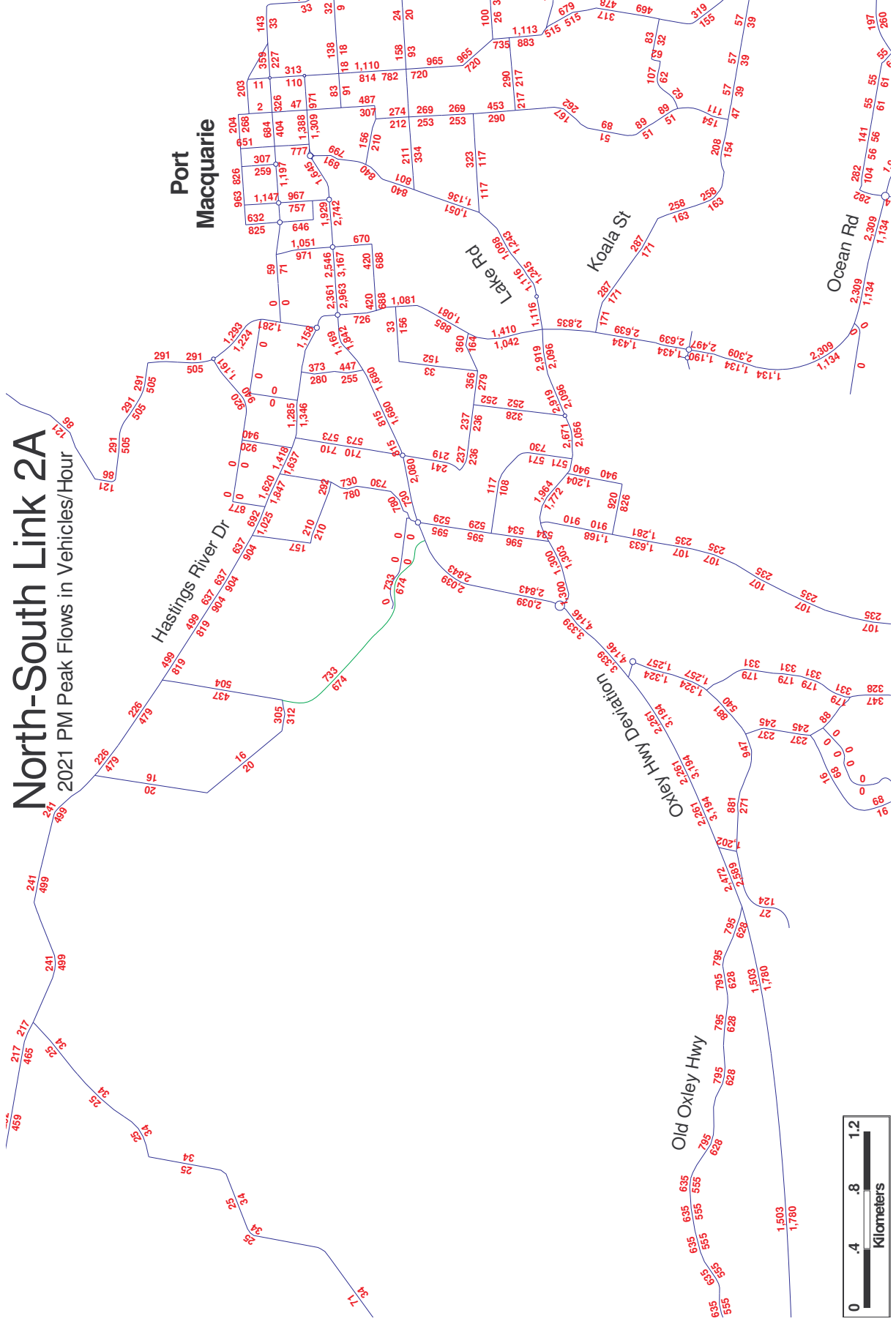
East-West Link 3B

2021 PM Peak Flows in Vehicles/Hour



North-South Link 2A

2021 PM Peak Flows in Vehicles/Hour



Port
Macquarie

Hastings River Dr

Lake Rd

Koala St

Ocean Rd

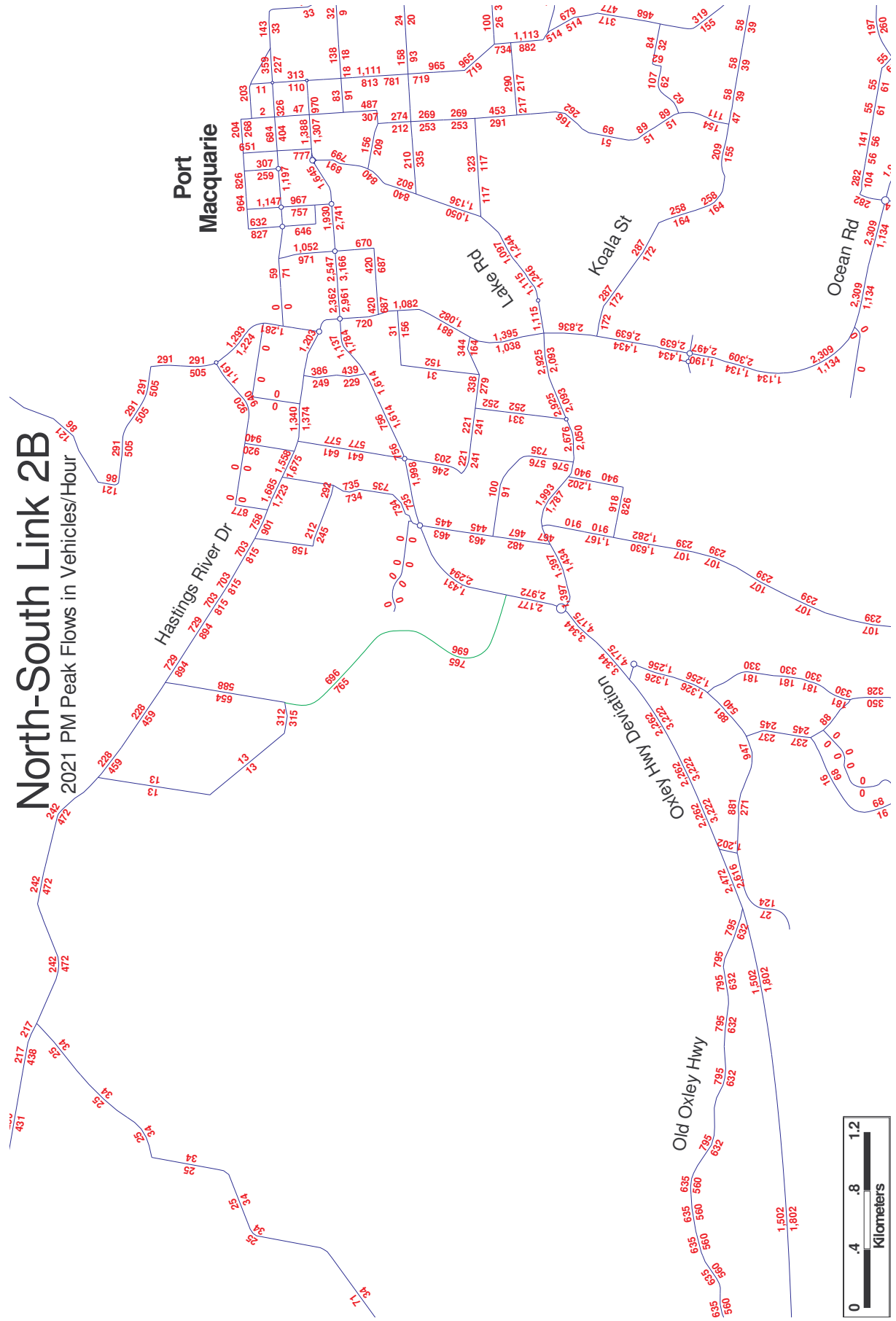
Old Oxley Hwy

Oxley Hwy Deviation



