

Barlows Road Option Modelling

Barlows Road Option

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Prepared for
Ballina Shire Council

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ii

Table of Contents

1	Introduction	1
	1.1 Background	1
	1.2 Summary of the Model	1
	1.3 Report content	2
2	Modelling	3
	2.1 Scenario 1 - Without WAR	3
	2.2 Scenario 2 - With WAR	3
3	Modelling Results	6
	3.2 Scenario 1 - Without WAR	6
	3.3 Scenario 2. With WAR	7
4	Apportionment	10

Appendices

Appendix A LOS and VC Ratio Plots

Appendix B Apportionment Matrix for BRO

Tables

Table 2-1	Proposed Upgrades to 2036 Road Network	3
Table 3-1	2036 Without WAR Modelled Daily Results for BRO	6
Table 3-2	2036+ With WAR Modelled Daily Results for BRO	7
Table 4-1	Percent of trips that start or finish in Development areas	10

Figures

Figure 1-1	Western Bypass Options	1
Figure 2-1	Scenario 1 Modelled Roads	4
Figure 2-2	Scenario 2 Modelled Roads	5
Figure 3-1	Preferred westbound traffic route for trips that use the BRO	6
Figure 3-2	2036 Modelled Volumes Without WAR	8
Figure 3-3	2036+ Modelled Volumes With WAR	9

1 Introduction

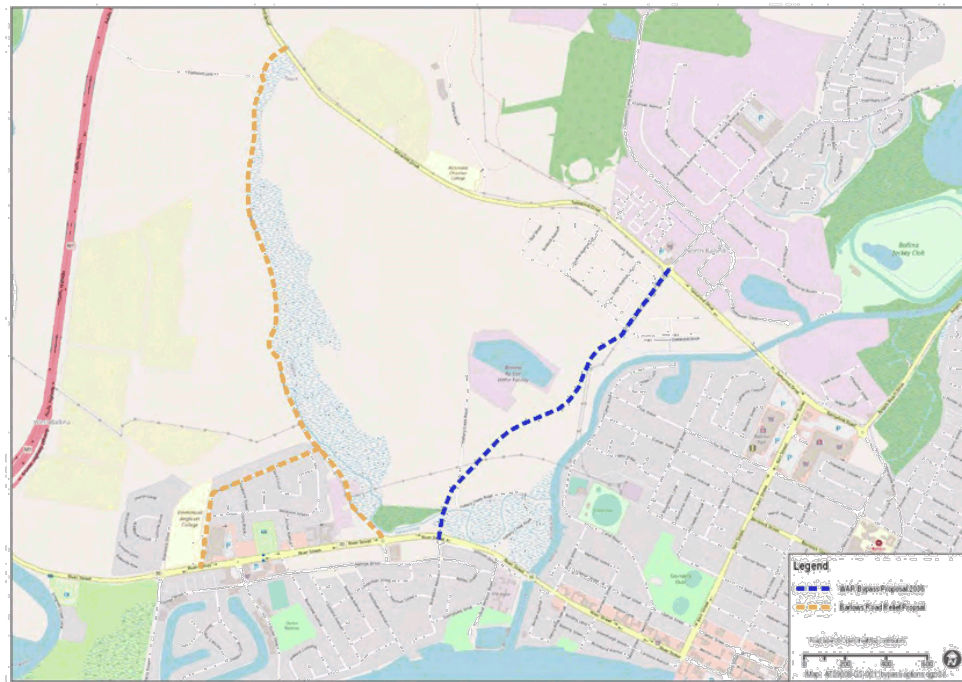
1.1 Background

Cardno has been commissioned by the Ballina Shire Council (Council) to test a second corridor for an additional western bypass of Ballina.

Based on discussions with Council, and Cardno’s previous history providing traffic modelling services for Council, it is understood that in the 2014 Strategic Modelling Update for the 2014 update of the Section 94 plan, a western bypass (Western Arterial Road; WAR) of Ballina was considered. This proposed alignment runs from River Street at Brampton Avenue to Tamarind Drive at Ferngrove Drive as demonstrated in Figure 1-1. It is understood the proposed bypass is estimated to cost \$33M and would be expected to take at least 5 years to complete due to its location and alignment. The alignment also means that operationally there is no feasible staging for parts of this link. Construction is not currently scheduled until the 2028 – 2036 period.

Given the current congestion issues within Ballina, the option to create an earlier, lower cost connection is being investigated which would utilise the Barlows Road corridor between Western Ballina and Tamarind Drive. This proposed connection is also demonstrated in Figure 1-1. It is envisaged that this option will be able to be constructed faster and cheaper than the WAR alignment proposed in the 2014 update. The following outlines the results of the modelling for the Barlows Road option (BRO).

Figure 1-1 Western Bypass Options



1.2 Summary of the Model

This modelling will utilise the existing TRACKS model developed by Cardno as part of the 2014 Strategic Modelling Update. As a consequence, some familiarity with the 2014 Strategic Modelling Update report is expected. This report will only discuss the required changes and results of this study.



Two new scenarios have been created:

1. A 2014 modelled network with the BRO coded. This scenario will use the 2036 demographics developed as part of the 2014 Strategic Modelling Update. This scenario will estimate the demand that would use this corridor if it was built first. The 2036 demographics was true to the Council population projections, but had low (close to one) persons per household in a number of development areas.
2. A 2036 network with all modelled upgrades as per the 2036 Run2, developed as part of the 2014 Strategic Modelling Update, with the BRO coded. This scenario will use the 2036+ demographics developed as part of the 2014 study. The 2036+ demographics increased the persons per household to 2 persons per household in the development areas, thus, while it has the Council projection of dwellings, it has more people than the Council 2036 projection. This scenario will estimate the demand that would still use this corridor once the WAR has been constructed.

A select link analysis has been undertaken on the BRO as part of Scenario 2. The select link matrices for the BRO will be aggregated to development parcels/zones to facilitate the calculation of the developer contributions apportionment.

1.3 Report content

This report will describe the modelled network and show the results of the application of the adopted future demographics to the BRO and the WAR. It will also report on the apportionment calculations.

2 Modelling

2.1 Scenario 1 - Without WAR

A copy of the calibrated 2014 network from the 2014 Strategic Modelling Update was created and the BRO was coded into this network. At the same time, a review of the local modelled posted speeds was undertaken. As a result of this review, a small number of changes were required to the modelled network. The final modelled network is demonstrated in Figure 2-1.

