ATTACHMENT TO AGENDA ITEM

Ordinary Meeting

22 November 2016

Agenda Item 11.6 **Goulburn Valley Highway Shepparton Bypass Economic Benefit Reports**

Attachment 1	**Shepparton Bypass Stage 1**	**496**
Attachment 2	**Letter to Minister Luke Donnellan - GV Highway Bypass - Final(2)**	**497**
Attachment 3	**Shepparton Bypass Strategic Model Update**	**499**
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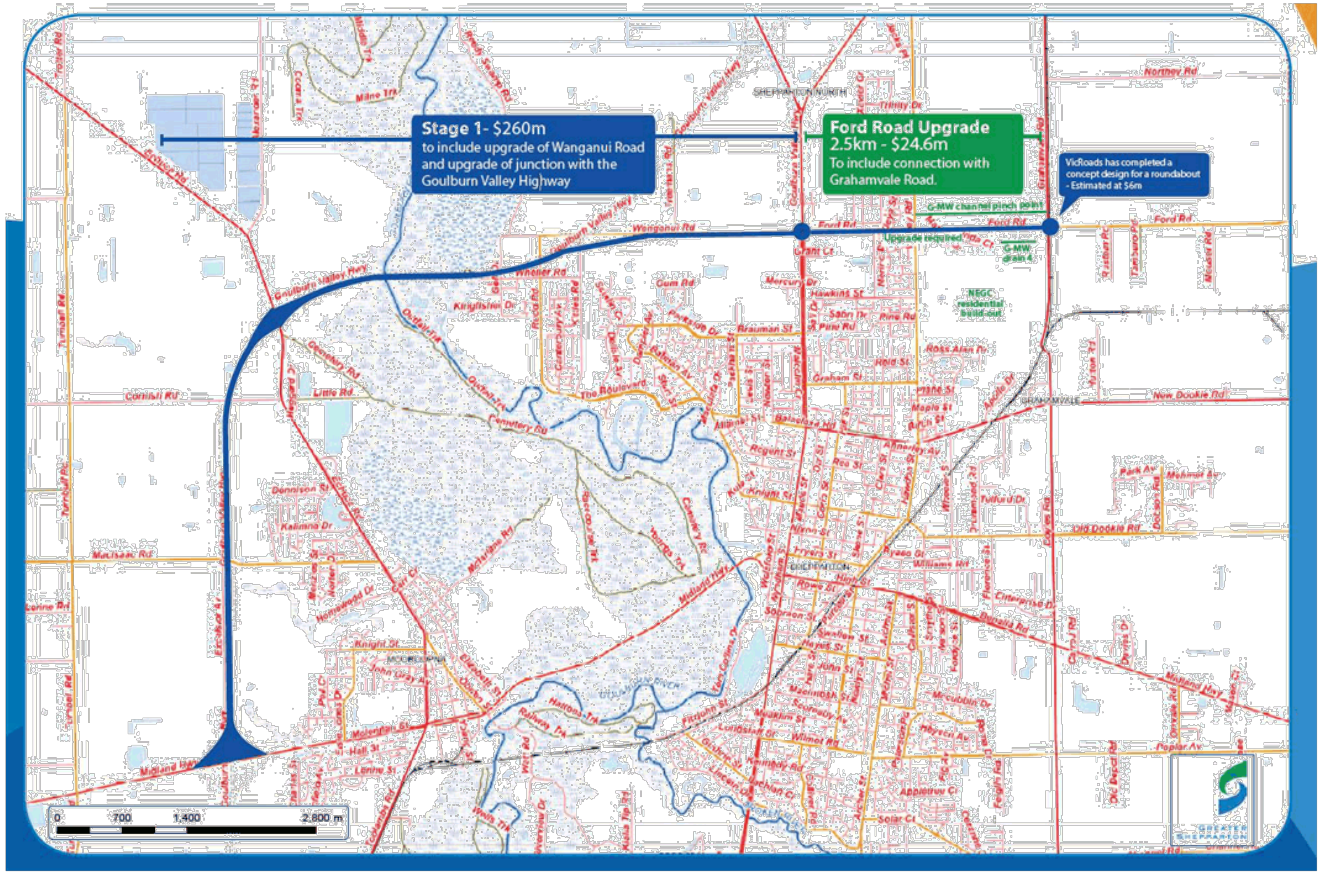
Stage 1- $260m
to include upgrade of Wanganui Road and upgrade of junction with the Goulburn Valley Highway
Ford Road Upgrade
2.5km - $24.6m
To include connection with Grahamvale Road.
VicRoads has completed a concept design for a roundabout - Estimated at $6m
0
700
1,400
2,800 m

GREATER SHEPPARTON

18 May 2016

The Hon Luke Donnellan
Minister for Roads and Road Safety
Level 22
1 Spring Street
MELBOURNE VIC 3000

Dear Minister

GOULBURN VALLEY HIGHWAY SHEPPARTON BYPASS

As you are aware, the Goulburn Valley Highway is an integral transport route. It connects the Goulburn Valley region with Melbourne and forms a vital link in the national highway system between Melbourne and Brisbane. The Goulburn Valley Highway also joins Melbourne and Central Victoria with inland New South Wales and Queensland.

Sections of the Goulburn Valley Highway in and around Greater Shepparton can no longer adequately cater for the large and rising traffic volumes that use the highway daily.

The Shepparton Bypass as a solution to address the inadequacies of the highway has been proposed since 1995, however the necessary funding has yet to be secured. Funding from both the State and Federal Governments is required for this project to be completed.

The full 36km two lane Shepparton Bypass is estimated to cost around $1.2 billion. The Federal and Victorian Governments have provided advice that the project needs to be divided into affordable stages for government consideration. Council has listened and is taking a staged approached to the construction of the Bypass as a dual lane highway. The priority is stage 1a – Echuca-Mooroopna to GV Highway (5.05kms) and Stage 1b – Echuca – Mooroopna Road to the Midland Highway (5.0kms).

Construction of the first stage will:

- Provide an additional east-west crossing of the Goulburn River, reducing the impact of heavy vehicles on Shepparton's CBD.
- Provide relief for congested intersections in the city centre.
- Strength the supply chain of the GV's food processing, manufacturing, storage and warehousing enterprises.
- Improve safety and accessibility for both local and through traffic.
- Reduce accidents, particularly those including heavy vehicles.
- Improve freight movements from the GV to domestic and export markets as a result of reduced travel times and transport costs.
- Improve the level of service for commercial traffic in the region.
- Cater for the region's long-term growth.
- Provide the first step on the fill duplication of the GV Highway from Shepparton to Melbourne.