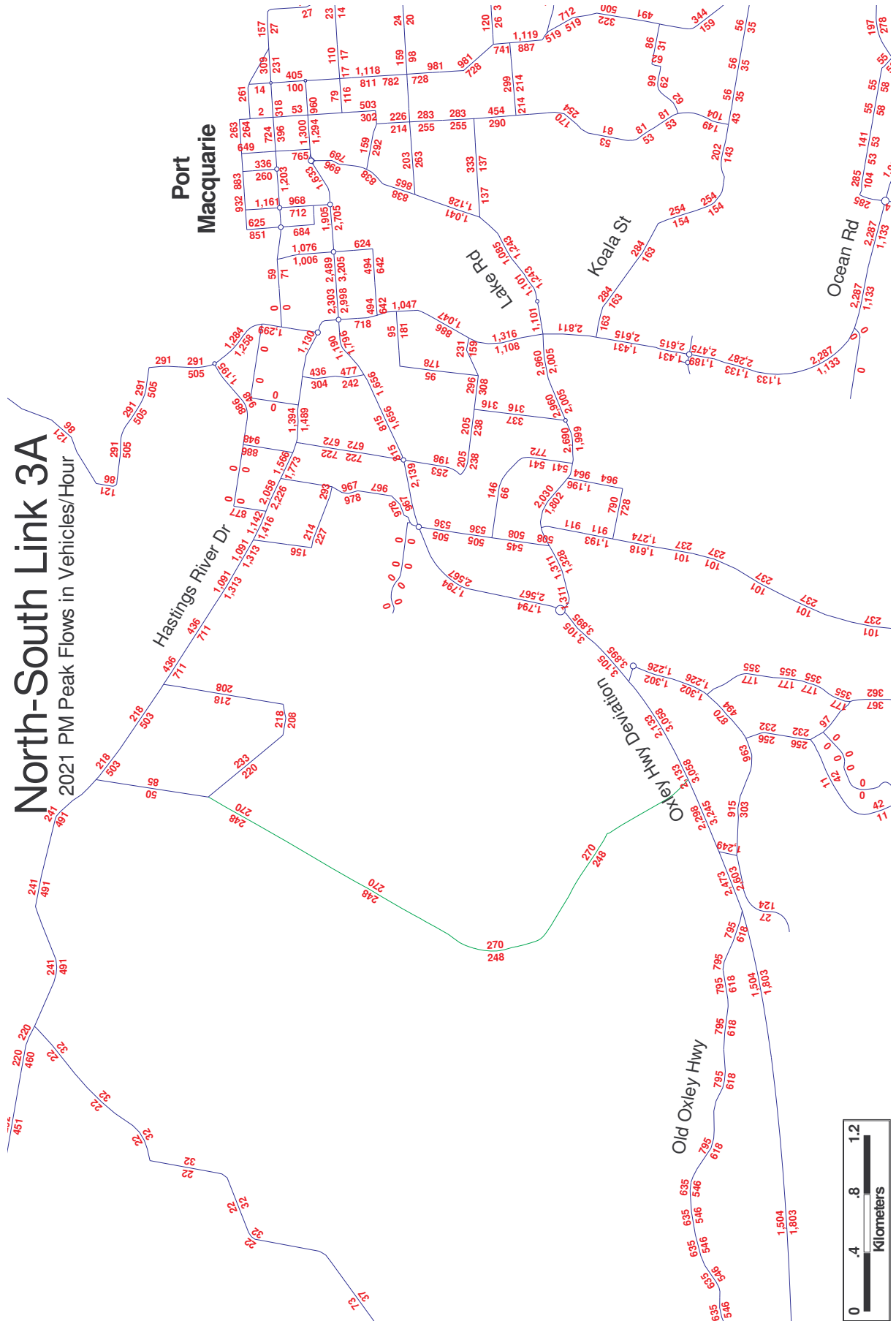
North-South Link 2B

2021 PM Peak Flows in Vehicles/Hour



North-South Link 3A

2021 PM Peak Flows in Vehicles/Hour



Port Macquarie

Hastings River Dr

Lake Rd

Koala St

Ocean Rd

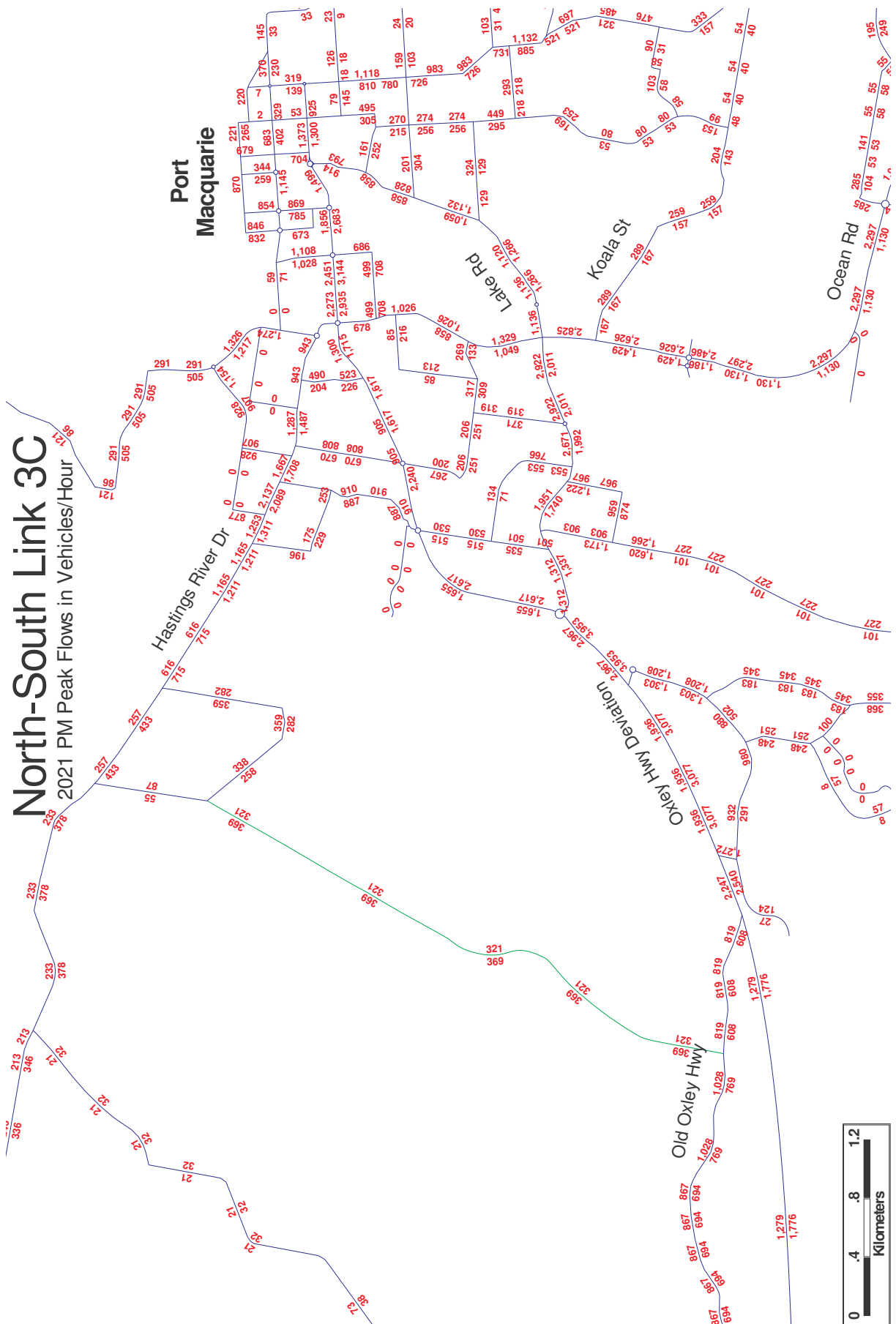
Old Oxley Hwy

Oxley Hwy Deviation