The demographics used for this scenario were the 2036 demographics matching the Council supplied future projections created for the 2014 Strategic Modelling Update. This demographic set was chosen as it was considered the closest match to the expected demand in the first couple of years of operation, before the WAR is opened.

2.2 Scenario 2 - With WAR

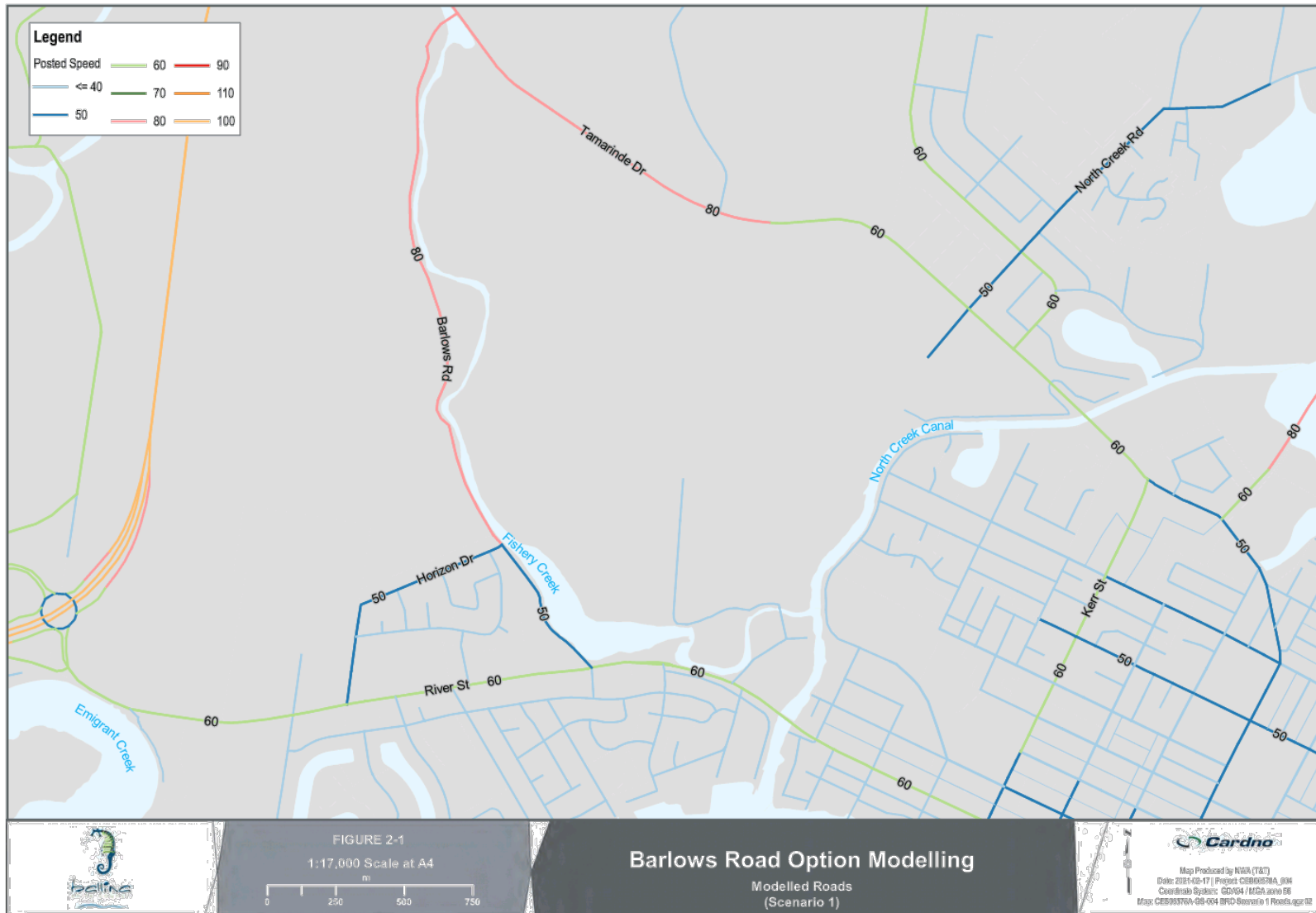
A copy of the Run2 2036 network from the 2014 Strategic Modelling Update was created and the BRO was coded into this network. The final modelled network is demonstrated in Figure 2-2. The other proposed upgrades between the 2014 network and the 2036 Run2 network are detailed in Table 2-1

The demographics for this scenario were the 2036+ demographics created for the 2014 Strategic Modelling Update. This demographic set models the expected final demand for the development land that will be released by 2036.

