Appendix 2

Extract from SMEC - *Hastings Road and Traffic Study, 2003*

CONTENTS

1 INTRODUCTION

1.1 PROJECT ORIGIN

Hastings Council is one of the fastest growing non-metropolitan centres in Australia and is facing significant demands of infrastructure provision to cater for growth and maintenance of assets to meet community expectations. The Council has approximately 650 km of roads serving a population of about 70,000 people. Population is expected to grow to 100,000 by 2021. The LGA has experienced an average 3% pa population growth since 1990, occurring mainly in the urban centres along the coastal belt east of the Pacific Highway.

1.2 BACKGROUND

SMEC Australia was engaged by Hastings Council in October 1999 to carry out a study of its major road network. An earlier study had been undertaken by GHD Consultants in 1985. It documented the existing major road network and forecast the likely future traffic growth, identified deficiencies and suggested measures to address these deficiencies. In 1993, Connell Wagner updated the GHD study and reviewed the major road improvements required to service future traffic demand. Although these studies were adequate at the time, Council recognised the need for the development of a detailed major roads strategy integrating with future urban expansion. The Hastings Roads and Traffic Study provides a framework for Council to manage its expanding road infrastructure assets.

1.3 PROJECT OBJECTIVES

The principal objectives of the Hastings Roads and Traffic Study are:

- to provide a road and traffic plan for the major road network
- to incorporate in the plan a road hierarchy structure
- to prepare forecast traffic flows based on appropriate traffic modelling techniques
- to provide a practical and cost-effective implementation strategy

1.4 STUDY METHODOLOGY

The methodology adopted by SMEC to address the scope of works identified in the project brief included the following key steps.

1.4.1 Stakeholder Consultation

The study involved extensive consultations with key Council staff, key stakeholder groups and agencies, e.g. schools, RTA, local development representatives and consultants, community access and disability representatives, bus companies, Councillors, tourist operators and conservation groups.

1.4.2 Data Collection and Review

The data review involved examination of existing Council and agency related studies, planning instruments and strategies. Additional data requirements and issues were also identified. Traffic data from Council, RTA and police databases were assessed and additional traffic count surveys undertaken.

1.4.3 Data Analysis and Modelling

Various types of data were used in developing the traffic model: current jobs data received from the Hastings Business Enterprise Centre (BEC), Hastings Urban Growth Strategy (HUGS) 2000, population projections, and intersection and mid-block traffic count data. The 1991 trip matrix data model from the GHD study was expanded through the use of this data to develop a more comprehensive model (162 zones compared to the previous 60 zone model.). The HUGS 2000 population estimate for 2021 has been accommodated by factoring in urban consolidation of existing urban centres and expansion within the planned growth areas.

1.4.4 Preparation of a Road Hierarchy Plan

A road hierarchy plan was developed on the basis of land-use constraints and issues, including the location of existing and future land uses, the alignment of principal traffic routes, the sensitivity of land-uses adjoining the corridors and property setbacks and road reserve widths.

1.4.5 Preparation of an Implementation Strategy

An implementation strategy was developed taking into account the adequacy of the existing road system in terms of level of service (LoS). The road hierarchy was also considered in determining priorities. Councils existing rolling works program (6 years) was used as a starting point for developing an implementation plan for the study. Projects have been categorised into "low", "moderate" and "high" priorities. It was considered reasonable for high priority projects to be implemented in 5 years, medium priority projects in 5 to 15 years and low priority projects beyond 15 years.

1.4.6 Associated Studies

A number of associated studies have also been undertaken concurrently with the Hastings Roads and Traffic Study. They are:

- Oxley Highway Duplication – Economic Analysis
- Innes Peninsula Traffic Study
- North Haven Bypass Traffic Assessment

Each of these studies were undertaken by SMEC for Council in response to an issue identified for closer examination during the course of the main study. A synopsis of each study is included in Appendix B.

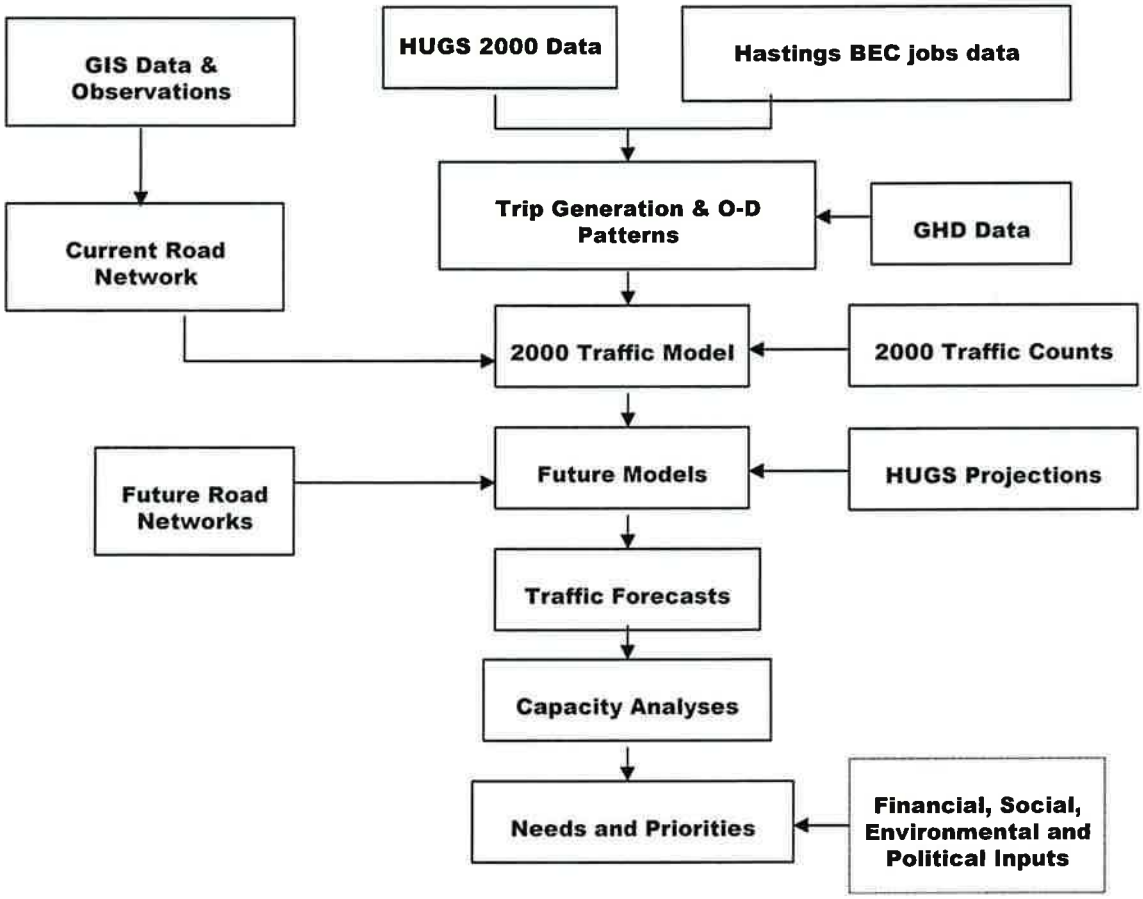
1.4.7 Public Exhibition

As part of the community consultation process, the Implementation Plan and Road Hierarchy Plan was exhibited at several venues throughout the study area.