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To construct stage 1 of the Bypass the investment required on an 80% Federal and 20% State basis is:

- $52 million from the State Government which includes $20 million for preliminary investigation and initial works, such as environmental and cultural impact and heritage studies, land acquisition and detailed design concept and construction.
- $208 million from the Federal Government for construction of stage one.

Council recently committed $35,000 to undertake a social impact study of the creation of stages 1a and 1b of the project, and has offered to co-ordinate an updated traffic count on behalf of the state government.

Council, at the May Ordinary Council Meeting resolved to *"Adopt the staged approach to Bypass delivery proposed by VicRoads, including the initial proposals focusing on the single lane provision of Stages 1a and 1b as a combined single project" … and … "write to Minister Donnellan requesting that the Bypass and specifically the combined Stages 1a and 1b be confirmed as a State government priority project".*

Therefore, I seek your assistance to ensure that the Victorian Government demonstrates its support for the Goulburn Valley Highway Shepparton Bypass by articulating it as a priority project within state government strategic transport plans. Additionally, that the Victorian Government recommends this priority project to the Federal Government for inclusion in Infrastructure Australia priorities.

For your information, I also wish to advise that Council also resolved at the May Ordinary Council Meeting to "*write to all candidates contesting the Federal seat of Murray in the forthcoming election to seek their commitment (in writing) to the combined Stage 1a and 1b estimated at $260 million*". I will inform you of any response or commitment received from the candidates in this regard.

On behalf of Greater Shepparton City Council, I would like to thank you in anticipation of your support for this key priority infrastructure project.

Please do not hesitate to contact Council's Chief Executive Officer, Peter Harriott on (03) 5832 9884 should you wish to discuss this matter further.

Yours sincerely

Cr Dinny Adem
MAYOR

C16/10073

cc John Merritt – Chief Executive Officer - Vic Roads
Bryan Sherritt – Regional Director, NE Region – Vic Roads

AECOM

Shepparton Bypass Strategic Model Update
Greater Shepparton City Council
30-Aug-2016

Shepparton Bypass Strategic Model Update

Demand Forecast and Economic Evaluation

Shepparton Bypass Strategic Model Update

Demand Forecast and Economic Evaluation

Client: Greater Shepparton City Council

ABN: N/A

Prepared by

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30-Aug-2016

AECOM in Australia and New Zealand is certified to the latest version of ISO9001, ISO14001, AS/NZS4801 and OHSAS18001.

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Quality Information

Document Shepparton Bypass Strategic Model Update

Ref

Date 30-Aug-2016

Prepared by Julie Vinas and Henry Le

Reviewed by Adrian Koon

Revision History

Revision	Revision Date	Details	Authorised	
			Name/Position	Signature
A	19-Aug-2016	Draft Report	Henry Le Associate Director	
B	25-Aug-2016	Draft Report	Henry Le Associate Director	
C	30-Aug-2016	Report	Henry Le Associate Director	

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Executive Summary

In 2012 VicRoads engaged AECOM to develop a strategic transport model for the Greater Shepparton area, to assess the traffic and economic impacts associated with a number of bypass configuration options. The study was completed and documented in the report *Development of the Shepparton Bypass Strategic Transport Model* (September 2012). A total of seven options for the Shepparton Bypass were modelled including Option 1, 2, 3, 4, 5, 5A and 5B. Option 5A (also known as the Northern Bypass) involves a standard freeway with one lane in each direction and at grade intersections connecting Midland Highway in the south and Goulburn Valley Highway and Wanganui Road intersection in the north.

In May 2016, the Greater Shepparton City Council commissioned AECOM to update the model and use the updated model to study the travel demand and economic performance for variations of Option 5A, which are known as Options 1A, 1B and 1A&B (Option and Stage are used interchangeably in this report).

This study has updated the strategic transport model for Greater Shepparton in the following areas.

- The demographic data for the base and all future years were updated with the Victoria In Future (VIF) 2014.
- The traffic growth rates at the external cordon of the model were updated to be in line with the population and employment growth rates.
- The special traffic generators in the model were reviewed and left unchanged, except that the Goulburn Valley Freight Logistics Centre was assumed to be opened in 2031 rather than 2021, as advised by Council.
- The road networks were updated with three options of the bypass. In addition, it was assumed that Ford Road would be upgraded to be aligned with the proposed bypass at this location, and the cost of Ford Road upgrade was also included in the economic evaluation process.

The traffic analysis indicated that Option 1B in isolation would attract very low traffic volumes because it represents an option without connections to Goulburn Valley Highway and Ford Road upgrade. Option 1A&B would attract the highest traffic volume and therefore relieve more traffic on the Midland Highway and Goulburn Valley Highway and within the city centre than the other options.

The report has also updated all economic evaluation parameters to 2015 prices, and provided an economic evaluation for three options. Sensitivity analysis was also conducted by varying some economic parameters.

The economic evaluation indicates that all three options have a benefit cost ratio (BCR) less than 1. Option 1A provides the highest BCR, while Option 1B has the lowest BCR.

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1.0 Introduction

1.1 Study Background

In 2012 VicRoads engaged AECOM to develop a strategic transport model for the Greater Shepparton area, to assess the traffic and economic impacts associated with a number of bypass configuration options. The study was completed and documented in the report *Development of the Shepparton Bypass Strategic Transport Model* (September 2012). There are a total of seven options for the Shepparton Bypass including Option 1, 2, 3, 4, 5, 5A and 5B. Option 5A (also known as the Northern Bypass) involves a standard freeway with one lane in each direction with at grade intersections connecting Midland Highway in the south and Goulburn Valley Highway and Wanganui Road intersection in the north.