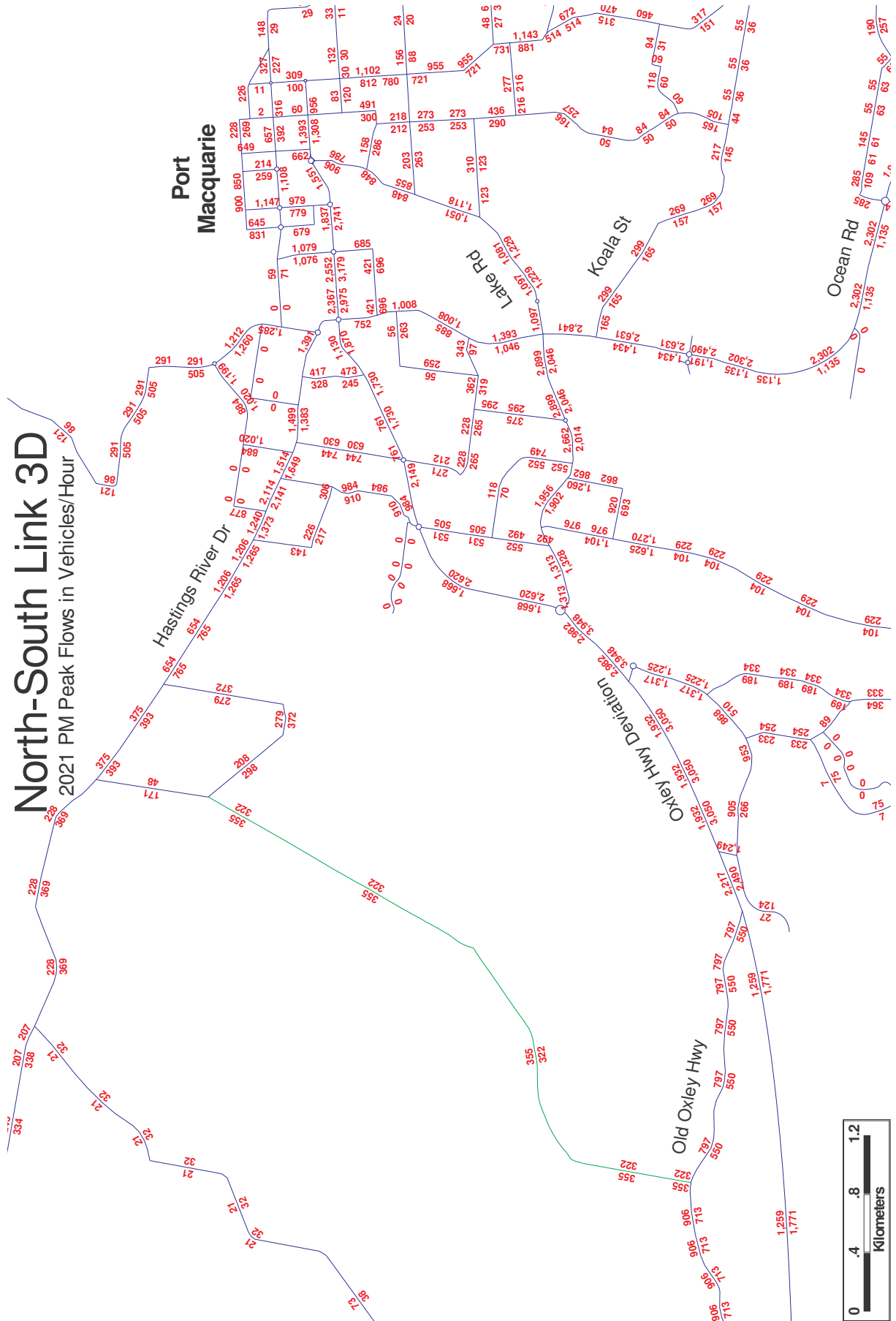
North-South Link 3C

2021 PM Peak Flows in Vehicles/Hour



North-South Link 3D

2021 PM Peak Flows in Vehicles/Hour



Port Macquarie

Hastings River Dr

Lake Rd

Koala St

Ocean Rd

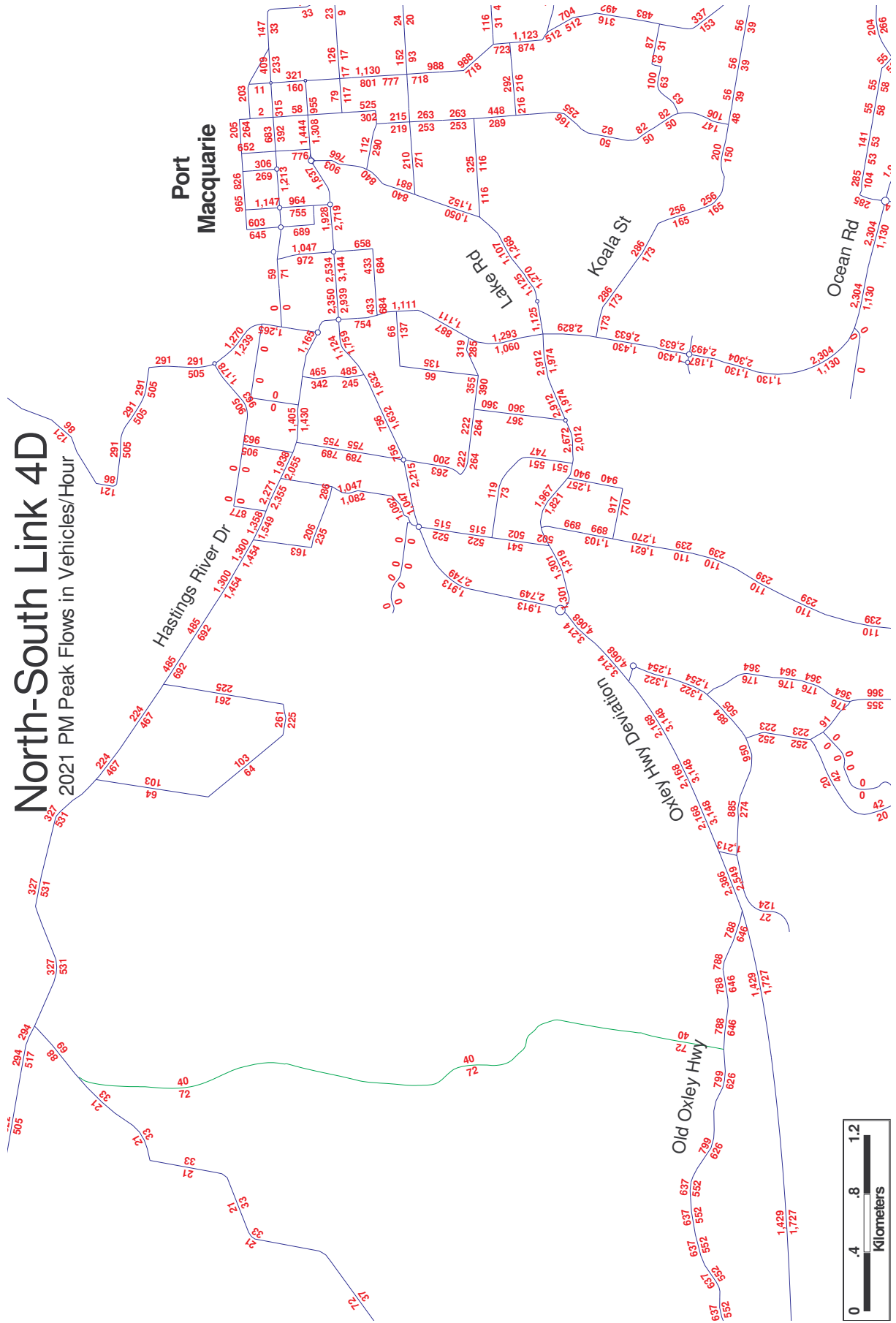
Oxley Hwy Deviation

Old Oxley Hwy