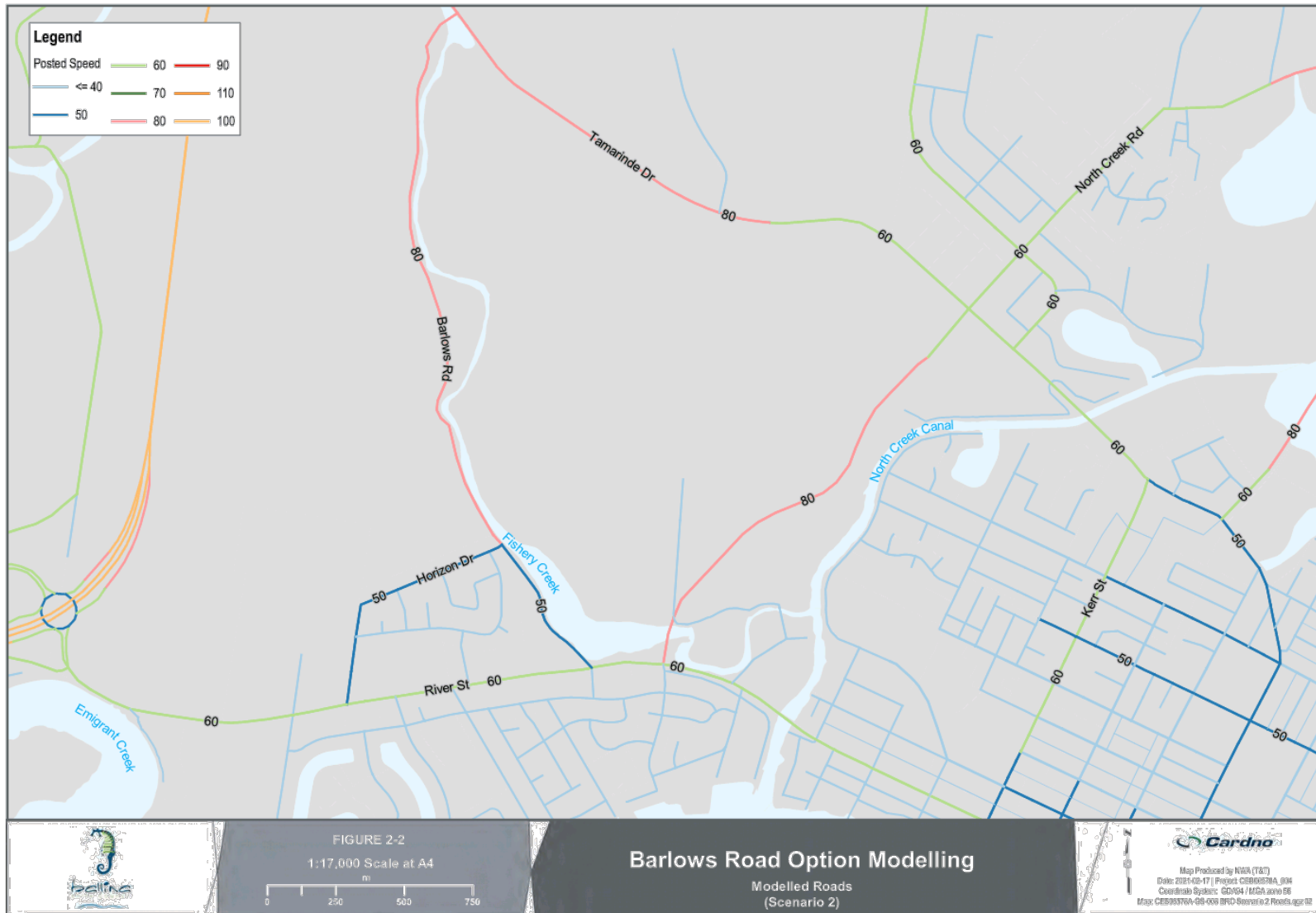
Table 2-1 Proposed Upgrades to 2036 Road Network

No.	Name	Modelled link type
1b	Western Arterial (Option 4) (WAR), Tamarind Drive at North Creek Road to River Road at Brampton Avenue	2 Lanes 80 km/h.
6	River Street, Fisheries Creek Bridge to Tweed Street	4 Lanes 60 km/h
7	Tamarind Drive, North Creek Road to Kerr Street	4 Lane 60km/h
9	Upgrade Fisheries Creek Bridge	4 Lanes 60km/h
10	Duplication of North Creek Canal Bridge	4 Lanes 60km/h
11	River Street, Fisheries Creek Bridge to Southern Highway Interchange of Ballina Bypass	4 Lanes 60km/h
12-14	Hutley Drive Extension	2 Lane 60km/h
15	Bangalow Road / Hogan Street - new LILO	
16	Angels Beach Drive / Sheather Street - new LILO	
18	North Creek Road and Bridge	2 Lane 80km/h
20	Ross Lane Improvements West	4 Lanes 60km/h
21	Tintenbar Road / Teven Road - Climbing Lanes	3 lanes 80. km/h
23	Pacific Highway/ Southern Cross Drive Right Turn Ban	
27	Traffic calming - North Creek Road / Res Hill/ Hutley Drive	2 lanes 50 km/h
29	Tamar Street/ Cherry Street Roundabout	
31,33	Cumbalum North-South Link	2 Lanes 50km/h
A	Woodburn to Ballina Pacific Highway upgrades completed	4 Lanes 100km/h
B	Tintenbar to Ewingsdale Pacific Highway upgrades completed	
C	Bruxner/ Pacific Highway Interchange Completion	
E	Sandy Flat Road Upgrade	2 Lane 50km/h
F	North Creek & Hutley Drive, Reservoir Hill Deviation	
G	North Creek Road, Tamarind Drive to Southern Cross Drive	4 lanes 60 km/h

10.1 Barlows Road Option - Traffic Modelling



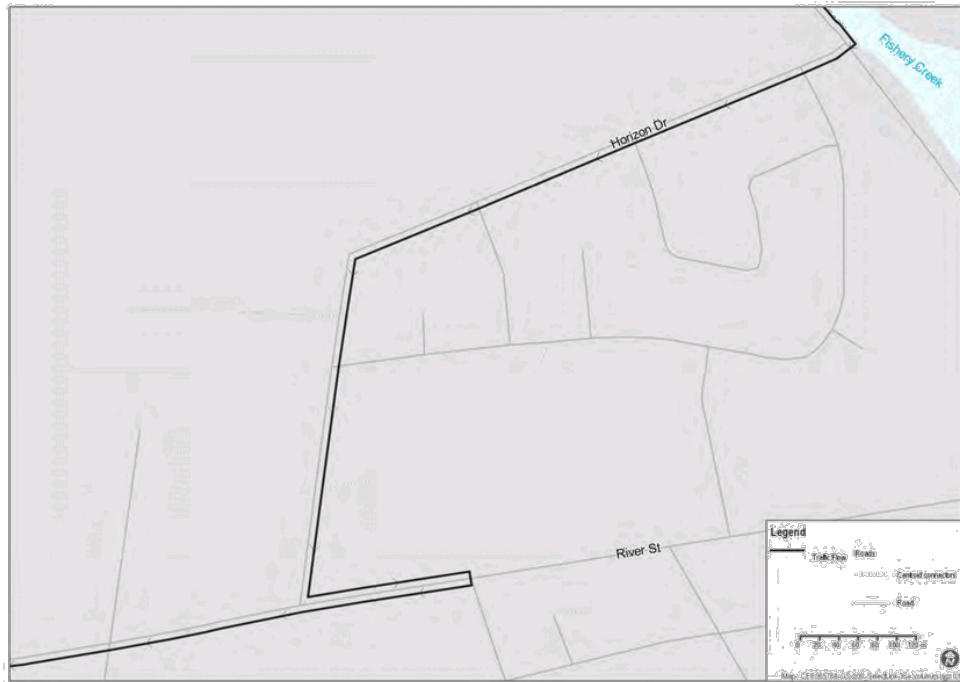
10.1 Barlows Road Option - Traffic Modelling