2 DATA, ANALYSES AND ASSUMPTIONS

2.1 OVERVIEW OF DATA AND ANALYSIS PROCESSES

The main data and processes used in the analysis of the data in this project are summarised in the flow chart below. The current road network in Hastings was imported into TransCAD in a GIS format and additional links were strategically included in this network to create a future network. Traffic forecasts were produced for alternative future networks using the HUGS 2000 population projections as a basis for growth. The impact of traffic growth on road conditions was then assessed using various capacity analysis methods. The results of these analyses, supported by the analysis of historic crash data and local knowledge, provided a basis for recommended road works. However, there are other important considerations outside the scope of this analysis which could affect needs and priorities (eg. financial, social, environmental and political).



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2.2 ROADS AND TRAFFIC

2.2.1 Current Network

The area covered by the 2000 modelled network encompasses Wauchope in the west to Telegraph Point in the north and Laurieton in the south. All streets are accurately reflected in the underlying base map using Transcad's GIS capability.

Figures 2.1 and 2.2 in Appendix A show the modelled roads and zone plan for the current network, for Hastings and Port Macquarie respectively.

2.2.2 Future Road Networks

Future road networks were developed for 2001, 2011 and 2021. The future road networks include the roads in the existing modelled network as well as additional links in Port Macquarie as shown in Figure 2.3 in Appendix A. Scenarios were tested for 2000, 2011 and 2021; the results of which are given in Chapters 3 and 4.

2.3 POPULATION AND EMPLOYMENT

2.3.1 Introduction

The population and jobs data had to be converted to traffic zones for use in the model. Jobs data from the Hastings Business Enterprise Centre were geographically located by business addresses (5,177) whilst HUGS population data was located in 117 collector districts. Both sets of data were reallocated into 161 SMEC zones utilising the GIS facilities in TransCAD, detailed maps and local knowledge.

2.3.2 Population Growth

Figure 2.4 in Appendix A shows the projected population for various localities in Hastings. In HUGS 2000, population growth through to 2021 has been accommodated by factoring in urban consolidation (particularly in Port Macquarie), expansion of Area 14 and development of the Area 13 New Town.

2.3.3 Employment Growth

The jobs data from the Hastings Business Enterprise Centre was expanded in proportion to the population growth. A small reallocation of jobs was necessary from older areas not expected to grow much to new developing areas. The extent of jobs growth in each traffic zone is illustrated in Figures 2.5 to 2.8 in Appendix A for the periods 2001-2011 and 2011-2021. Maps are presented for Hastings as a whole and for Port Macquarie.

3 TRAFFIC ANALYSIS AND MODELLING

3.1 ANALYSIS OF EXISTING CONDITIONS

3.1.1 Traffic Flows

Traffic flow data were collected from a number of sources including:

- Hastings Council – intersection flow data from various study reports and Council's mid-block counts database from 1997 to 1999
- RTA – Traffic Volume Data, Northern Region 1998
- mid-block counts – 24 hour counts by TTS at 18 locations
- intersection counts – AM and PM peak intersection traffic flow surveys at 24 sites

Estimates of 2001 PM peak hour two-way modelled traffic flows on the existing road network are illustrated in Figures 3.1 and 3.2 (Appendix A), Details of flows across defined screenlines are given in Table 3-A~~Table 3-A~~ and Table 3-B~~Table 3-B~~. The locations of screen-lines for these flows are shown in Figures 3.1 and 3.2 in Appendix A.

3.1.2 Road and Intersection Capacity

Mid-block Sections

Road capacity is typically expressed in terms of level of service (LoS). The existing mid-block LoS was estimated by comparing existing traffic flows with estimated mid-block road capacities. The performance of links in the road network deteriorates as flows near capacity, with increased traffic delays experienced by road users. A road link's LoS is expressed by a letter between A (no congestion) and F (highly congested) as defined in Part 2 of Austroads Guide to Traffic Engineering Practice. Appendix C contains a definition of the various levels of service. Generally, a LoS between A and C is acceptable for major roads with occasional sections at D.

Figures 3.5 and 3.6 in Appendix A show the levels of service for existing roads in the broader Hastings area and in Port Macquarie. There is no significant peak hour congestion in the rural areas but sections of Ocean Drive north of Lochinvar Place, Lake Road, parts of Hastings River Drive and some roads in the CBD show poor levels of service, indicating significant congestion and delays during peak periods.

Intersections

A total of 26 intersections were identified for detailed analysis to determine the existing level of performance. Turning flows derived from peak period traffic counts were analysed using SIDRA to estimate the peak hour level of service at each intersection. The results of the SIDRA analyses for the critical PM peak period (3pm to 4pm) are presented in Table 3-C~~Table 3-C~~, in order from highest congestion at the top of the table to the lowest at the bottom.

Table 3-A 2001 Daily Traffic Volumes (Hastings)

Road Section	Location	2001
Screenline A		
Pembroke Road	North of Redbank Road	5,200
Oxley Highway	East of Kings Creek Road	6,900
Bago Road	North of Pacific Highway	900
Sub-total of Screenline A		***13,000***
Screenline B		
Hastings River Drive	East of Pacific Highway	6,400
Fernbank Creek Road	East of Pacific Highway	1,200
Oxley Highway	East of Pacific Highway	8,200
Oxley Highway Deviation	East of Pacific Highway	-
Houston Mitchell Drive	East of Pacific Highway	1,100
Ocean Drive (Kew)	East of Pacific Highway	3,900
Sub-total of Screenline B		***20,800***
Screenline C		
Hastings River Drive	West of Pacific Highway	7,500
Oxley Highway	West of Phillip Charley Drive	8,500
Oxley Highway Deviation	West of Phillip Charley Drive	-
Ocean Drive	South of Links Crescent	4,100
Sub-total of Screenline C		***20,100***
Screenline D		
Pembroke Road	South of Reids Road	5,100
Pacific Highway	South of Blackmans Point Road	8,200
Sub-total of Screenline D		***13,300***
Screenline E		
Bago Road	South of Kings Creek Road	900
Pacific Highway	North of Houston Mitchell Drive	7,600
Ocean Drive (Lake Cathie)	North of Lake Cathie	4,100
Sub-total of Screenline E		***12,600***
Screenline F		
Pacific Highway	North of Kendall Road	8,200
Ocean Drive (Bonny Hills)	South of Bonny Hills	4,700
Subtotal of Screenline F		***12,900***

Note: 1. Assumes daily flows are about 10 times PM peak hour traffic volumes.
2. Refer to Figure 3.1 and 3.2 for definition of screenlines.

Table 3-B 2001 Daily Traffic Volumes (Port Macquarie)

Road Section	Location	2001
Screenline G		
William Street	East of Hollingworth Street	14,800
Gordon Street	East of Hollingworth Street	17,500
Hindman Street (extended)	North of Lake Road	-
Lake Road	West of Ocean Drive	18,900
Outer Ring Road	West of Colonel Barney Drive	-
Sub-total of Screenline G		***51,200***
Screenline H		
Park Street	South of Bay Street	9,700
Hastings River Drive	East of Widderson Street	12,500
Widderson Street	North of Oxley Highway	5,200
Clifton Drive	North of Oxley Highway	7,800
Outer Ring Road	South of Lady Nelson Drive	-
Sub-total of Screenline H		***35,200***
Screenline J		
Pacific Drive	South of Hill Street	4,700
Lord Street	South of Hill Street	9,400
Granite Street	South of Savoy Street	5,100
Ocean Drive (realigned)	South of Lake Road	17,200
Oxley Highway	South of Wrights Road	10,600
Oxley Highway Deviation	South of Wrights Road	-
Sub-total of Screenline J		***47,000***

Note: 1. Assumes daily flows are about 10 times PM peak hour traffic volumes.
2. Refer to Figure 3.2 in Appendix A for definition of screenlines.