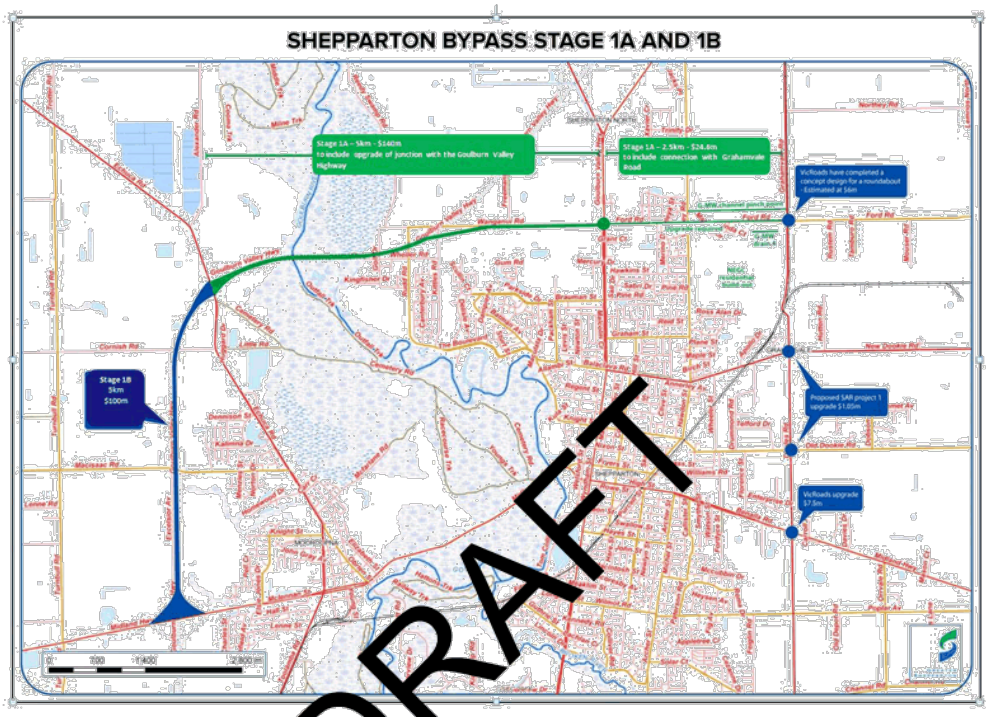
In May 2016, the Greater Shepparton City Council commissioned AECOM to update the model and use the updated model to study the travel demand and economic performance for variations of Option 5A, which are known as Options 1A, 1B and 1A&B (Option and Stage are used interchangeably in this report).

1.2 Study Scope

The main scope of this study includes:

- Update the Shepparton Strategic Transport Model to ensure that the model reflects the most current traffic and demographic data available
- Model the impact of Stages 1A and 1B as indicated in Figure 1 both separately and cumulatively (Stage 1AB). Stage 1A involves linking Echuca – Mooroopna Road to Grahamvale Road and Stage 1B connects Echuca – Mooroopna Road to Midland Highway. Both stages would include the update of Ford Road.
- Provide a cost benefit analysis for the three options

Figure 1: Shepparton Bypass Options



Source: Shepparton City Council

1.3 Structure of the report

The purpose of this report is to describe model updates, and present a forecast of travel demand and economic evaluation results for each bypass option.

- **Section 2** summarises key updates to the model
- **Section 3** presents the modelling results for three staging options
- **Section 4** presents the economic assessment results
- **Section 5** provides some concluding remarks

2.0 Model Updates

2.1 Methodology

The methodology for updating the Shepparton Bypass Strategic Model (the Shepparton Model) is as follows:

- Use the Shepparton Model developed by AECOM for VicRoads in 2012 as a starting point for this study
- Update the demographic data for 2011, 2016, 2021, 2031 and 2041 for the study area using the demographic data from the Victorian Integrated Transport Model (VITM) provided by the Department of Economic Development, Jobs, Transport and Resources (DEDJTR) in June 2015, based on VIF 2014. The VITM input data was developed originally by SGS Economics and Planning for 70 zones across the study area, and was disaggregated into 198 zones for the Shepparton Model
- Review the traffic growth rates for light and heavy vehicles at the external cordon
- Code the project network for three scenarios: Stage 1A Bypass, Stage 1B Bypass, and combined Stage 1A&B Bypass. The base cases were the same as those used in the 2012 study.
- Prepare and conduct model runs for 3 options for 5 planning years
- Update the economic parameters wherever possible and produce the economic evaluation results for three options

The following sections will discuss the model inputs to be updated.

2.2 Demographic data

Demographic data is a key input into the Shepparton Model as it will drive travel demand in the future. This study updates the demographic data input to the Shepparton Model based on the most recent data source: VIF 2014 provided by DEDJTR. Table 1 below shows a broad comparison of total population, total jobs and employment for the study area between VIF2011 (used for the previous 2012 study) and VIF2014 for this study. The data shows no significant changes in population and employment in 2011 and 2021, but growth is stronger in 2031 and 2041. This results in a 5% and 11% increase in population and employment in VIF2014 than VIF2011 in 2031 and 2041. The enrolments provided by VIF 2014 are also much higher than as shown in VIF2011.

Table 1: Comparison of demographic data between VIF 2011 and VIF2014

Parameters	Data source	2011	2016	2021	2031	2041
Total Population	VIF 2011	51,098	54,089	56,956	62,154	66,244
	VIF 2014	50,181	53,104	57,103	65,302	73,786
	Percentage change	-2%	-2%	0%	5%	11%
Total Jobs	VIF 2011	31,342	32,617	34,085	36,831	39,940
	VIF 2014	30,386	32,126	34,635	38,825	44,484
	Percentage change	-3%	-2%	2%	5%	11%
Enrolments	VIF 2011	14,413	15,879	17,105	18,212	19,097
	VIF 2014	24,345	25,208	26,143	26,785	28,868
	Percentage change	69%	59%	53%	47%	51%

Appendix B provides more details of the distribution of demographic data for Shepparton in VIF 2014 by small area.

2.3 Traffic Growth rates applied to external-external trips

Table 2 below shows the growth rates of external-external trips, for each external transport zone, by light and heavy vehicles separately, which have been reviewed by VicRoads and adopted for this study.