3 Modelling Results

Council acknowledges that given the geometry of Barlows Road and Horizon Road, trips on the BRO that also use River Street west of Horizon Road will generally want to use Horizon Road. However, the intersection of Horizon Road with River Street is currently configured as a left-in/left-out intersection which restricts movements. In the model, all the cars using the BRO and then heading west on River Street, i.e. wanting to turn right at the Horizon Road / River Street intersection, are coming down Horizon Road, turning left onto River Street and using the roundabout at Quays Drive to do a U-turn and then heading back west on River Street. This is demonstrated in Figure 3-1

Figure 3-1 Preferred westbound traffic route for trips that use the BRO



In addition, the inclusion of the BRO has diverted close to 5000 trips from the Tamarind Drive Bridge, over North Creek Canal, to the River Street Bridge. These diverted trips are from all areas north of Deadmans Creek Road, on Tamarind Drive, going to and from the city centre. This shift in traffic movements places increased pressure on River Street, between Barlows Road and the city centre, that is only partially mitigated by the addition of the WAR. Based on this, it is considered that the upgrade of River Street, between Barlows Road and the city centre, to four lanes will have to be developed prior to the BRO or as part of the overall BRO works.

3.2 Scenario 1 - Without WAR

The traffic volumes are demonstrated in Figure 3-2. Figures for LOS, and Volume over Capacity (VC) from Scenario 1 are demonstrated in Appendix A-1 and Appendix A-2 respectively.

The traffic volumes, LOS and VC ratios for the BRO in this scenario are demonstrated in Table 3-1

Table 3-1 2036 Without WAR Modelled Daily Results for BRO

Road	Daily Volume (vehicles)	Peak Hour VC	Peak Hour LOS
Barlows Road Option	9,985	0.54	A



3.3 Scenario 2. With WAR

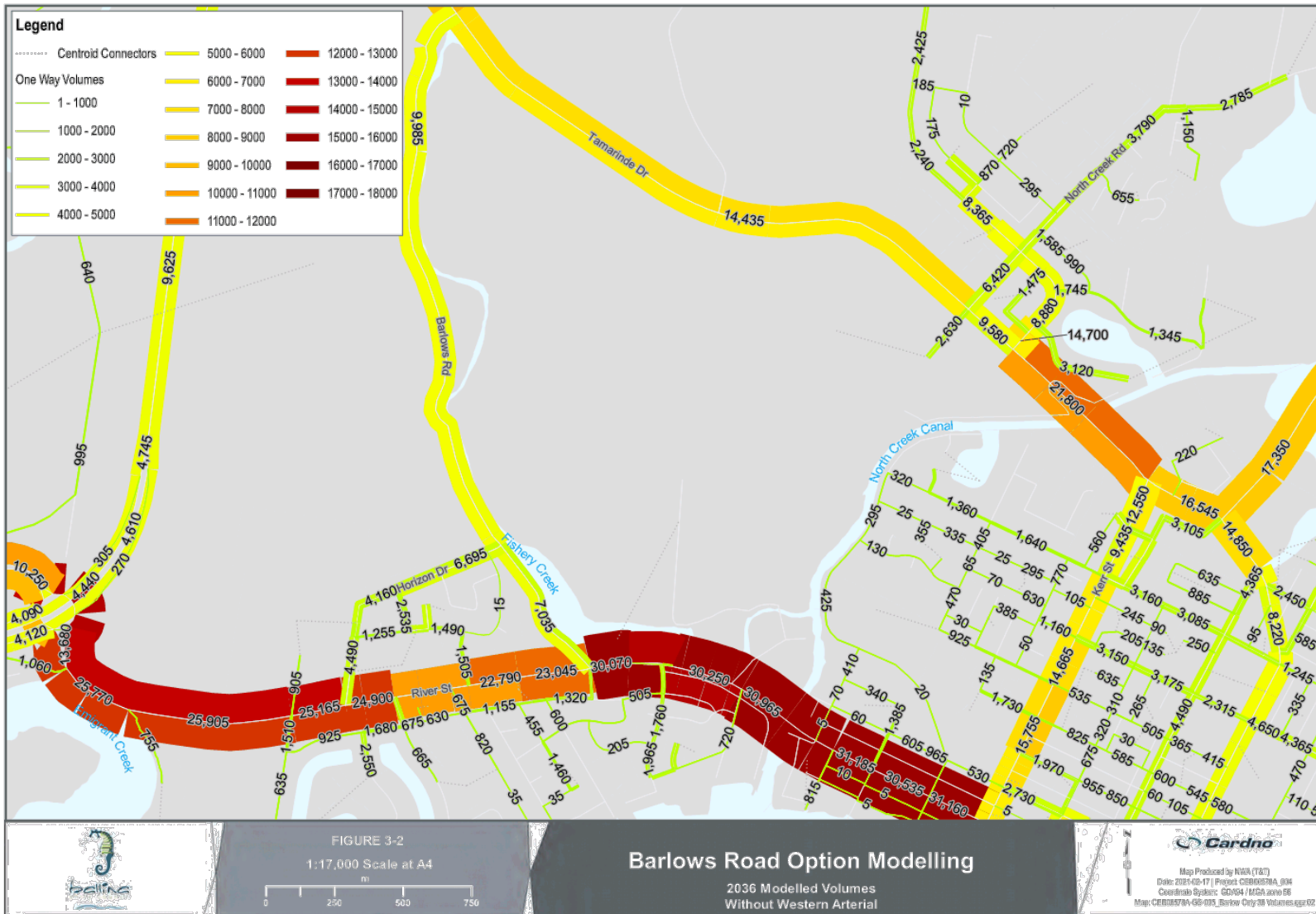
The traffic volumes are demonstrated at Figure 3-3. Figures for LOS, and Volume over Capacity (VC) from Scenario 2 are shown in Appendix A-3 and Appendix A-4 respectively.