Table 3-C Existing Intersection Capacity Analysis Results

Rank	Intersection	Existing Layout	Overall LoS	Worst Movement LoS
1	Hastings River Dr / Bellbowie St	Give-way	A	D (SB)
2	Hastings River Dr / Widderson St	Give-way	A	D (NB)
3	Warlters St / Park St	Stop	A	D (EB)
4	Ocean Dr / Koala St	1L Roundabout	B	C (WB)
5	Park St / Buller St	Signals	B	C (WB)
6	Horton St / William St	2L Roundabout	B	C (EB)
7	Granite St / Savoy St	Stop	B	C (EB)
8	Ocean Dr / Bold St (Laurieton)	Stop	A	C (SB)
9	Oxley Hwy / Morton St	Give-way	A	C (NB)
10	Koala St / Kennedy Dr	Stop	A	C (EB)
11	Ocean Dr / Kew Rd (Laurieton)	Give-way	B	B
12	Ocean Dr / The Parade (Laurieton)	Give-way	B	B
13	Ocean Dr / Mathew Flinders Dr	1L Roundabout	B	B
14	Ocean Dr / Pacific Drive	1L Roundabout	B	B
15	Ocean Dr / Crestwood Dr	1L Roundabout	B	B
16	Ocean Dr / Lake Rd	2L Roundabout	B	B
17	Central Rd / Hindman St	2L Roundabout	B	B
18	Oxley Hwy / Widderson St	2L Roundabout	B	B
19	Oxley Hwy / Hindman St	2L Roundabout	B	B
20	Park St / Bay St	1L Roundabout	B	B
21	Horton St / Gordon St	2L Roundabout	B	B
22	Gordon St / Lake Rd	2L Roundabout	B	B
23	Gordon St / Lord St	2L Roundabout	B	B
24	Oxley Hwy / Fernhill Dr	2L Roundabout	B	B
25	Hastings River Dr / Park St	2L Roundabout	B	B
26	Koala St / Granite St	Give-way	A	B (SB)

Note: 1. PM peak hour (3-4pm)
2. LoS is level of service – See Appendix C for definition.

3.1.3 Accidents

Crash Data

Crash data was available in digital form from RTA for the period 1992 to 2000. The data was imported into the TransCAD GIS system and overlayed on the road system to enable interrogation of it by road hierarchy and crash type.

Mid-block Crashes

The casualty crash rates on mid-block sections were calculated for the nine years of casualty crash records and using existing traffic flows. This provided a relative measure of the crash risk across a range of road types and it forms a basis for ranking possible road projects from a safety viewpoint.

Figure 3.7 and 3.8 in Appendix A show mid-block crash rates expressed in terms of the number of casualty crashes per 100 million vehicle-kilometres. Crashes involving fatalities are also shown by a triangular symbol, whilst the location of all casualty crashes is shown by a dot symbol.

Intersection Crashes

Intersection crash rates are expressed in the form of a ratio of casualty crashes to intersecting traffic volumes. The intersections with the highest rates are listed in Table 3-D~~Table 3-D~~ Figures 3.9 and 3.10 in Appendix A show the location of all intersection casualty crashes as well as the location of fatal crashes for Port Macquarie, larger areas of Hastings and the Wauchope township area.

Table 3-D Intersections Ranked by Casualty Crash Rate

Street 1	*Street 2*	*Locality*	*Crashes/yr*	*Crash Rate*
Pacific	Bago	Herons Creek	2.2	26.3
Pacific	Hasting River	Blackmans Point	2.1	17.9
Pacific	Houston Mitchell	Sapling Creek	1.4	17.6
Burrawan	Owen	Port Macquarie	0.8	11.4
Pacific	Oxley	Sancrox	1.1	9.9
Ocean	Binbilla	Bonny Hills	0.4	9.4
Ocean	Houston Mitchell	Lake Cathie	0.4	9.4
Ocean	Bonny View	Bonny Hills	0.4	9.1
Koala	O'Brien's	Port Macquarie	0.4	8.5
Bold	Mill	Laurieton	0.4	8.3
Home	Owen	Port Macquarie	0.4	8.3
Pacific	Tuppenny	Port Macquarie	0.4	8.3
Oxley	Hastings	Wauchope	0.5	8.3
Ocean	Panorama	Bonny Hills	0.4	7.7
Bolwarra	Jindalee	Port Macquarie	0.4	7.5
Kennedy	Pacific	Port Macquarie	0.5	6.8
Oxley	Wrights	Port Macquarie	0.4	6.7
Buller	Park	Port Macquarie	0.9	5.6
Grant	Hill	Port Macquarie	0.5	5.4
Granite	Hill	Port Macquarie	0.5	5.1
Kennedy	Shelly Beach	Port Macquarie	0.4	5.1
Granite	Savoy	Port Macquarie	0.4	5.0
Kennedy	Yarranabee	Port Macquarie	0.4	4.6
Pacific	Ocean	Kew	0.7	4.5
Hastings River	Aston	Port Macquarie	0.6	4.4
Hastings River	Clifton	Port Macquarie	0.6	4.2
Hastings River	Newport Island	Port Macquarie	0.4	4.0
Koala	Ocean	Port Macquarie	0.2	3.7
Park	Warlters	Port Macquarie	0.5	3.6
Pacific	Sancrox	Sancrox	0.6	3.6
Hill	Lord	Port Macquarie	0.5	3.4
Burrawan	Lord	Port Macquarie	0.4	3.4
Lord	William	Port Macquarie	0.5	3.2
Hastings River	Findlay	Port Macquarie	0.4	3.1
Oxley	Widderson	Port Macquarie	0.5	3.1

Note: 1. Crash rate is equal to the number of casualty crashes divided by the exposure, which is a function of the intersecting traffic volumes (refer AustRoads 2000; Part 4).

3.2 FUTURE FLOWS ON EXISTING ROAD NETWORK

3.2.1 Introduction

Modelling has been undertaken for 2000, 2011 and 2021 traffic demands, based on the 2000 HUGS growth forecasts. Alternative future network scenarios were analysed with or without some of the proposed road connections illustrated in Figure 2.3 (Appendix A).

3.2.2 Base Case ('Do-Nothing')

Figures 3.11 and 3.12 summarise the expected growth in traffic flow across key screenlines. Table 3-E~~Table 3-E~~ and Table 3-F~~Table 3-F~~ show details of the forecast flows at the screenlines.

2011 Forecasts

The existing road network is described as the base case or 'do-nothing' network. Figures 3.13 and 3.14 in Appendix A show the 2011 PM peak hour traffic forecasts for the base case network. Traffic flows are proportional to the widths of the lines in the diagrams.