Table 2: Traffic Growth rates applied to external-external trips

External Zone	Road Name	Location	Light & Heavy vehicles		
			2011-16	2016-31	2031-41
301	Katamatite-Shepparton Road	North east of Lemnos North Road	1.1%	1.3%	1.2%
302	Goulburn Valley Highway	North east of Trewins Road	1.1%	1.3%	1.2%
303	Barmah-Shepparton Road	North west of Zeerust Road	1.1%	1.3%	1.2%
304	Echuca-Mooroopna Road	North west of Dougan Road	1.1%	1.3%	1.2%
305	Merrigum-Ardmona Road	West of Ardmona Road	1.1%	1.3%	1.2%
306	Midland Highway	West of Ardmona Road	1.1%	1.3%	1.2%
307	Ferguson Road	West of Downer Road	1.1%	1.3%	1.2%
308	Toolamba-Rushworth Road	West of Downer Road	1.1%	1.3%	1.2%
309	Mooroopna-Murchison Road	South of Bitcon Road	1.5%	1.5%	1.2%
310	Goulburn Valley Highway	South of Ross Road	1.5%	1.5%	1.2%
311	Euroa-Shepparton Road	South of Union Road	1.5%	1.5%	1.2%
312	Shepparton-Eurora Road	South of Mitchell Road	1.1%	1.3%	1.2%
313	Midland Highway	East of Boundary Road	1.1%	1.3%	1.2%
314	New Dookie Road	East of Boundary Road	1.1%	1.3%	1.2%
315	Lemnos-Cosgrove Road	East of Boundary Road	1.1%	1.3%	1.2%
316	Congupna East Road	East of Boundary Road	1.1%	1.3%	1.2%
317	Jubilee Road	East of Boundary road	1.1%	1.3%	1.2%

With the exception of zones 309-311 (located to the south of the study area), the growth rate for light and heavy vehicles has generally kept in line with forecast population growth for the study area. Zones 309-311 have higher growth rates as the analysis of permanent count station data revealed that the Goulburn Valley Highway to the south of the study area has experienced higher traffic growth than the other permanent count stations surrounding the study area.

Table 3: Forecast population and employment growth for the study area[1] (VIF2014)

Year	Population	Employment
2011	50,181	30,386
2016	53,104	32,126
2021	57,103	34,635
2031	65,302	38,825
2041	73,786	44,484
Growth rate p.a.		
2011-16	1.1%	1.1%
2016-21	1.5%	1.5%
2021-31	1.4%	1.1%
2031-41	1.2%	1.4%

[1] *Study area is smaller than the entire Greater Shepparton area*

2.4 Treatment of Special Generators

Additional trips associated with a number of special generators in the study area (that cannot be adequately represented by the trip attraction equations alone) were incorporated into the model. The special generators that were identified, along with the additional trip types, included:

- Shepparton railway station – park/kiss and ride trips
- Mooroopna railway station – park/kiss and ride trips
- Greater Shepparton City Council (Welsford Street offices) – visitor trips
- Shepparton Regional Hospital – patient and visitor trips
- Shepparton Private Hospital – patient and visitor trips
- Goulburn Valley Freight Logistics Centre – truck trips.

Table 4 shows the additional trips estimated for each of the special generators. The vehicle trips generated by these special generators are reasonable and do not require additional review, with the exception of the Goulburn Valley Freight Logistics Centre (GVFLC). In the 2012 study, it was assumed that the GVFLC would be operated in 2021. However, in the Inception meeting, Council indicated that the GVFLC would be likely to be opened in 2031, therefore the timing for the GVFLC was revised to start in 2031 as shown in Table 4. The remaining special generators were assumed unchanged.

Shepparton Bypass Strategic Model Update

Table 4: Additional daily trips associated with special generators in the study area

Special Generator	Transport Zone	Additional Daily (24-hour) Light Vehicle Trips					Additional Daily (24-hour) Heavy Vehicle Trips				
		2011	2016	2021	2031	2041	2011	2016	2021	2031	2041
Shepparton Railway Station	27	281	298	314	342	365	-	-	-	-	-
Mooroopna Railway Station	47	27	28	30	32	34	-	-	-	-	-
Greater Shepparton City Council (Welsford Street offices)	11	260	275	290	316	337	-	-	-	-	-
Shepparton Regional Hospital	109	666	705	743	811	864	-	-	-	-	-
Shepparton Private Hospital	110	150	159	167	182	19	-	-	-	-	-
Goulburn Valley Freight Logistics Centre	62	-	-	-	-	-	-	-	-	2,813	3,039

2.5 Assumptions on the road network

1. The base cases

Assumed to be the same as those in the 2012 study

2. Stage 1A Bypass

This option was known as part of Option 5A of the 2012 study. It involves a bypass from the Echuca Road to the intersection of Goulburn Valley Highway and Wanganui Road in the north. This option has the following characteristics:

- Highway standard road with a speed limit of 100 km/hr
- One lane in each direction
- At-grade intersections at Echuca Road and Goulburn Valley Highway.
- Strathmerton Deviation is not included (located further north of the study area). Actually, the Strathmerton Deviation would have no significant impact to all three options, because traffic from that direction, with deviation or not, would merge to Goulburn Valley Highway to turn to Wanganui Road to access the bypass and vice versa.
- Upgrade Wanganui Road between the Bypass and Goulburn Valley Hwy

In addition, this option includes improvements on Ford Road between Goulburn Valley Hwy and Grahamvale Road resulting in the adoption of a 1 lane arterial in each direction (80 km/hr).

3. Stage 1B Bypass

This option involves a bypass between Midland Hwy and Echuca Road and has similar characteristicsto Option 1A above. It also includes improvements at Ford Road between Goulburn Valley Hwy and Grahamvale Road.

4. Stage 1A & 1B combined

This option involves a bypass between Midland Hwy and Goulburn Valley Highway with similar characteristics Option 1A. It also includes improvements at Ford Road between Goulburn Valley Hwy and Grahamvale Road.

3.0 Modelling results

3.1 Base Case

The 2011 and future base year road network were assumed to be the same as those in the 2012 study.