North-South Link 4D

2021 PM Peak Flows in Vehicles/Hour



Port Macquarie

Hastings River Dr

Lake Rd

Koala St

Ocean Rd

Old Oxley Hwy

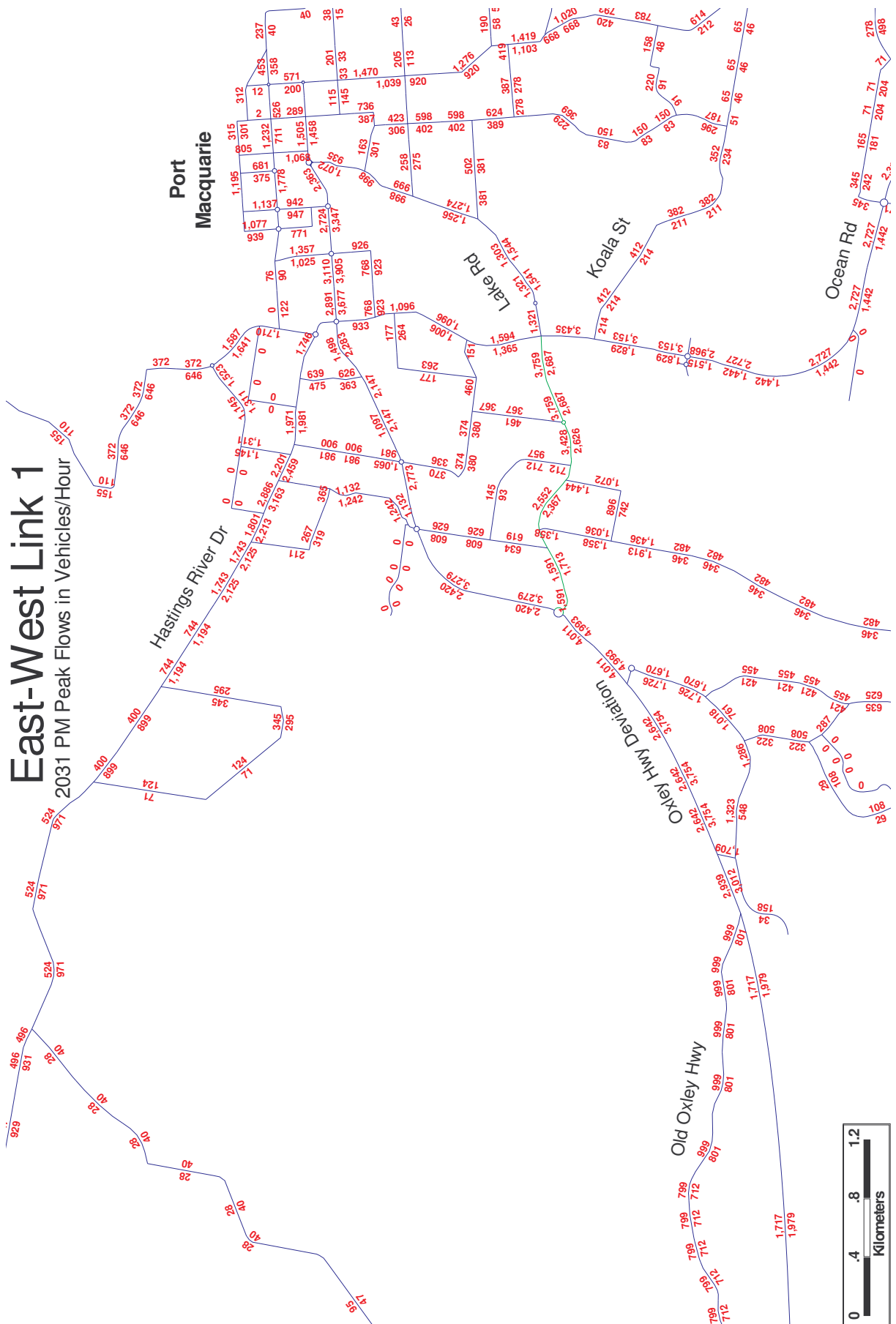
Oxley Hwy Deviation



Appendix B 2031 PM Peak Network Traffic Flows

East-West Link 1

2031 PM Peak Flows in Vehicles/Hour