Figures 3.15 (Appendix A) illustrates the increases in traffic from 2001 to 2011 on the following regional roads in the Hastings area:

- Pacific Highway
- Ocean Drive between Lake Cathie and Kew
- Oxley Highway
- Pembroke Road

Figure 3.16 (Appendix A) illustrates the expected increases in traffic from 2001 to 2011 on the following roads in Port Macquarie:

- Oxley Highway, particularly east of Ruins Way
- Gordon Street
- Ocean Drive, between Treeview Way and Emerald Drive
- Lake Road
- Central Road
- Lord Street
- Clifton Drive
- CBD streets

This will greatly exacerbate congestion that already exists along Ocean Drive, Lake Road and Central Road. Roads such as Clifton Drive, Central Road and Lake Road are not suited to carrying large amounts of traffic.

Table 3-E 2001, 2011 and 2021 Daily Traffic Volumes – Do Nothing Case (Hastings)

Road Section	Location	2001	2011	2021
Screenline A				
Pembroke Road	North of Redbank Road	5,200	7,600	9,400
Oxley Highway	East of Kings Creek Road	6,900	9,900	12,200
Bago Road	North of Pacific Highway	900	1,200	1,500
Sub-total of Screenline A		***13,000***	***18,700***	***23,100***
Screenline B				
Hastings River Drive	East of Pacific Highway	6,400	7,900	11,300
Fernbank Creek Road	East of Pacific Highway	1,200	1,600	3,100
Oxley Highway	East of Pacific Highway	8,200	11,000	11,500
Oxley Highway Deviation	East of Pacific Highway	-	-	-
Houston Mitchell Drive	East of Pacific Highway	1,100	1,900	2,400
Ocean Drive (Kew)	East of Pacific Highway	3,900	5,900	7,500
Sub-total of Screenline B		***20,800***	***28,300***	***35,800***
Screenline C				
Hastings River Drive	West of Pacific Highway	7,500	9,300	13,800
Oxley Highway	West of Phillip Charley Drive	8,500	13,200	15,300
Oxley Highway Deviation	West of Phillip Charley Drive	-	-	-
Ocean Drive	South of Links Crescent	4,100	5,800	7,300
Sub-total of Screenline C		***20,100***	***28,300***	***36,400***
Screenline D				
Pembroke Road	South of Reids Road	5,100	7,600	9,400
Pacific Highway	South of Blackmans Point Road	8,200	11,000	13,200
Sub-total of Screenline D		***13,300***	***18,600***	***22,600***
Screenline E				
Bago Road	South of Kings Creek Road	900	1,200	1,500
Pacific Highway	North of Houston Mitchell Drive	7,600	11,200	14,000
Ocean Drive (Lake Cathie)	North of Lake Cathie	4,100	5,800	7,300
Sub-total of Screenline E		***12,600***	***18,200***	***22,800***
Screenline F				
Pacific Highway	North of Kendall Road	8,200	11,800	15,100
Ocean Drive (Bonny Hills)	South of Bonny Hills	4,700	8,400	10,800
Subtotal of Screenline F		***12,900***	***20,200***	***25,900***

Note: 1. Assumes daily flows are about 10 times PM peak hour traffic volumes.
2. Refer to Figure 3.1 for definition of screenlines.

Table 3-F 2001, 2011 & 2021 Daily Traffic Vols – Do Nothing Case (Port Macquarie)

Road Section	Location	2001	2011	2021
Screenline G				
William Street	East of Hollingworth Street	14,800	19,200	22,900
Gordon Street	East of Hollingworth Street	17,500	25,100	33,400
Hindman Street (extended)	North of Lake Road	-	-	-
Lake Road	West of Ocean Drive	18,900	23,100	25,700
Outer Ring Road	West of Colonel Barney Drive	-	-	-
Sub-total of Screenline G		***51,200***	***67,400***	***82,000***
Screenline H				
Park Street	South of Bay Street	9,700	12,900	15,800
Hastings River Drive	East of Widderson Street	12,500	14,600	18,100
Widderson Street	North of Oxley Highway	5,200	7,000	9,200
Clifton Drive	North of Oxley Highway	7,800	12,500	15,500
Outer Ring Road	South of Lady Nelson Drive	-	-	-
Sub-total of Screenline H		***35,200***	***47,000***	***58,600***
Screenline J				
Pacific Drive	South of Hill Street	4,700	5,400	6,000
Lord Street	South of Hill Street	9,400	12,500	15,900
Granite Street	South of Savoy Street	5,100	7,000	8,800
Ocean Drive (realigned)	South of Lake Road	17,200	21,500	24,200
Oxley Highway	South of Wrights Road	10,600	26,600	39,100
Oxley Highway Deviation	South of Wrights Road	-	-	-
Sub-total of Screenline J		***47,000***	***73,000***	***94,000***

Note: 1. Assumes daily flows are about 10 times PM peak hour traffic volumes.
2. Refer to Figure 3.2 for definition of screenlines.

2021 Forecasts

Figures 3.17 and 3.18 (Appendix A) show the 2021 PM peak hour traffic forecasts for the base network. Traffic flows are proportional to the widths of the lines in the diagrams.

The 2021 modelling results indicate a significant further increase over 2011 traffic such that all major roads and many minor roads in the existing network will be highly trafficked. Thus, traffic congestion will spread to more roads on a broader radius from Port Macquarie CBD.

Some growth is evident on the following regional roads between 2011 and 2021, as shown in Figure 3.19 (Appendix A):

- Pacific Highway
- Oxley Highway
- Hastings River Drive
- Ocean Drive between Kew and Lake Cathie

Roads within Port Macquarie expected to have significant growth between 2011 and 2021 are shown in Figure 3.20 (Appendix A) and include:

- Oxley Highway, especially east of Pacific Highway
- Gordon Street
- Hastings River Drive
- Kennedy Drive
- Parts of Ocean Drive, particularly north of Matthew Flinders Drive
- Lake Road
- Parsons Ridge Road
- Central Road
- Clifton Drive
- Widderson Street

There will be a clear redistribution of traffic from Ocean Drive to Kennedy Drive, as congestion builds on Ocean Drive.

3.3 FUTURE FLOWS ON IMPROVED NETWORK

3.3.1 2001 Forecasts (with Ocean Drive 1st Stage)

One of the primary works being considered for early implementation is the ring road connection across Kooloonbung Creek. To evaluate the impact of its early implementation, this link was included in a model run with 2001 travel demands.

The results of this run are given in Table 3-G~~Table 3-G~~ and Table 3-H~~Table 3-H~~ illustrated in Figures 3.21 and 3.22 (Appendix A). The first plot provides estimates of 2001 PM peak hour flows. The second plot illustrates the change in flows from the base case network. In this latter plot, the change in flows is proportional to the width of the lines. Increases in flow from the base network are shown in blue, whilst decreases are in a yellow colour.