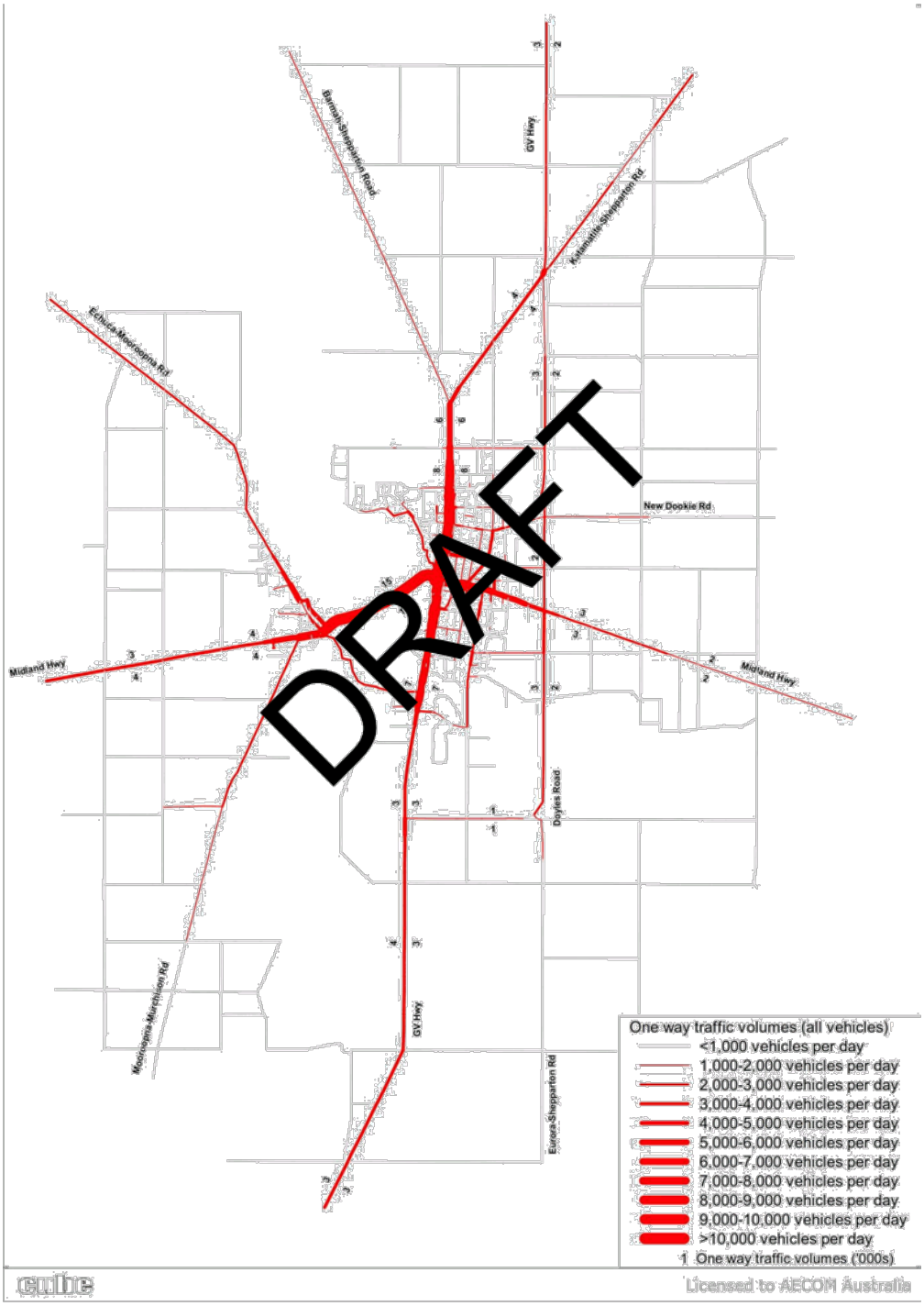
Figure 2 and Figure 3 illustrate the magnitude of daily (24-hour) traffic volumes across the road network in 2011 and 2041 respectively. As can be seen, Goulburn Valley Highway and Midland Highway within the inner area of Shepparton tend to experience higher traffic volumes than other roads. Figure 4 shows the difference in daily traffic volumes between 2041 and 2011 base cases. By 2041, traffic volumes are expected to increase as a result of forecast population and employment growth in the study area.

Figure 5 to Figure 7 illustrate the same set of information for heavy vehicles only. The figures show Goulburn Valley Highway, Shepparton Alternative Route and Midland Highway currently carry relatively high volumes of heavy vehicles, which will continue to increase into the future. Heavy vehicle traffic on Mooroopna-Murchison Road (immediately south of the Midland Highway) is also expected to increase into the future due to the additional truck traffic generated from the proposed Goulburn Valley Freight Logistics Centre, which was assumed to open in 2031.

Table 5 details existing (2011) and forecast traffic volumes (2016, 2021, 2031, 2041) along key roads in the study area. By 2041, Midland Highway would carry around 39,100 vehicles per day along the causeway, and Goulburn Valley Highway between Wanganui Road and Shepparton-Barmah Road would carry 17,100 vehicles per day. Relatively large heavy vehicle volumes of about 6100 vehicles per day are also expected along the causeway of the Midland Highway.

Shepparton Bypass Strategic Model Update

Figure 2: 2011 Base Case one way traffic volumes ('000s) – All vehicles – Daily



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Shepparton Bypass Strategic Model Update