The traffic volumes, LOS and VC ratio for the BRO in this scenario are demonstrated in Table 3-2

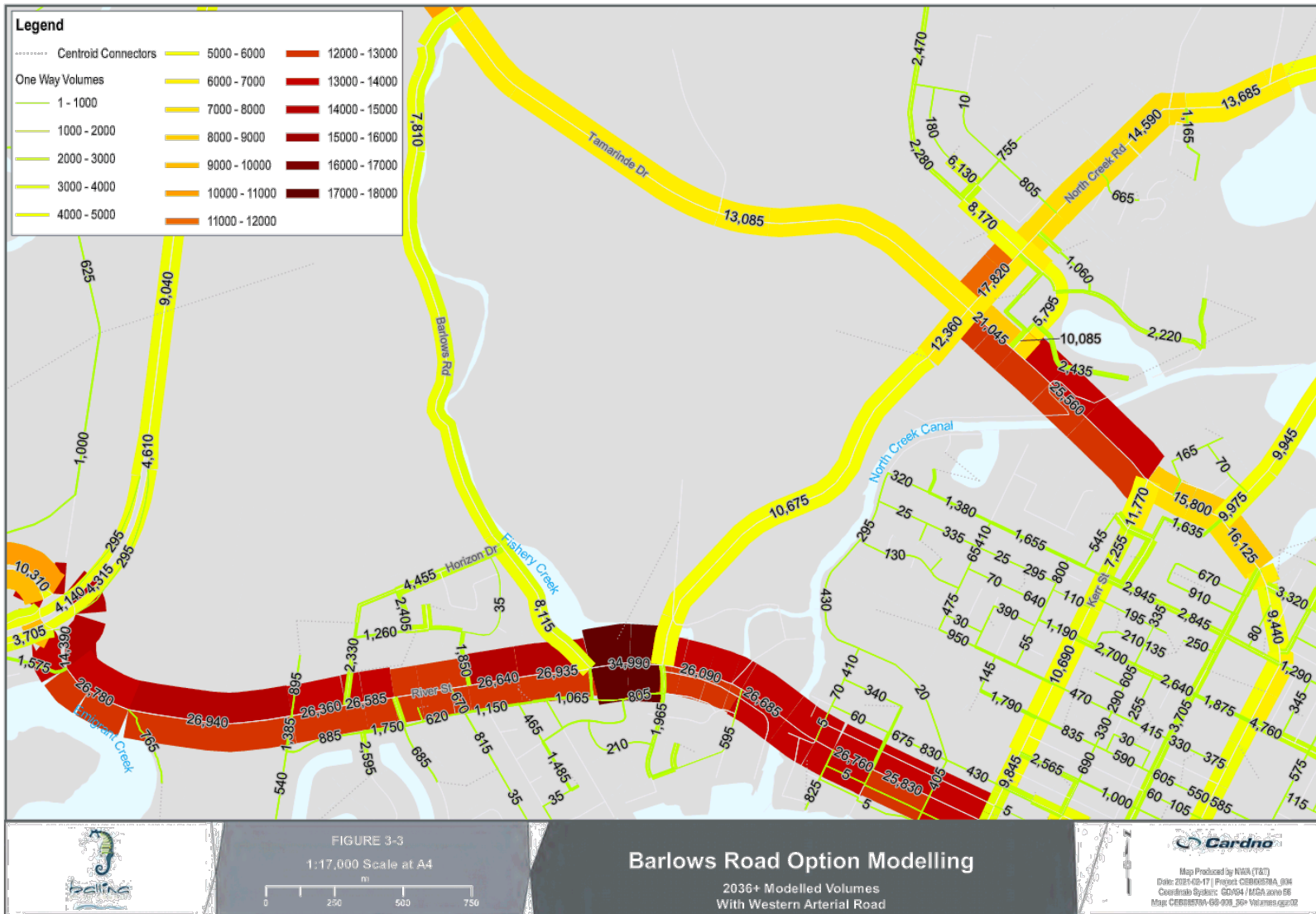
Table 3-2 2036+ With WAR Modelled Daily Results for BRO

Road	Daily Volume	Peak Hour VC	Peak Hour LOS
Barlows Road Option	7,810	0.41	A

10.1 **Barlows Road Option - Traffic Modelling**



10.1 Barlows Road Option - Traffic Modelling



4 Apportionment

The method for apportionment of trips to development areas is via a grouping/partitioning of the select link matrices to zones or group of zones that contain each development area.

In 2014, across all the Ballina shire, there were 31 separate development areas. With the exception of two, (CH1 and LH6) each parcel is fully contained in single model zone. However, due to spatial proximity with each other and model zonal resolution, 6 zones contain more than one parcel. As TRACKS is only able to group/partition at the model zone level, this meant that some 'groups' contained more than one development parcel.

Where the development parcel is much smaller than the model zone that contains it, it may be possible that there is already existing development that is contributing to the trips produced by the zone and therefore slightly overestimating the percentage due to that development area. This would mean that some development areas could end up paying slightly more per trip than other development areas.

The select link matrix that TRACK's produces contains the number of trips that use the selected link for each OD pairing. Once the select link matrix has been grouped/partitioned, each cell of new matrix contains the number of trips going from the group the row represents, to the group the column represents that use the selected link. The partitioned matrix is demonstrated in Appendix B.

For the apportionment, a trip belongs to a development area if:

- > it starts in that development area, or,
- > it doesn't start in any development area and ends in that development area.

The above two conditions allow Council to charge for every trip that uses the selected link, has an end in one of the developments areas, without charging for the same trip twice.