Table 3-G: 2001 Daily Traffic Volumes – Ocean Drive Improvements (Hastings)

Road Section	Location	2001 (Do Nothing)	2001 (Improvement)
Screenline A			
Pembroke Road	North of Redbank Road	5,200	5,200
Oxley Highway	East of Kings Creek Road	6,900	6,900
Bago Road	North of Pacific Highway	900	900
Sub-total of Screenline A		***13,000***	***13,000***
Screenline B			
Hastings River Drive	East of Pacific Highway	6,400	6,400
Fernbank Creek Road	East of Pacific Highway	1,200	1,100
Oxley Highway	East of Pacific Highway	8,200	7,800
Oxley Highway Deviation	East of Pacific Highway	-	-
Houston Mitchell Drive	East of Pacific Highway	1,100	800
Ocean Drive (Kew)	East of Pacific Highway	3,900	3,900
Sub-total of Screenline B		***20,800***	***20,000***
Screenline C			
Hastings River Drive	West of Pacific Highway	7,500	7,500
Oxley Highway	West of Phillip Charley Drive	8,500	8,200
Oxley Highway Deviation	West of Phillip Charley Drive	-	-
Ocean Drive	South of Links Cresent	4,100	4,500
Sub-total of Screenline C		***20,100***	***20,200***
Screenline D			
Pembroke Road	South of Reids Road	5,100	5,200
Pacific Highway	South of Blackmans Point Road	8,200	8,200
Sub-total of Screenline D		***13,300***	***13,400***
Screenline E			
Bago Road	South of Kings Creek Road	900	900
Pacific Highway	North of Houston Mitchell Drive	7,600	7,200
Ocean Drive (Lake Cathie)	North of Lake Cathie	4,100	4,500
Sub-total of Screenline E		***12,600***	***12,600***
Screenline F			
Pacific Highway	North of Kendall Road	8,200	8,100
Ocean Drive (Bonny Hills)	South of Bonny Hills	4,700	4,800
Subtotal of Screenline F		***12,900***	***12,900***

Note: 1. Assumes daily flows are about 10 times PM peak hour traffic volumes.
2. Refer to Figure 3.1 for definition of screenlines.

Table 3-H 2001 Daily Traffic Volumes– Ocean Drive Improvements (Port Macquarie)

Road Section	Location	2001 (Do Nothing)	2001 (Improvement)
Screenline G			
William Street	East of Hollingworth Street	14,800	15,400
Gordon Street	East of Hollingworth Street	17,500	15,500
Hindman Street (extended)	North of Lake Road	-	10,500
Lake Road	West of Ocean Drive	18,900	18,600
Outer Ring Road	West of Colonel Barney Drive	-	-
Sub-total of Screenline G		***51,200***	***60,000***
Screenline H			
Park Street	South of Bay Street	9,700	9,800
Hastings River Drive	East of Widderson Street	12,500	13,300
Widderson Street	North of Oxley Highway	5,200	4,400
Clifton Drive	North of Oxley Highway	7,800	7,400
Outer Ring Road	South of Lady Nelson Drive	-	-
Sub-total of Screenline H		***35,200***	***34,900***
Screenline J			
Pacific Drive	South of Hill Street	4,700	4,600
Lord Street	South of Hill Street	9,400	8,000
Granite Street	South of Savoy Street	5,100	4,400
Ocean Drive (realigned)	South of Lake Road	17,200	19,900
Oxley Highway	South of Wrights Road	10,600	10,200
Oxley Highway Deviation	South of Wrights Road	-	-
Sub-total of Screenline J		***47,000***	***47,100***

Note: 1. Assumes daily flows are about 10 times PM peak hour traffic volumes.
2. Refer to Figure 3.2 for definition of screenlines.

The majority of traffic impacts will occur in Port Macquarie. From Figure 3.22, the key changes expected are:

- a significant increase in traffic on Hindman Street; a relatively wide street but with a number of direct property accesses and minor cross roads
- a significant decrease in traffic on Central Road; a reasonably wide road, but with significant parking and pedestrian activity
- a noticeable reduction in traffic on Lake Road east of the ring road link, marginally relieving existing congestion and conflicts along this road
- a noticeable reduction in traffic on Gordon Street, particularly between Horton Street and Lake Road
- a reduction in traffic using Kennedy Drive and Lord Street, along its whole length; a marginal benefit to the numerous residents living along this road
- a reduction in traffic using Fernhill Road

3.3.2 2011 Forecasts

Further network changes were made for the 2011 models. The 2011 improvement run includes the following changes to the Port Macquarie network:

- the proposed ring road link between Lochinvar Place and Hindman Street that has been the subject of an EIS and concept design study
- the Oxley Highway deviation between Lake Road and Phillip Charley Drive
- an east-west link road between Major Innes Drive adjacent to the proposed Anglican school and the Oxley Highway deviation

The results of this run are given Table 3-I~~Table 3-I~~ and Table 3-J~~Table 3-J~~ and illustrated in Figures 3.23 and 3.24 (Appendix A). The first plot provides estimates of 2011 PM peak hour flows for Hastings and the second for Port Macquarie.

The key changes in flows as a result of these improvements are likely to be:

- a very significant reduction in traffic on the existing Oxley Highway alignment between Phillip Charley Drive and Wrights Road
- a significant increase in traffic on Hindman Street
- a significant decrease in traffic on Central Road
- a significant reduction in traffic using Kennedy Drive and Lord Street
- a noticeable increase in traffic on Koala Street; a relatively narrow road with a poor alignment
- a noticeable increase in traffic at the eastern end of Hastings River Drive and the southern end of Park Street, placing more strain on the two existing roundabouts
- a noticeable reduction in traffic on Lake Road east of the ring road link
- a noticeable reduction in traffic on Gordon Street, particularly between Horton Street and Lake Road
- a reduction in traffic using Braemar Drive/Hillcrest Avenue, as a result of an expected redistribution of traffic from Kennedy Drive to Koala Street

Table 3-I 2011 Daily Traffic Volumes – Improvement Case (Hastings)

Road Section	Location	2011 (Do Nothing)	2011 (Improvement)
Screenline A			
Pembroke Road	North of Redbank Road	7,600	9,000
Oxley Highway	East of Kings Creek Road	9,900	8,600
Bago Road	North of Pacific Highway	1,200	1,200
Sub-total of Screenline A		***18,700***	***18,800***
Screenline B			
Hastings River Drive	East of Pacific Highway	7,900	6,900
Fernbank Creek Road	East of Pacific Highway	1,600	1,300
Oxley Highway	East of Pacific Highway	11,000	12,100
Oxley Highway Deviation	East of Pacific Highway	-	-
Houston Mitchell Drive	East of Pacific Highway	1,900	1,700
Ocean Drive (Kew)	East of Pacific Highway	5,900	5,800
Sub-total of Screenline B		***28,300***	***27,800***
Screenline C			
Hastings River Drive	West of Pacific Highway	9,300	8,000
Oxley Highway	West of Phillip Charley Drive	13,200	14,400
Oxley Highway Deviation	West of Phillip Charley Drive	-	-
Ocean Drive	South of Links Cresent	5,800	5,900
Sub-total of Screenline C		***28,300***	***28,300***
Screenline D			
Pembroke Road	South of Reids Road	7,600	9,000
Pacific Highway	South of Blackmans Point Road	11,000	9,600
Sub-total of Screenline D		***18,600***	***18,600***
Screenline E			
Bago Road	South of Kings Creek Road	1,200	1,200
Pacific Highway	North of Houston Mitchell Drive	11,200	11,000
Ocean Drive (Lake Cathie)	North of Lake Cathie	5,800	5,900
Sub-total of Screenline E		***18,200***	***18,100***
Screenline F			
Pacific Highway	North of Kendall Road	11,800	11,800
Ocean Drive (Bonny Hills)	South of Bonny Hills	8,400	8,400
Subtotal of Screenline F		***20,200***	***20,200***

Note: 1. Assumes daily flows are about 10 times PM peak hour traffic volumes.
2. Refer to Figure 3.1 for definition of screenlines.