Figure 3: 2041 Base Case one way traffic volumes ('000s) – All vehicles – Daily

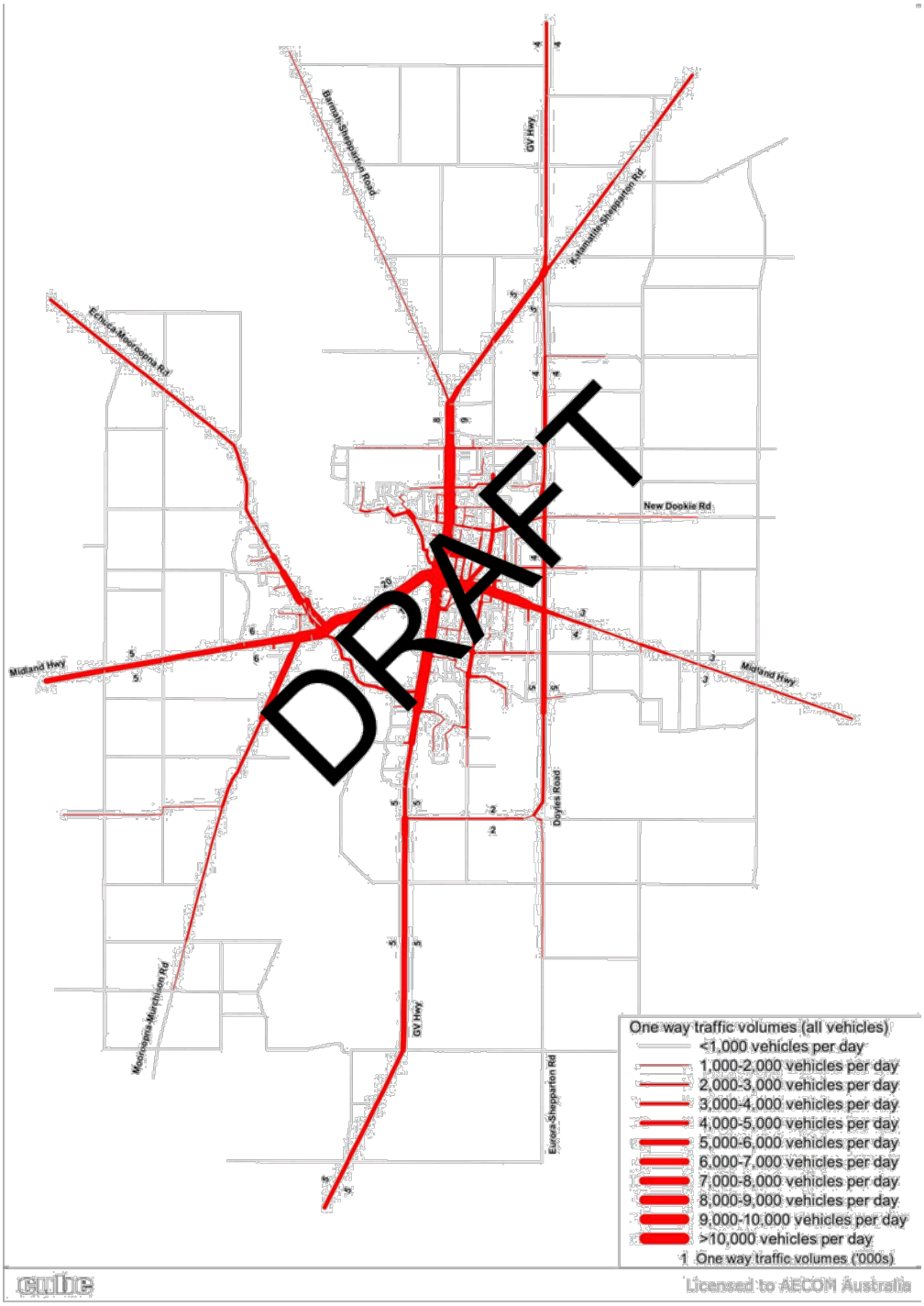

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Figure 4: Difference in daily (24-hour) traffic volumes between 2041 Base Case and 2011 Base Case – all vehicles