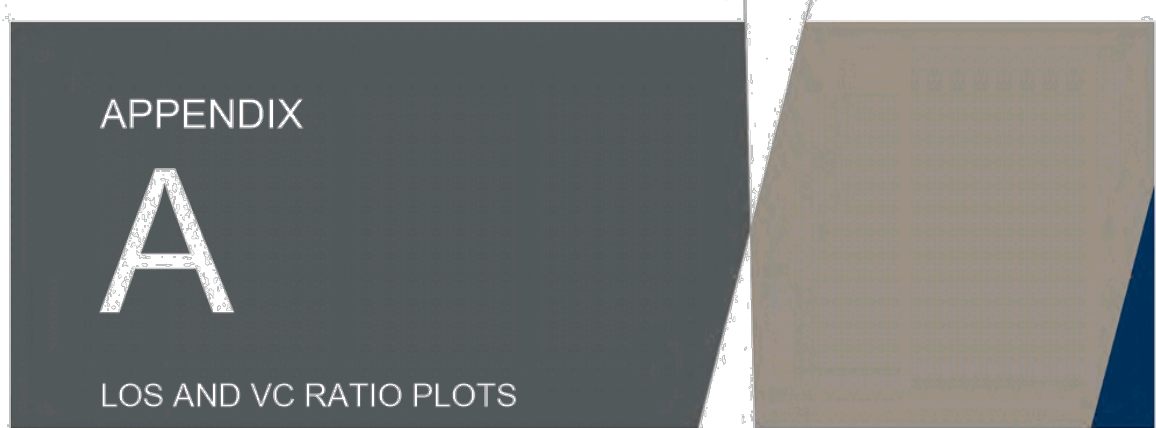
35.5% of the trips modelled using the BRO did not start or end in a development area and so this proportion has not been assigned to any development area. 64.5% of the trips modelled using the BRO have been assigned to particular development areas. There is the possibility of infill in non-development areas contributing new trips that will use the BRO. This report does not address that scenario.

Of the development areas in Lennox Head, only the development area off Ross Lane has any trips that use the BRO, with these trips representing just over 0.1% of the total trips. None of the North Ballina, East Ballina, Skennars Head or Wollongbar/Alstonville development areas have any trips that use the BRO. All the Wardell development areas make up 0.23% of the trips.

Table 4-1 Percent of tips that start or finish in Development areas

Dev Areas	Percent of traffic
CR1	26.26
CR2	13.35
CR3	22.11
LH1	0.11
WB1	2.44
WD1	0.08
WD2, WD3, WD4 ⁽¹⁾	0.11
WD5	0.03

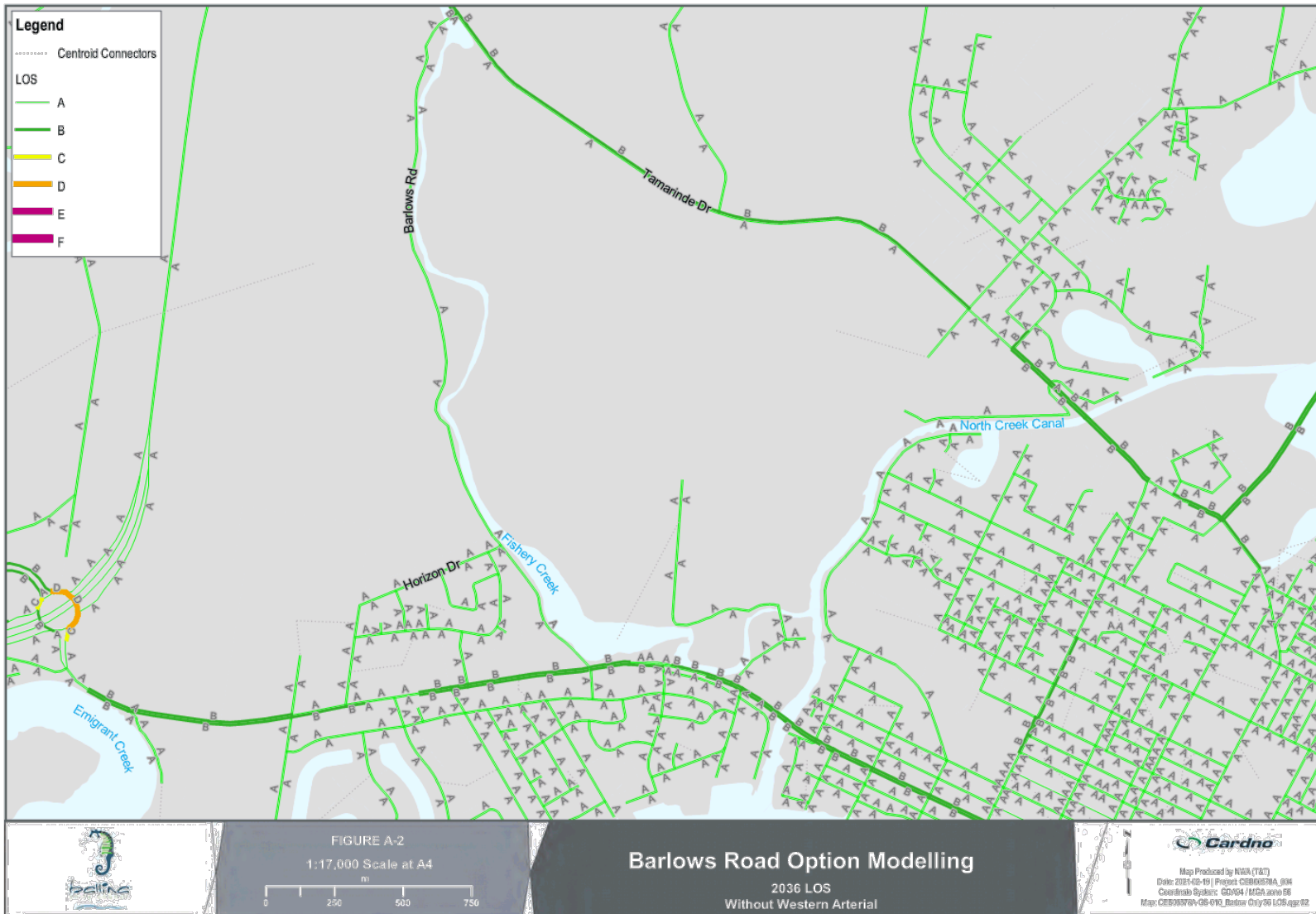
(1) Development areas WD2, WD3, and WD4 are all contained in one model zone. The model doesn't have the zonal resolution to separately report on the percentages for each of these areas.