Port Macquarie

Koala St

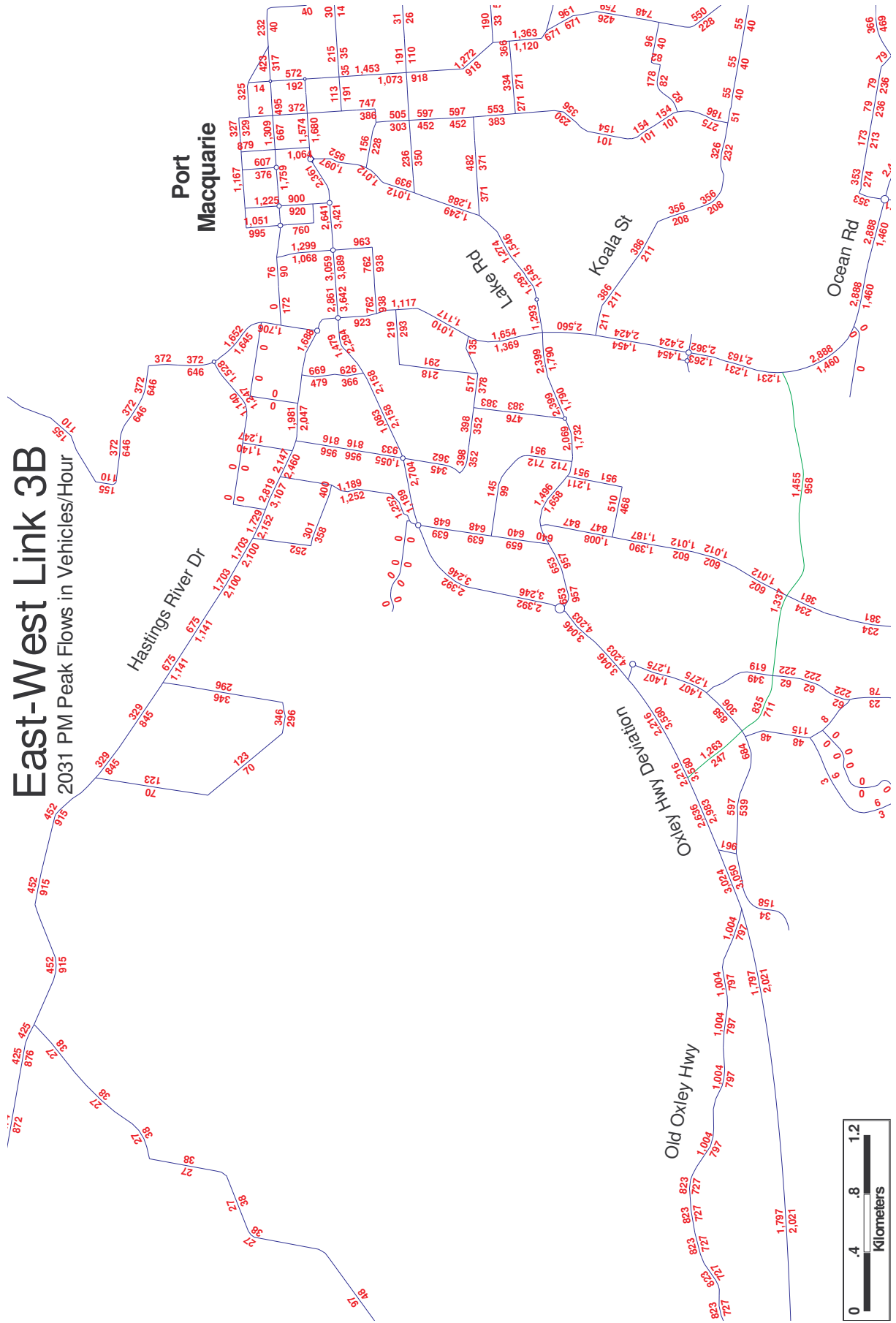
Ocean Rd

Old Oxley Hwy



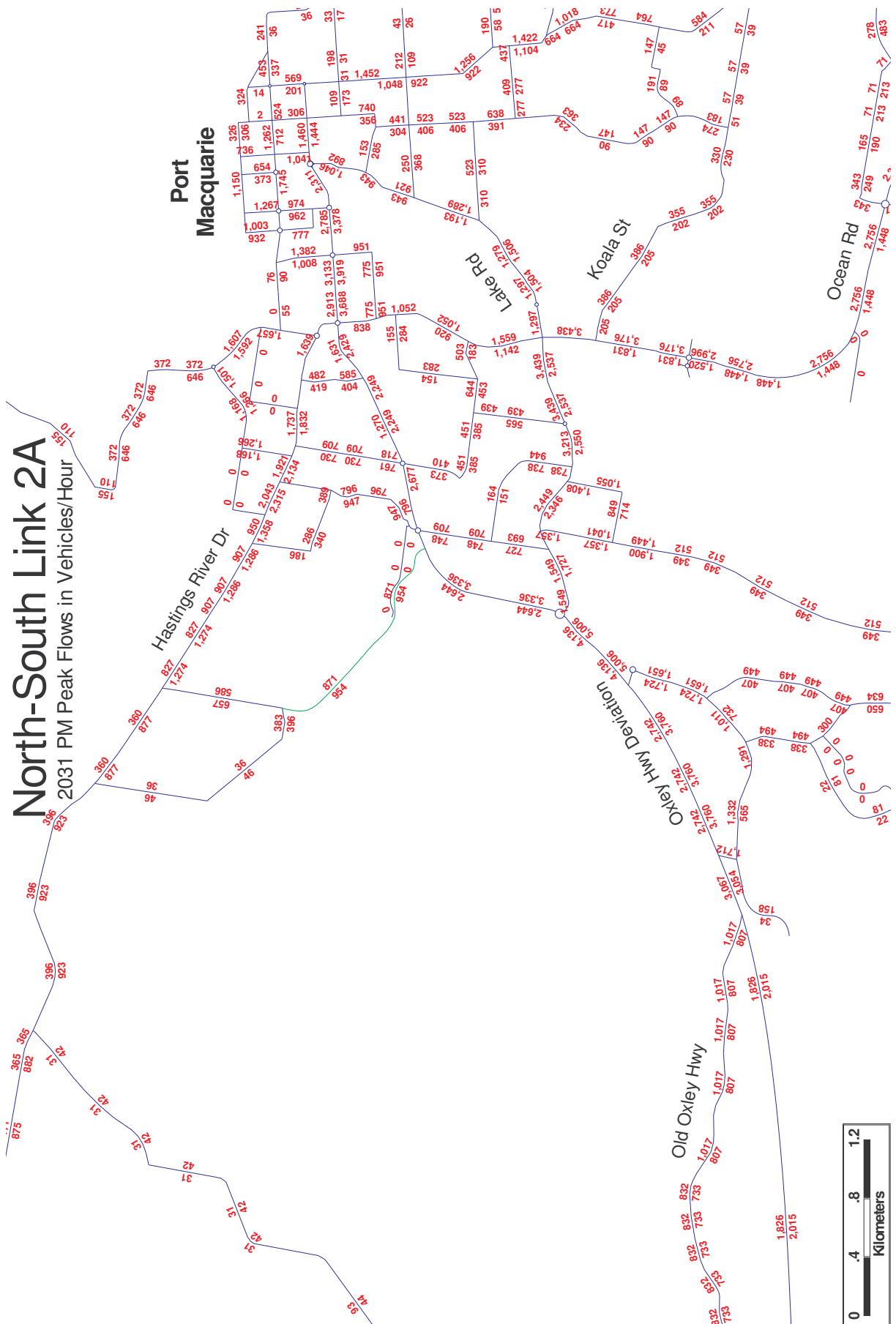
East-West Link 3B

2031 PM Peak Flows in Vehicles/Hour



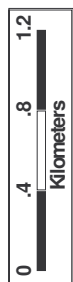
North-South Link 2A

2031 PM Peak Flows in Vehicles/Hour