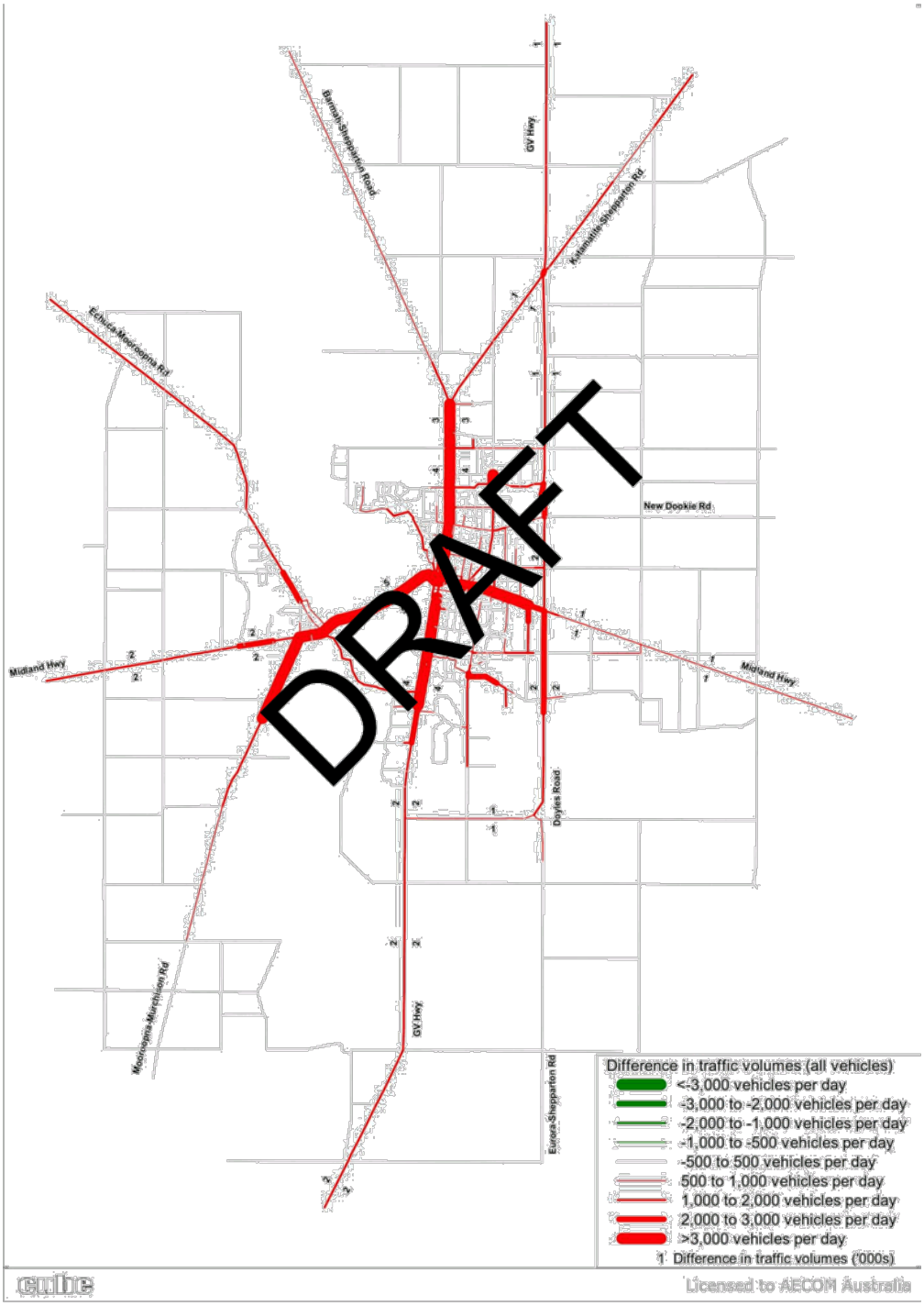

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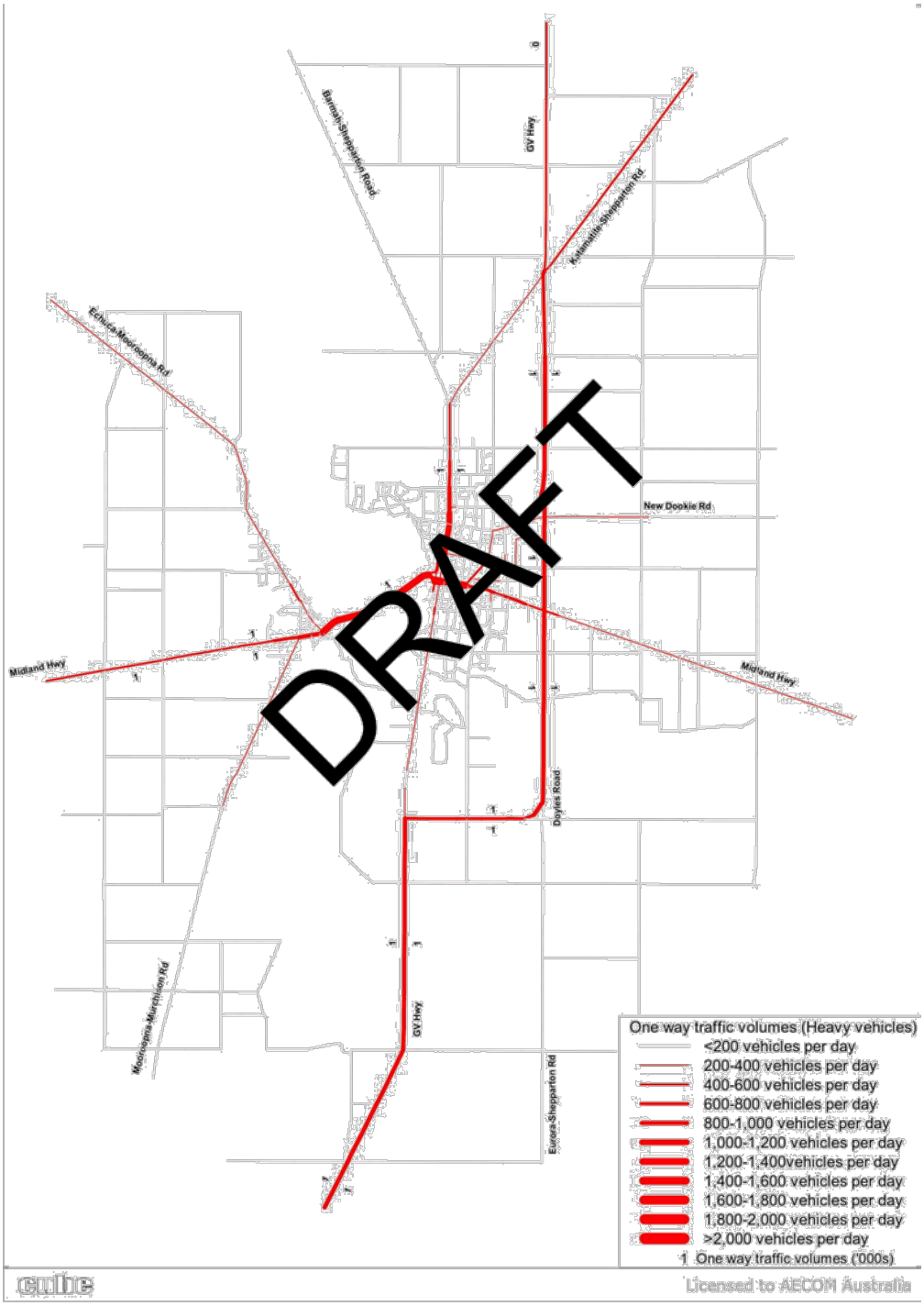
Figure 5: 2011 Base Case one way traffic volumes ('000s) – Heavy vehicles – Daily



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Shepparton Bypass Strategic Model Update

Figure 6: 2041 Base Case one way traffic volumes ('000s) – Heavy vehicles – Daily

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Figure 7: Difference in daily (24-hour) traffic volumes between 2041 Base Case and 2011 Base Case – Heavy vehicles

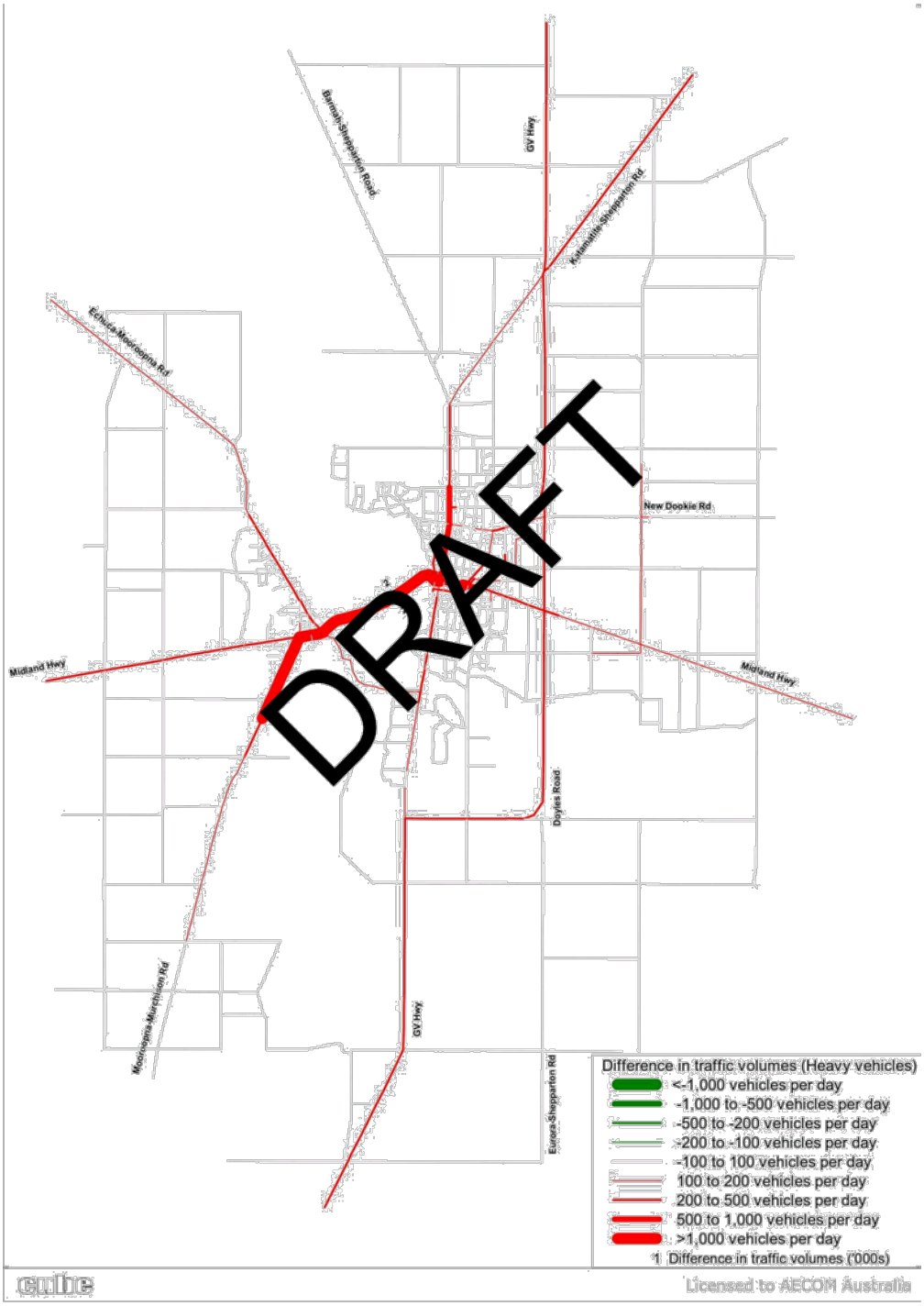

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Table 5: Base Case traffic volumes