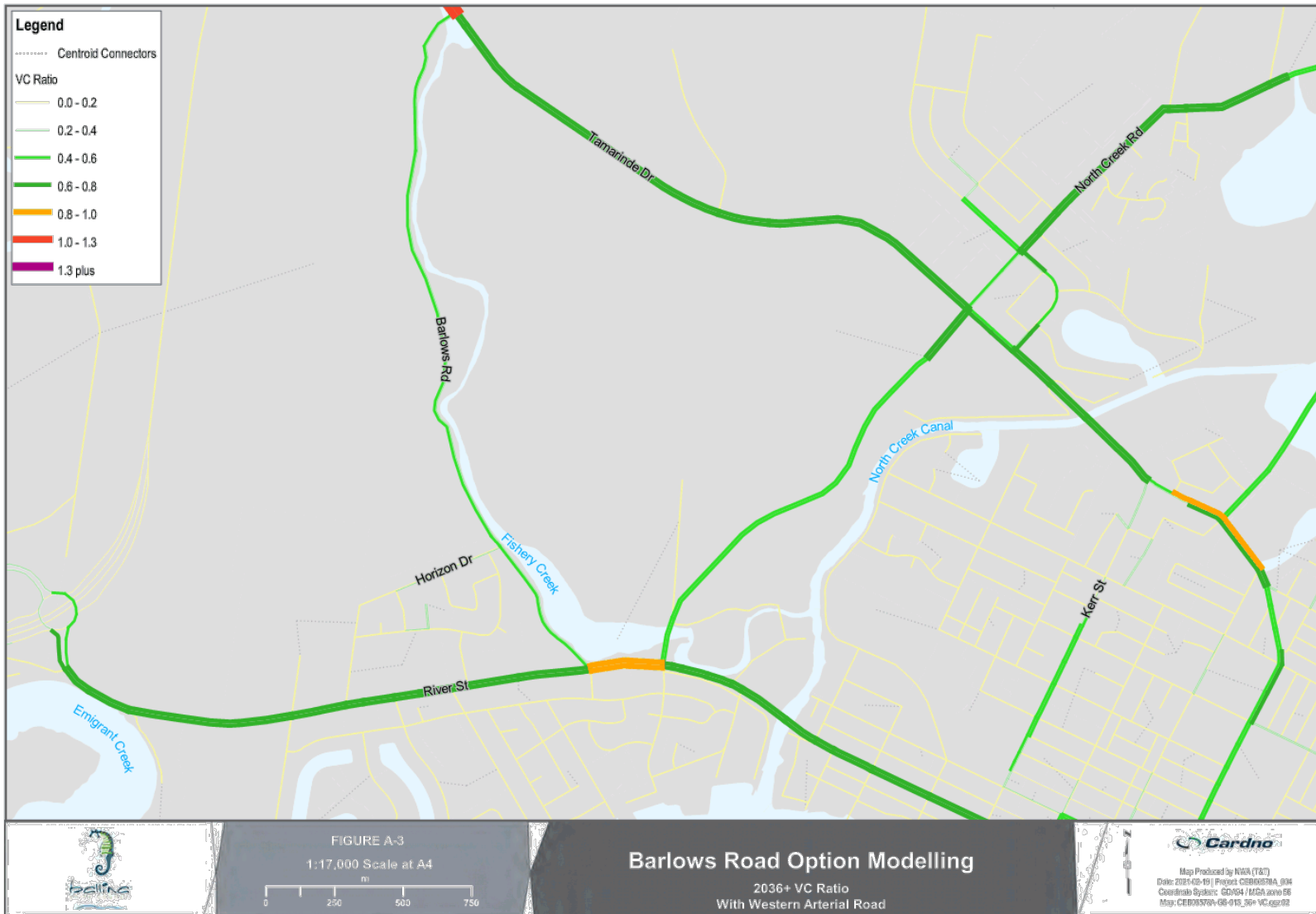
10.1 **Barlows Road Option - Traffic Modelling**



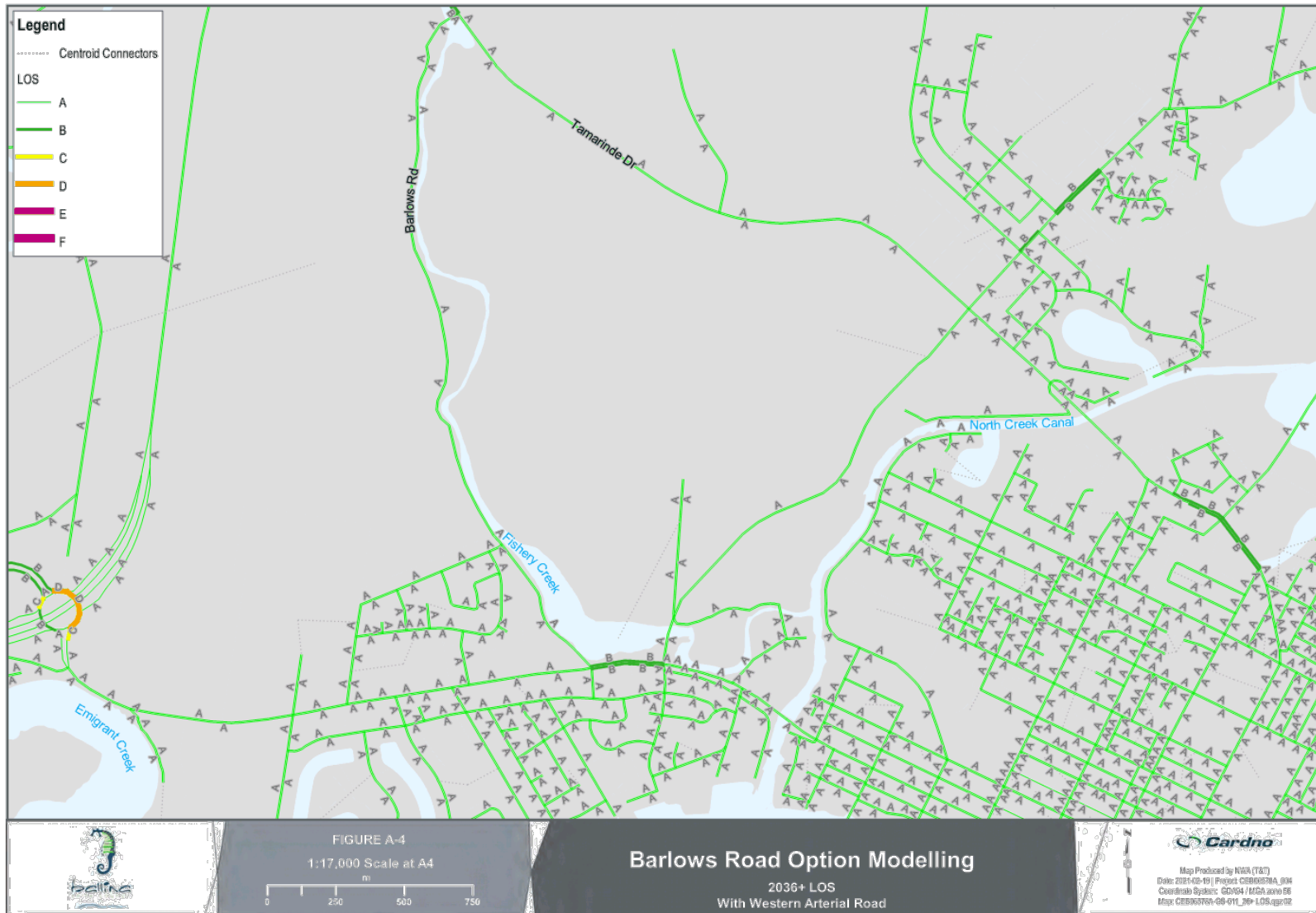
10.1 **Barlows Road Option - Traffic Modelling**