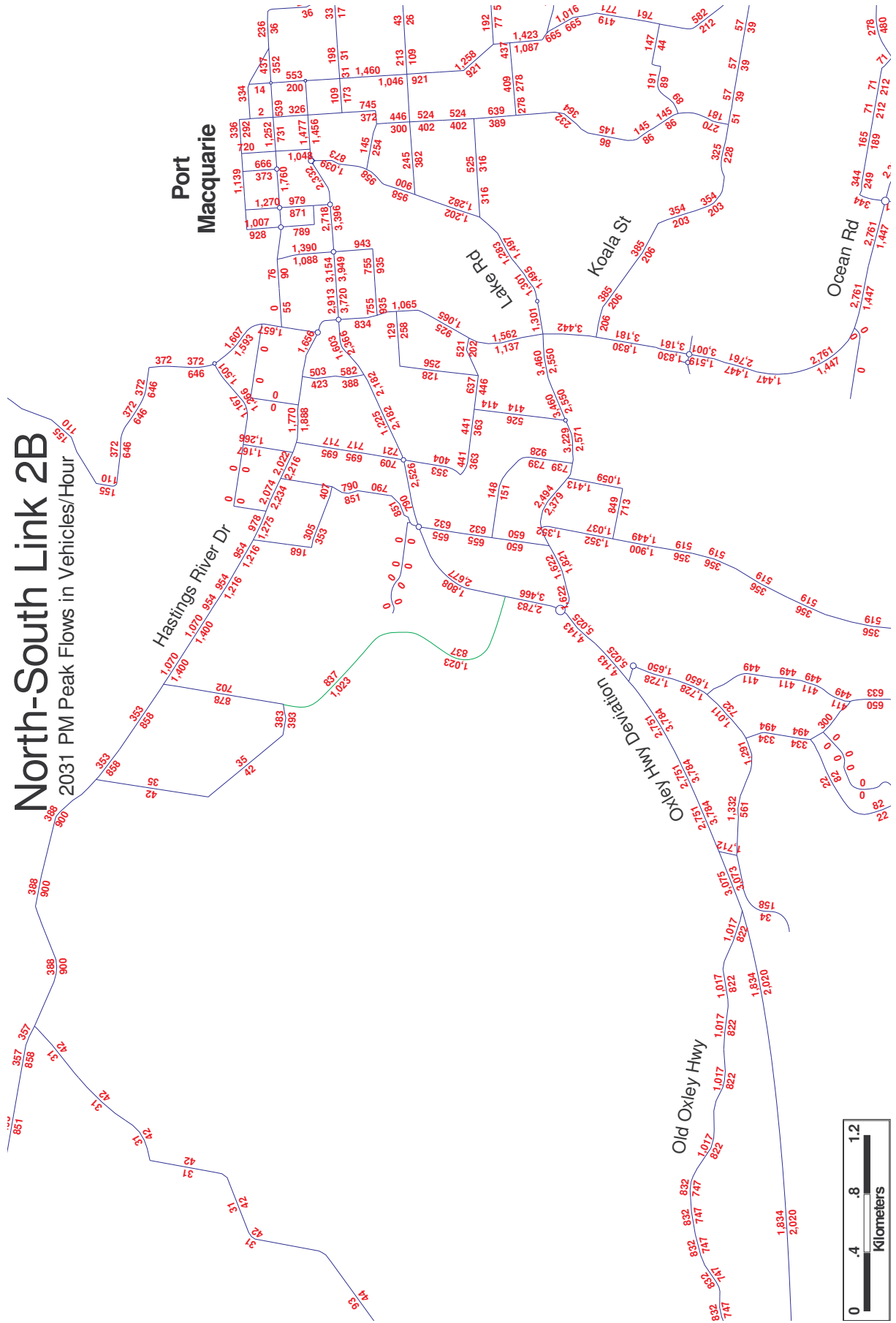
**Port
Macquarie**

Old Oxley Hwy



North-South Link 2B

2031 PM Peak Flows in Vehicles/Hour



Port Macquarie

Hastings River Dr

Lake Rd

Koala St

Ocean Rd

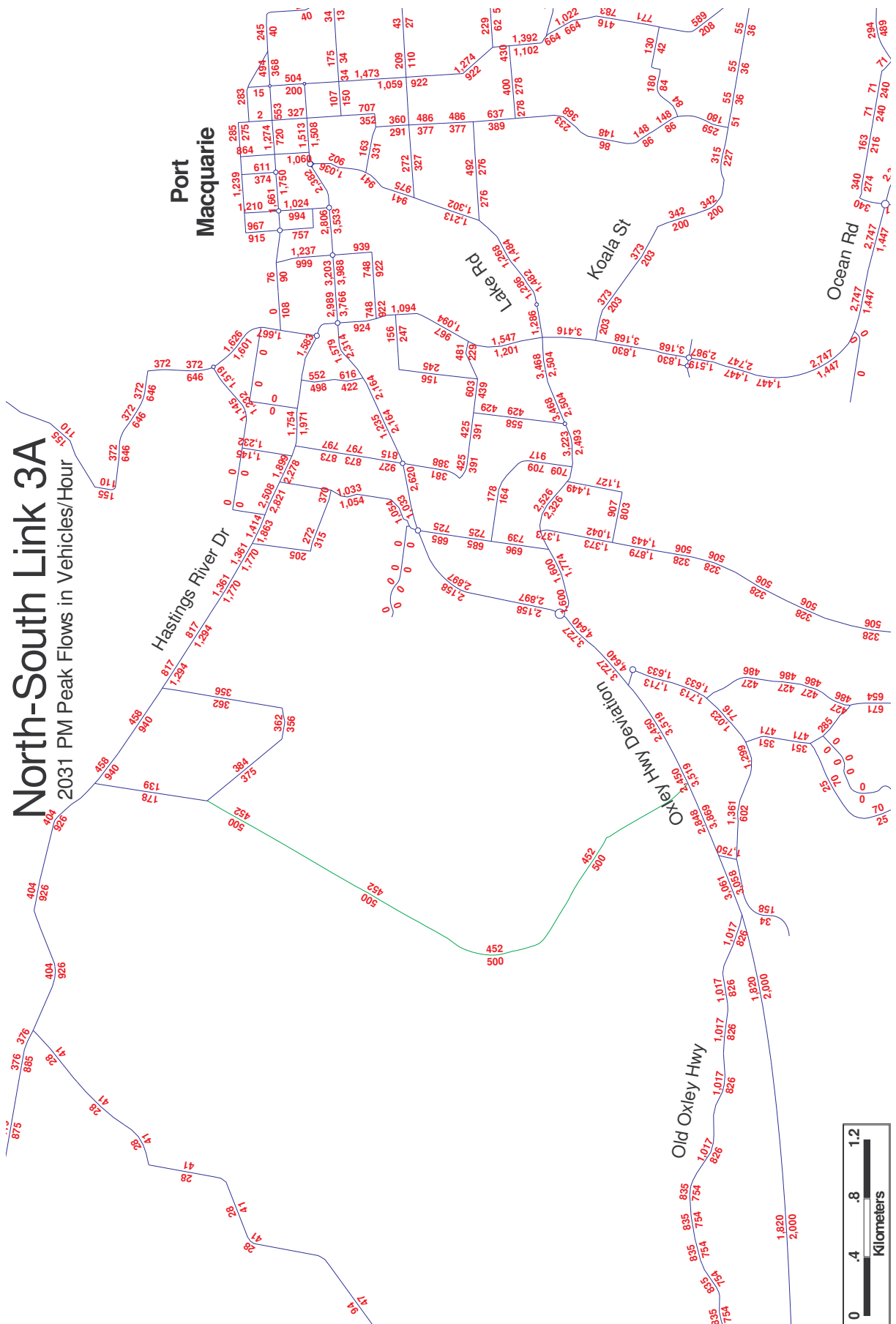
Old Oxley Hwy

Oxley Hwy Deviation



North-South Link 3A