Table 3-J: 2011 Daily Traffic Volumes – Improvement Case (Port Macquarie)

Road Section	Location	2011 (Do Nothing)	2011 (Improvement)
Screenline G			
William Street	East of Hollingworth Street	19,200	19,700
Gordon Street	East of Hollingworth Street	25,100	21,200
Hindman Street (extended)	North of Lake Road	-	12,500
Lake Road	West of Ocean Drive	23,100	23,100
Outer Ring Road	West of Colonel Barney Drive	-	-
Sub-total of Screenline G		***67,400***	***76,500***
Screenline H			
Park Street	South of Bay Street	12,900	13,200
Hastings River Drive	East of Widderson Street	14,600	17,400
Widderson Street	North of Oxley Highway	7,000	6,800
Clifton Drive	North of Oxley Highway	12,500	12,300
Outer Ring Road	South of Lady Nelson Drive	-	-
Sub-total of Screenline H		***47,000***	***49,700***
Screenline J			
Pacific Drive	South of Hill Street	5,400	5,200
Lord Street	South of Hill Street	12,500	9,200
Granite Street	South of Savoy Street	7,000	5,800
Ocean Drive (realigned)	South of Lake Road	21,500	27,000
Oxley Highway	South of Wrights Road	26,600	7,300
Oxley Highway Deviation	South of Wrights Road	-	20,500
Sub-total of Screenline J		***73,000***	***75,000***

Note: 1. Assumes daily flows are about 10 times PM peak hour traffic volumes.
2. Refer to Figure 3.2 for definition of screenlines.

Figure 3.25 (Appendix A) illustrates the difference in forecast flows in 2011 between the 'do-nothing' case and the proposed improvements described above.

3.3.3 2021 Forecasts

In addition to all the above-mentioned changes for the 2011 network, the 2021 improvement options include the following changes to the Port Macquarie network:

- the Oxley Highway deviation between Phillip Charley Drive and Pacific Highway
- an outer ring road (an extension of the east-west link road included in the 2011 network) between Ocean Drive Greenmeadows to Boundary Road near the airport

The results of the 2021 run are given in Table 3-K~~Table 3-K~~ and Table 3-I~~Table 3-I~~ in Figures 3.26 and 3.27 (Appendix A). The first plot provides estimates of 2021 PM peak hour flows for Hastings and the second for Port Macquarie. The key changes in flows as a result of these improvements are:

- a very significant reduction in traffic on the existing Oxley Highway alignment between Pacific Highway and Wrights Road
- a significant increase in traffic on Hindman Street
- a significant decrease in traffic on Central Road
- a significant reduction in traffic on Lake Road west of Ocean Drive
- a significant reduction in traffic on Clifton Drive; a relatively narrow poorly aligned residential street with numerous property accesses
- a significant reduction in traffic using Kennedy Drive and Lord Street, along its whole length
- a significant reduction in traffic using Hastings River Drive west of Widderson Street, particularly between Woods Street and Clifton Drive
- a noticeable reduction in traffic using Pacific Highway between Oxley Highway and Hastings River Drive, as a result of an expected redistribution of traffic to Oxley Highway and the outer ring road
- a noticeable reduction in traffic on Gordon Street, particularly between Horton Street and Lake Road
- a noticeable reduction of traffic using Major Innes Drive and parts of Ruins Way

Figure 3.28 (Appendix A) illustrates the difference in forecast flows in 2021 between the 'do-nothing' case and the proposed improvements described above.

Table 3-K: 2021 Daily Traffic Volumes – Improvement Cases (Hastings)

Road Section	Location	2021 (Do nothing)	2021 (Improvement)
Screenline A			
Pembroke Road	North of Redbank Road	9,400	9,400
Oxley Highway	East of Kings Creek Road	12,200	12,200
Bago Road	North of Pacific Highway	1,500	1,500
Sub-total of Screenline A		***23,100***	***23,100***
Screenline B			
Hastings River Drive	East of Pacific Highway	11,300	6,200
Fernbank Creek Road	East of Pacific Highway	3,100	1,900
Oxley Highway	East of Pacific Highway	11,500	1,200
Oxley Highway Deviation	East of Pacific Highway	-	17,100
Houston Mitchell Drive	East of Pacific Highway	2,400	2,600
Ocean Drive (Kew)	East of Pacific Highway	7,500	7,600
Sub-total of Screenline B		***35,800***	***36,600***
Screenline C			
Hastings River Drive	West of Pacific Highway	13,800	7,300
Oxley Highway	West of Phillip Charley Drive	15,300	5,500
Oxley Highway Deviation	West of Phillip Charley Drive	-	17,100
Ocean Drive	South of Links Cresent	7,300	6,500
Sub-total of Screenline C		***36,400***	***36,400***
Screenline D			
Pembroke Road	South of Reids Road	9,400	9,400
Pacific Highway	South of Blackmans Point Road	13,200	13,200
Sub-total of Screenline D		***22,600***	***22,600***
Screenline E			
Bago Road	South of Kings Creek Road	1,500	1,500
Pacific Highway	North of Houston Mitchell Drive	14,000	14,800
Ocean Drive (Lake Cathie)	North of Lake Cathie	7,300	6,500
Sub-total of Screenline E		***22,800***	***22,800***
Screenline F			
Pacific Highway	North of Kendall Road	15,100	15,200
Ocean Drive (Bonny Hills)	South of Bonny Hills	10,800	10,700
Subtotal of Screenline F		***25,900***	***25,900***

Note: 1. Assumes daily flows are about 10 times PM peak hour traffic volumes.
2. Refer to Figure 3.1 for definition of screenlines.

Table 3-L : 2021 Daily Traffic Volumes – Improvement Cases (Port Macquarie)

Road Section	Location	2021 (Do nothing)	2021 (Improvement)
Screenline G			
William Street	East of Hollingworth Street	22,900	23,500
Gordon Street	East of Hollingworth Street	33,400	26,900
Hindman Street (extended)	North of Lake Road	-	13,200
Lake Road	West of Ocean Drive	25,700	21,900
Outer Ring Road	West of Colonel Barney Drive	-	7,900
Sub-total of Screenline G		***82,000***	***93,400***
Screenline H			
Park Street	South of Bay Street	15,800	15,900
Hastings River Drive	East of Widderson Street	18,100	15,000
Widderson Street	North of Oxley Highway	9,200	6,700
Clifton Drive	North of Oxley Highway	15,500	10,100
Outer Ring Road	South of Lady Nelson Drive	-	10,500
Sub-total of Screenline H		***58,600***	***58,200***
Screenline J			
Pacific Drive	South of Hill Street	6,000	5,400
Lord Street	South of Hill Street	15,900	11,300
Granite Street	South of Savoy Street	8,800	6,100
Ocean Drive (realigned)	South of Lake Road	24,200	25,200
Oxley Highway	South of Wrights Road	39,100	12,400
Oxley Highway Deviation	South of Wrights Road	-	25,700
Sub-total of Screenline J		***94,000***	***86,100***

Note: 1. Assumes daily flows are about 10 times PM peak hour traffic volumes.
2. Refer to Figure 3.2 for definition of screenlines.

4 EVALUATION OF FUTURE TRAFFIC CONDITIONS

4.1 INTRODUCTION

This section presents the results of the capacity and level of service (LoS) analyses for the various future network and travel demand scenarios. A definition of level of service is given in Appendix C.