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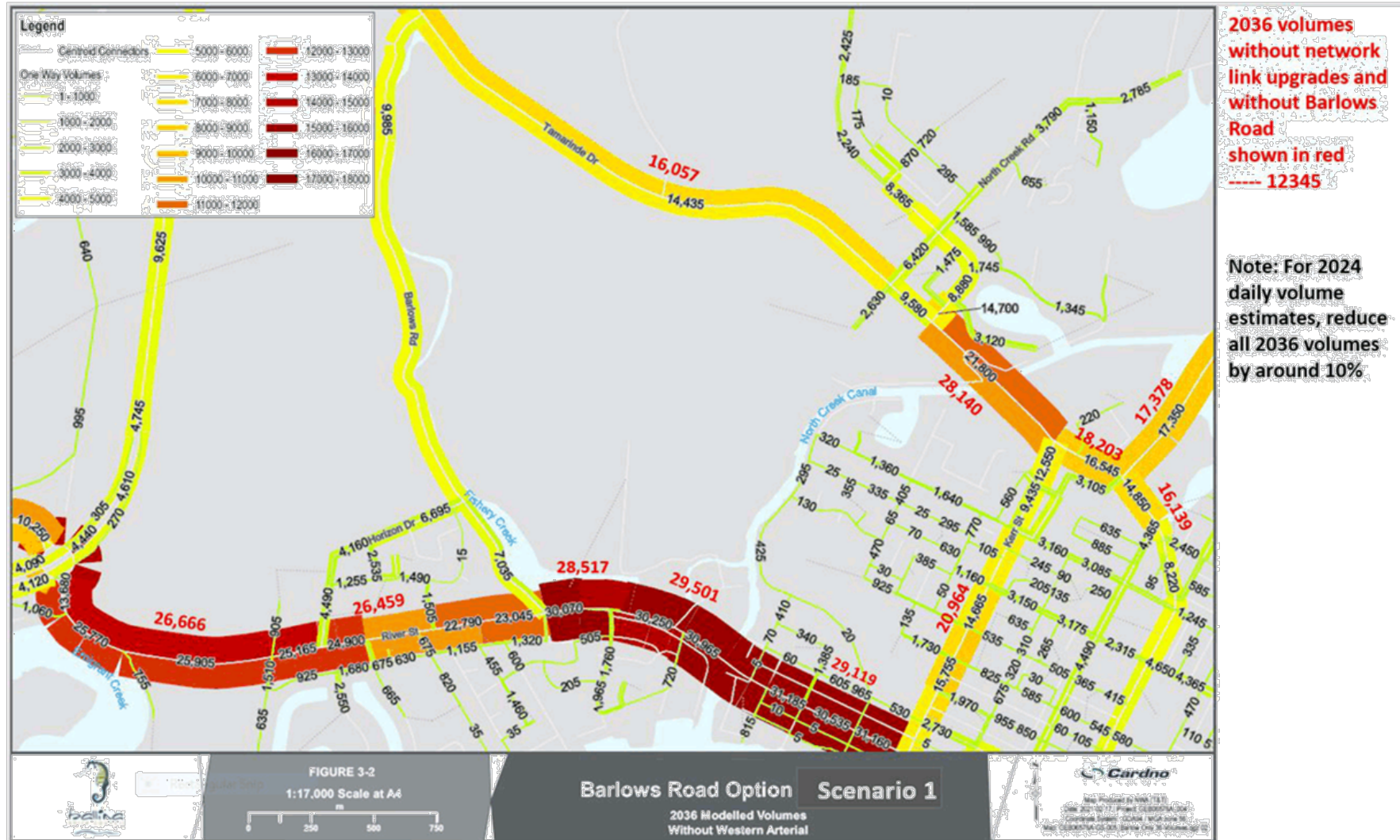
Barlows Road Option Modelling
Barlows Road Option

BRO Apportionment Matrix

Groups	Other	CR1	CR2	CR3	EB1	LH1	LH10,LH6	LH12,LH14,LH6	LH13	LH16	LH17,LH18,LH19,LH20	LH4	LH5	LH6	LH7,LH8,LH9	NB2	NB5,NB6	SH1	WB1	WD1	WD2,WD3,WD4	WD5	WUEA	total
Other	35.507	11.722	6.089	10.205	0.000	0.092	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.609	0.005	0.008	0.003	0.000	64.240
CR1	13.760	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.640	0.047	0.067	0.020	0.000	14.535
CR2	6.943	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.262	0.022	0.031	0.007	0.000	7.264
CR3	11.637	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.264	0.000	0.000	0.000	0.000	11.901
EB1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
LH1	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.013	0.000	0.000	0.000	0.000	0.014
LH10,LH6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
LH12,LH14,LH6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
LH13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
LH16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
LH17,LH18,LH19,LH20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
LH4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
LH5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
LH6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
LH7,LH8,LH9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NB2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NB5,NB6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SH1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
WB1	0.657	0.640	0.262	0.264	0.000	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.836
WD1	0.005	0.047	0.022	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.074
WD2,WD3,WD4	0.008	0.067	0.031	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.106
WD5	0.003	0.020	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.030
WUEA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

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