2031 PM Peak Flows in Vehicles/Hour



Port Macquarie

Koala St

Ocean Rd

Hastings River Dr

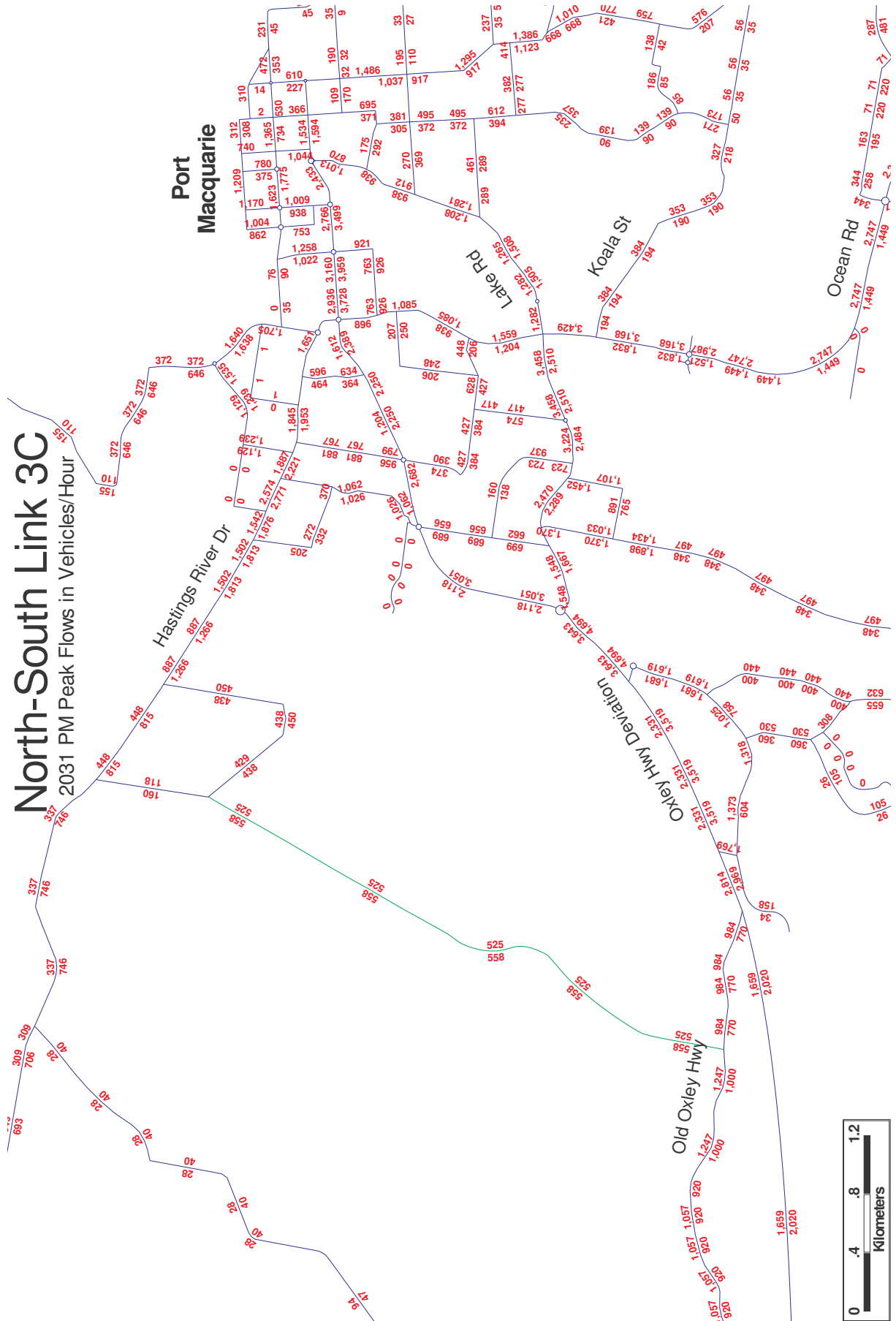
Oxley Hwy Deviation

Old Oxley Hwy



North-South Link 3C

2031 PM Peak Flows in Vehicles/Hour



Port Macquarie

Hastings River Dr

Lake Rd

Koala St

Ocean Rd