4.2 BASE CASE ('DO NOTHING') - 2011

4.2.1 Mid-block

Forecast 2011 base case levels of service are illustrated in Figures 4.1 and 4.2 (Appendix A). Without improvements, the peak hour levels of service on the following sections of road are expected to drop significantly by 2011:

- Ocean Drive, between Emerald Drive and Lake Road
- Oxley Highway, between Lake Road and Pacific Highway
- Gordon Street
- Clifton Drive
- Central Road
- Hastings River Drive, east of Woods Street
- Lake Road

4.2.2 Intersection

Turning flows derived from the 2011 base case model were analysed using SIDRA to estimate the peak hour level of service at each intersection. The results of the SIDRA analyses for the critical PM peak period (3pm to 4pm) are presented in Table 4-A~~Table 4-A~~ order from highest congestion at the top of the table to lowest at the bottom. Several of the worst performing intersections would clearly require capacity improvements in this case.

4.3 BASE CASE ('DO NOTHING') - 2021

4.3.1 Mid-block

Forecast 2021 base case levels of service are illustrated in Figures 4.3 and 4.4 (Appendix A). By 2021, further deterioration of peak hour traffic conditions are expected on the following sections of road:

- Ocean Drive, between Matthew Flinders Drive and Lake Road
- Parsons Ridge Road
- Kennedy Drive
- Lake Road
- Jindalee Road

Table 4-A 2011 Intersection Capacity Analysis Results – Do Nothing Case

Rank	*Intersection*	*Existing Layout*	*Overall LoS*	*Worst Movement LoS*
1	Ocean Dr / Koala St	1L Roundabout	F	F (WB)
2	Hastings River Dr / Bellbowrie St	Give-way	F	F (NB)
3	Warlters St / Park St	Stop	F	F (EB)
4	Ocean Dr / Pacific Dr	1L Roundabout	E	F (WB)
5	Horton St / William St	2L Roundabout	E	F (EB)
6	Hastings River Dr / Widderson St	Give-way	C	F (NB)
7	Horton St / Gordon St	2L Roundabout	C	D (WB)
8	Ocean Dr / Bold St (Laurieton)	Stop	B	D (NB)
9	Granite St / Savoy St	Stop	B	D (EB)
10	Oxley Hwy / Morton St	Give-way	A	D (NB)
11	Ocean Dr / The Parade (Laurieton)	Give-way	C	C (EB)
12	Oxley Hwy / Hindman St	2L Roundabout	C	C
13	Ocean Dr / Lake Rd	2L Roundabout	C	C
14	Ocean Dr / Kew Rd (Laurieton)	Give-way	B	C (NB)
15	Ocean Dr / Mathew Flinders Dr	1L Roundabout	B	C (WB)
16	Park St / Buller St	Signals	B	C (WB)
17	Koala St / Kennedy Dr	Stop	B	C (EB)
18	Oxley Hwy / Fernhill Dr	2L Roundabout	B	C (SB)
19	Hastings River Dr / Park St	2L Roundabout	B	C (SB)
20	Koala St / Granite St	Give-way	A	C (SB)
21	Ocean Dr / Crestwood Dr	1L Roundabout	B	B
22	Central Rd / Hindman St	2L Roundabout	B	B
23	Oxley Hwy / Widderson St	2L Roundabout	B	B
24	Park St / Bay St	1L Roundabout	B	B
25	Gordon St / Lake Rd	2L Roundabout	B	B
26	Gordon St / Lord St	2L Roundabout	B	B

Note: PM peak hour (3-4pm)

- Oxley Highway, between Hastings River Drive and Pacific Highway
- Fernhill Road
- Central Road
- Clifton Drive
- Widderson Street
- Hastings River Drive
- Park Street

4.3.2 Intersection

Turning flows derived from the 2021 base case model were analysed using SIDRA to estimate the peak hour level of service at each intersection. The results of the SIDRA analyses for the PM peak period (3pm to 4pm) are presented in Table 4-B~~Table 4-B~~, in order from highest congestion at the top of the table to lowest at the bottom. Most intersections would require capacity improvements in this case.

4.4 IMPROVEMENT CASE – 2001

The effect on level of service of the construction of the section of Ocean Drive across Kooloonbung Creek is illustrated in Figure 4.5 (Appendix A).

4.5 IMPROVEMENT CASE – 2011

4.5.1 Mid-block

Forecast 2011 levels of service for the improvement case are illustrated in Figures 4.6 and 4.7 (Appendix A). The following changes to peak hour level of service are expected to occur as a result of the improvements included in the 2011 test case network:

- much better conditions on Oxley Highway, between Phillip Charley Drive and Lake Rd
- worse conditions on Hindman Street, which will need to be addressed by road widening and intersection improvements

The diagrams also illustrate that conditions on Lake Road and Ocean Drive are only marginally improved, reflecting the need for a broader range of improvements across the network (eg., duplication of Ocean Drive and associated intersection improvements, additional traffic management improvements along Lake Road and Clifton Drive).

4.5.2 Intersection

Turning flows derived from the 2011 improvement case model were analysed using SIDRA for 8 of the intersections identified for improvement. The results of the SIDRA analyses are presented in Table 4-C~~Table 4-C~~ the form of improvement proposed and the resultant level of service for the overall intersection and the worst movement.

Table 4-B 2021 Intersection Capacity Analysis Results – Do Nothing Case

Rank	*Intersection*	*Existing Layout*	*Overall LoS*	*Worst Movement LoS*
1	Ocean Dr / Parsons Ridge Rd	1L Roundabout	F	F (WB)
2	Ocean Dr / Koala St	1L Roundabout	F	F (WB)
3	Oxley Hwy / Hindman St	2L Roundabout	F	F
4	Horton St / William St	2L Roundabout	F	F (EB)
5	Horton St / Gordon St	2L Roundabout	F	F
6	Hastings River Dr / Bellbowrie St	Give-way	F	F (NB)
7	Warlters St / Park St	Stop	F	F (EB)
8	Ocean Dr / Bold St (Laurieton)	Stop	E	F (NB)
9	Oxley Hwy / Fernhill Dr	2L Roundabout	D	F (NB)
10	Oxley Hwy / Morton St	Give-way	C	F (NB)
11	Hastings River Dr / Widderson St	Give-way	C	F (NB)
12	Ocean Dr / Kew Rd (Laurieton)	Give-way	D	E (NB)
13	Ocean Dr / Mathew Flinders Dr	1L Roundabout	C	E (WB)
14	Ocean Dr / Crestwood Dr	1L Roundabout	C	E (NB)
15	Ocean Dr / Lake Rd	2L Roundabout	D	D
16	Ocean Dr/The Parade (Laurieton)	Give-way	C	D (EB)
17	Park St / Buller St	Signals	C	D (WB)
18	Granite St / Savoy St	Stop	C	D (EB)
19	Oxley Hwy / Widderson St	2L Roundabout	B	C (NB)
20	Gordon St / Lake Rd	2L Roundabout	B	C (NB)
21	Gordon St / Lord St	2L Roundabout	B	C (SB)
22	Koala St / Kennedy Dr	Stop	B	C (EB)
23	Central Rd / Hindman St	2L Roundabout	B	B
24	Park St / Bay St	1L Roundabout	B	B
25	Hastings River Dr / Park St	2L Roundabout	B	B
26	Koala St / Granite St	Give-way	A	B (SB)

Note: PM peak hour (3-4pm)

Table 4-C: 2011 Intersection Capacity Analysis Results – Improvement Case

Rank	*Intersection*	*Improved Layout*	*Overall LoS*	*Worst Movement LoS*
1	Horton St / Gordon St	Signals	C	C
2	Ocean Dr / Koala St	2L Roundabout	B	C (WB)
3	Hastings River Dr / Widderson St	Signals	B	C (NB)
4	Hastings River Dr / Bellbowrie St	Signals	B	C (SB)
5	Warlters St / Park St	1L Roundabout	B	C (EB)
6	Ocean Dr / Bold St (Laurieton)	1L Roundabout	B	B
7	Ocean Dr / Pacific Dr	2L Roundabout	B	B
8	Granite St / Savoy St	1L Roundabout	B	B

Note: PM peak hour (3-4pm)

4.6 IMPROVEMENT CASE - 2021

4.6.1 Mid-block

The 2021 test network includes a range of improvements in addition to the 2011 network (eg., inclusion of an outer ring road and completion of Oxley Highway deviation). The following changes to peak hour level of service illustrated in Figures 4.8 and 4.9 (appendix A), are expected to occur:

- better conditions on the Pacific Highway, between Oxley Highway and Hastings River Drive, potentially deferring duplication of the highway through this section
- much better conditions on the existing Oxley Highway, east of Pacific Highway
- much better conditions on Hastings River Drive
- slightly better conditions on Fernhill Road and Clifton Drive
- worse conditions on proposed Jindalee Road extension
- much better conditions on Kennedy Drive
- worse conditions on Hindman Street, Lake Road and parts of Ocean Drive

4.6.2 Intersection

Turning flows derived from the 2021 improvement case model were analysed for 15 intersections. The results of the analyses are presented Table 4-D~~Table 4-D~~.

Table 4-D: 2021 Intersection Capacity Analysis Results – Improvement Case

Rank	*Intersection*	*Improved Layout*	*Overall LoS*	*Worst Movement LoS*
1	Oxley Hwy / Hindman St	Signals	D	D
2	Ocean Dr / The Parade (Laurieton)	Sea-gull	B	C (WB)
3	Ocean Dr / Parsons Ridge Rd	2L Roundabout	B	C (WB)
4	Ocean Dr / Koala St	2L Roundabout	B	C (WB)
5	Horton St / Gordon St	Signals	B	C (SB)
6	Oxley Hwy / Fernhill Dr	2L Roundabout	B	C (NB)
7	Hastings River Dr / Bellbowrie St	Signals	B	C (SB)
8	Hastings River Dr / Widderson St	Signals	B	C (NB)
9	Warlters St / Park St	2L Roundabout	B	C (EB)
10	Ocean Dr / Kew Rd (Laurieton)	1L Roundabout	B	B
11	Ocean Dr / Bold St (Laurieton)	1L Roundabout	B	B
12	Ocean Dr / Mathew Flinders Dr	2L Roundabout	B	B
13	Ocean Dr / Crestwood Dr	2L Roundabout	B	B
14	Park St / Buller St	Signals	B	B
15	Granite St / Savoy St	1L Roundabout	B	B

Note: PM peak hour (3-4pm)

5 ROAD HIERARCHY

Existing road hierarchy plans jointly prepared by RTA and Council were reviewed for adoption in this study. The following constraints and issues were considered in confirming a suitable road hierarchy plan for Hastings:

- the location of existing and future major land-uses
- the alignment of principal traffic routes
- the sensitivity of land-uses adjoining the road corridors
- property setbacks and road reserve widths

A copy of the new adopted road hierarchy plan is included in Appendix D. The road categories incorporated in the hierarchy plan are:

- Primary Arterial – provide the more important links between Port Macquarie and other towns and centres of population, preferably with fully controlled access
- Secondary Arterial – provide connections and distribute traffic between primary arterials, with a minimum of direct property access
- Collector Roads – provide a connection between local streets and higher level roads, with some direct property accesses
- Local Streets – provide driveway access to properties and for local travel

6 IMPLEMENTATION STRATEGY

6.1 INTRODUCTION

A program for the implementation of roadworks must take account of the adequacy of the existing road system to provide safe and efficient travel for existing and future traffic levels. Intersection and mid-block levels of service and safety are critical measures of the adequacy of the existing road system and provide the basis for developing a program for strategic road improvements. The road hierarchy is also an important consideration in determining priorities for the proposed Implementation Plan.

6.2 PROGRAM

Council's existing works program covers a period of 6 years. This program was used as a starting point for developing an implementation plan for this study, with particular emphasis on projects listed in the first three years of the program. The priority allocated to projects early in the current program is likely to reflect a well considered process. These projects have been retained as high priority projects but will be subject to ongoing review.

Construction cost estimates are based on costs for similar projects given in Council's current works program. Generic rates for construction by road class or by typical road cross section were not readily available. The total estimated cost for the identified projects, including projects in Council's program is $56.6 million. This does not include the costs of a possible outer ring road connecting Ocean Drive to the airport. The proposed revised program including estimates of construction costs are included in Appendix E.

6.3 PRIORITY CATEGORIES

Candidate projects for implementation have been grouped into three categories, having 'high' 'moderate' or 'low' priority status. 'High' priority projects include those in the first 2 to 3 years of Council's program, as well as other project needs identified on the basis of capacity or safety deficiencies. This group of projects could span the first five years of the implementation plan, or more, depending on funding constraints. The 'moderate' priority projects could be constructed in the 5 to 15 year period and the remaining 'low' priority projects beyond 15 years, again dependant on funding.

6.4 THE PLAN

Implementation Plan drawings have been prepared to illustrate the location and extent of the proposed projects identified in the study. A large scale drawing (approx 1:60,000) covering the broader Hastings area shows intersection and road projects in the rural and semi-urban communities surrounding Port Macquarie. A more detailed drawing (1:12,500) shows the Port Macquarie area from Lighthouse Beach to the North Shore and west to include the airport.

The drawings distinguish low, moderate and high priority projects by colour (red, green and blue). They also differentiate between intersection works and mid-block works by symbol (circle for an intersection work and line for mid-block works). The following categories of projects are shown on the drawings:

- new road – shown as a dashed line indicating the construction of new works
- duplication – shown as a double line, indicating the construction of works to provide a four lane facility
- road widening/rehabilitation – shown as a full single line, indicating the reconstruction of an existing road for strengthening or widening purposes (eg., for on-road cycling)
- traffic management – shown as a dotted line, indicating relatively low cost works required to address safety, parking and other local operational deficiencies
- major intersection works – shown as a filled circle, indicating either significant intersection improvements or new works upgraded
- road closures – shown as crosses, indicating road to be closed as part of the plan

Small scale versions of the Implementation Plan are included in Appendix F.

7 RECOMMENDATIONS

The following recommendations are made to develop the findings of this study and to extend investigations on related planning and design issues:

- undertake a feasibility study of the outer ring road, including investigations of road network and alignment options
- pursue the upgrading of the Oxley Highway from Lake Road to the Pacific Highway generally in accordance with the staging program recommended in the SMEC Australia Pty Ltd report for Hastings Council: *Oxley Highway Duplication - Pacific Highway to Wrights Road - Economic Analysis (June 2001)*
- undertake a feasibility study for the completion of the West Haven Bypass road
- review Council's Section 94 Major Roads Contribution Plan on the basis of the implementation strategy provided in this study
- undertake future bus route planning based on the road hierarchy plan prepared in this study.