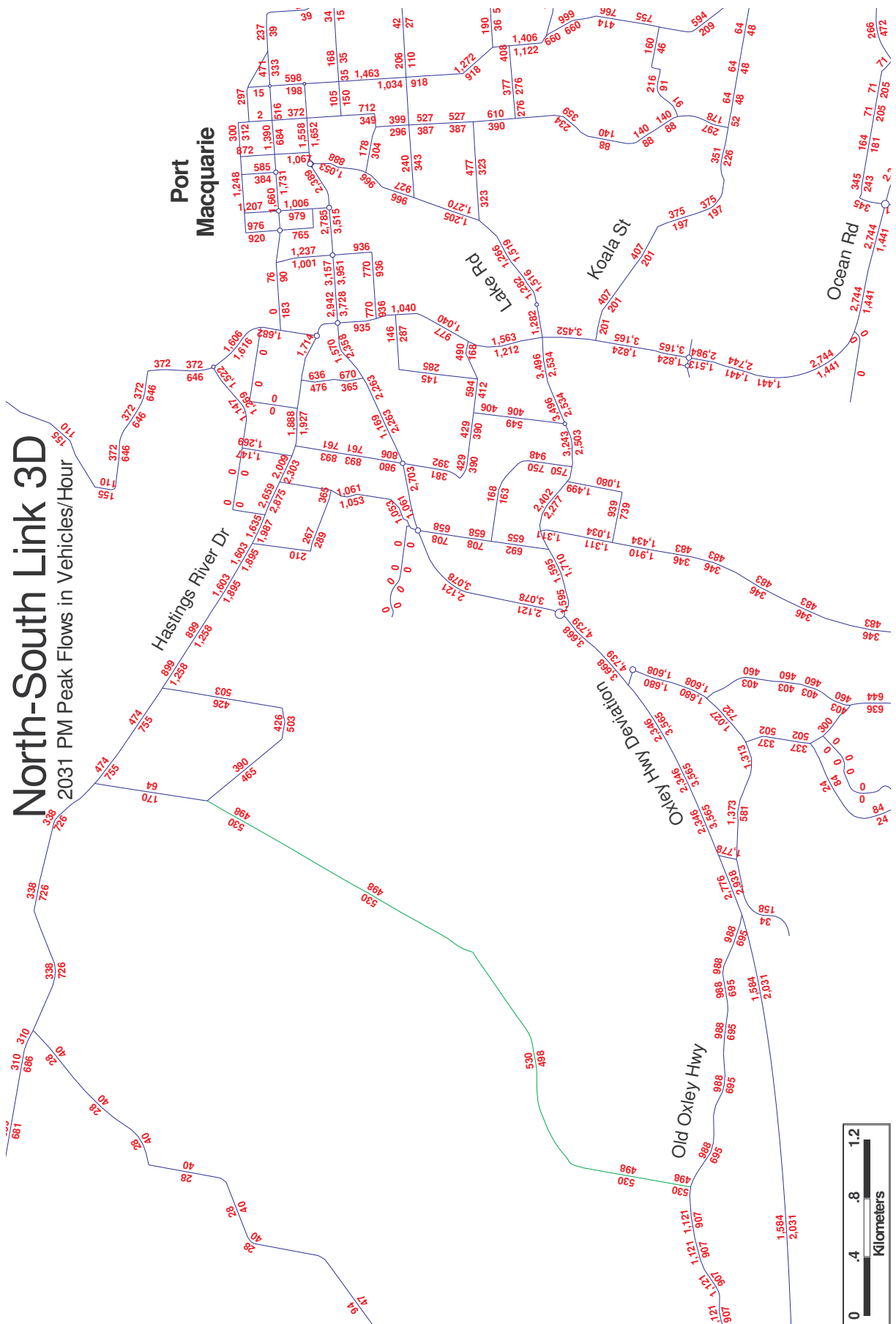
Oxley Hwy Deviation

Old Oxley Hwy



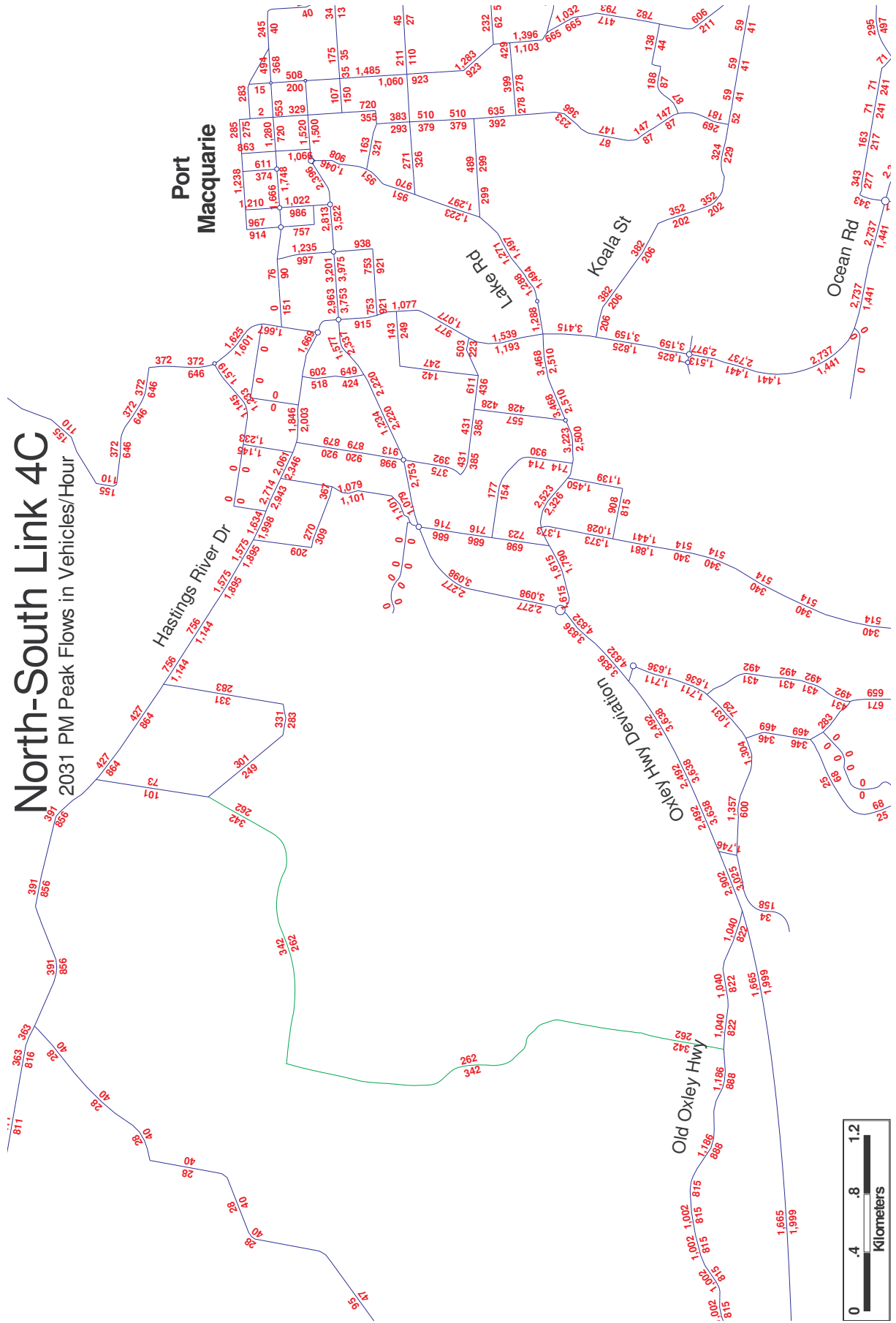
North-South Link 3D

2031 PM Peak Flows in Vehicles/Hour



North-South Link 4C

2031 PM Peak Flows in Vehicles/Hour



North-South Link 4D

2031 PM Peak Flows in Vehicles/Hour