Road name	Two-Way Daily (24-hour) All Vehicles					Two-Way Daily (24-hour) Heavy Vehicles				
	2011	2016	2021	2031	2041	2011	2016	2021	2031	2041
Shepparton Bypass										
Between Gribben Road and Bridge Road	0	0	0	0	0	0	0	0	0	0
Between Bridge Road and Mooroopna-Murchison Road	0	0	0	0	0	0	0	0	0	0
Between Mooroopna-Murchison Road and Midland Highway	0	0	0	0	0	0	0	0	0	0
Between Midland Highway and Echuca-Mooroopna Road	0	0	0	0	0	0	0	0	0	0
Between Echuca-Mooroopna Road and Wanganui Road	0	0	0	0	0	0	0	0	0	0
Between Wanganui Road and Shepparton-Barmah Road	0	0	0	0	0	0	0	0	0	0
Between Shepparton-Barmah Road and Goulburn Valley Highway	0	0	0	0	0	0	0	0	0	0
Goulburn Valley Highway										
Between Doyles Road and Karramomus Road	6,500	7,0[illegible]	7,500	8,700	9,800	1,600	1,800	1,900	2,200	2,500
Between Union Road and Mitchell Road	7,[illegible]0	7,[illegible]0	8,100	9,300	10,500	1,700	1,800	1,900	2,300	2,600
Between River Road and Rafferty Road	6,200	6,[illegible]0	6,600	8,700	9,300	400	400	400	500	600
Between Midland Highway and Fryers Street	10,200	10,800	11,300	13,800	15,400	600	700	700	1,100	1,600
Between Wanganui Road and Shepparton-Barmah Road	11,100	11,800	12,900	15,500	17,100	900	900	900	1,200	1,300
Between Shepparton-Barmah Road and Shepparton Alt. Route	7,200	7,600	7,900	9,400	10,100	500	600	600	700	800
Between Zeerust Road and Trewins Road	5,200	5,500	5,900	6,800	7,700	800	900	1,000	1,100	1,300
Midland Highway										

Road name	Two-Way Daily (24-hour) All Vehicles					Two-Way Daily (24-hour) Heavy Vehicles				
	2011	2016	2021	2031	2041	2011	2016	2021	2031	2041
Between Downer Road and Turnbull Road	7,000	7,400	8,000	9,200	10,500	1,000	1,100	1,100	1,400	1,500
Near Kidstown Adventure Playground (on causeway)	29,200	29,900	31,300	35,900	39,100	2,700	2,900	3,000	5,500	6,100
Between Goulburn Valley Highway and Maude Street	16,200	16,600	17,200	19,100	20,100	2,500	2,500	2,500	3,600	4,000
Between Doyles Road and Orrvale Road	5,300	5,500	5,700	6,400	7,000	800	800	800	1,000	1,100
Shepparton Alternative Route										
Between Archer Road and Central Kialla Road	2,700	2,900	3,300	3,700	4,400	1,400	1,500	1,600	1,800	2,000
Between Poplar Avenue and Midland Highway	6,200	7,600	7,900	8,200	11,500	1,700	1,800	1,900	2,000	2,200
Between New Dookie Road and Ford Road	5,000	5,300	5,400	6,200	7,100	1,600	1,700	1,700	1,800	2,000
Between Knights Road and Goulburn Valley Highway	3,300	3,500	4,100	4,400	5,600	1,300	1,400	1,500	1,600	1,800
Other Links										
Wanganui Road between Shepparton Bypass and GVH	2,000	2,200	2,400	2,600	2,900	100	100	100	100	100
Ford Road between GVH and Shepparton Alternative Route	2,600	3,000	3,400	4,100	5,100	400	400	300	400	500
Ford Road between Verney and Grahamvale Road	2,200	2,300	2,400	2,800	3,500	300	300	300	400	500
Katamatite-Shepparton Road at Congupna	4,500	4,800	5,100	5,800	6,600	900	1,000	1,100	1,200	1,400
Shepparton-Barmah Road North West of Shepparton Bypass	2,300	2,500	2,700	3,200	3,600	300	300	300	400	400
Echuca-Mooroopna Road North West of Shepparton Bypass	4,200	4,500	4,900	5,500	6,300	600	600	600	800	900
Mooroopna-Murchison Road South West of Shepparton Bypass	4,700	4,900	5,300	6,000	6,700	500	500	600	700	800
Shepparton Bypass (applies to options 6-8 only)										
Between Goulburn Valley Highway and River Road	0	0	0	0	0	0	0	0	0	0

3.2 Stage 1A

Figure 8 and Figure 9 illustrate the magnitude of forecast daily traffic volumes in 2041 across the road network under Option 1A, as well as the difference in one way traffic volumes when compared to the 2041 base case. Figure 10 and Figure 11 illustrate a similar picture for heavy vehicle volumes. Table 6 provides further detail on these, with a summary of existing and forecast two way daily traffic volumes along key roads in the study area, including the bypass.

Using the above information, the following inferences can be made:

- Shepparton Bypass between Wanganui Road west of Goulburn Valley Highway, under Option 1A, is expected to carry up to 10,000 vehicles (two ways) including around 1,200 trucks per day by 2041.
- The greatest reductions in traffic on the existing road network with Option 1A in place (when compared to the 2041 base case) are expected along the Midland Highway causeway (reduction of around 8,600 vehicles per day)
- The greatest reductions in heavy vehicle traffic on the existing road network with Option 1A in place (when compared to the 2041 base case) are also expected along the Midland Highway causeway (reduction of around 900 trucks per day by 2041).

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Figure 8: 2041 Stage 1A one way traffic volumes ('000s) – All vehicles – Daily

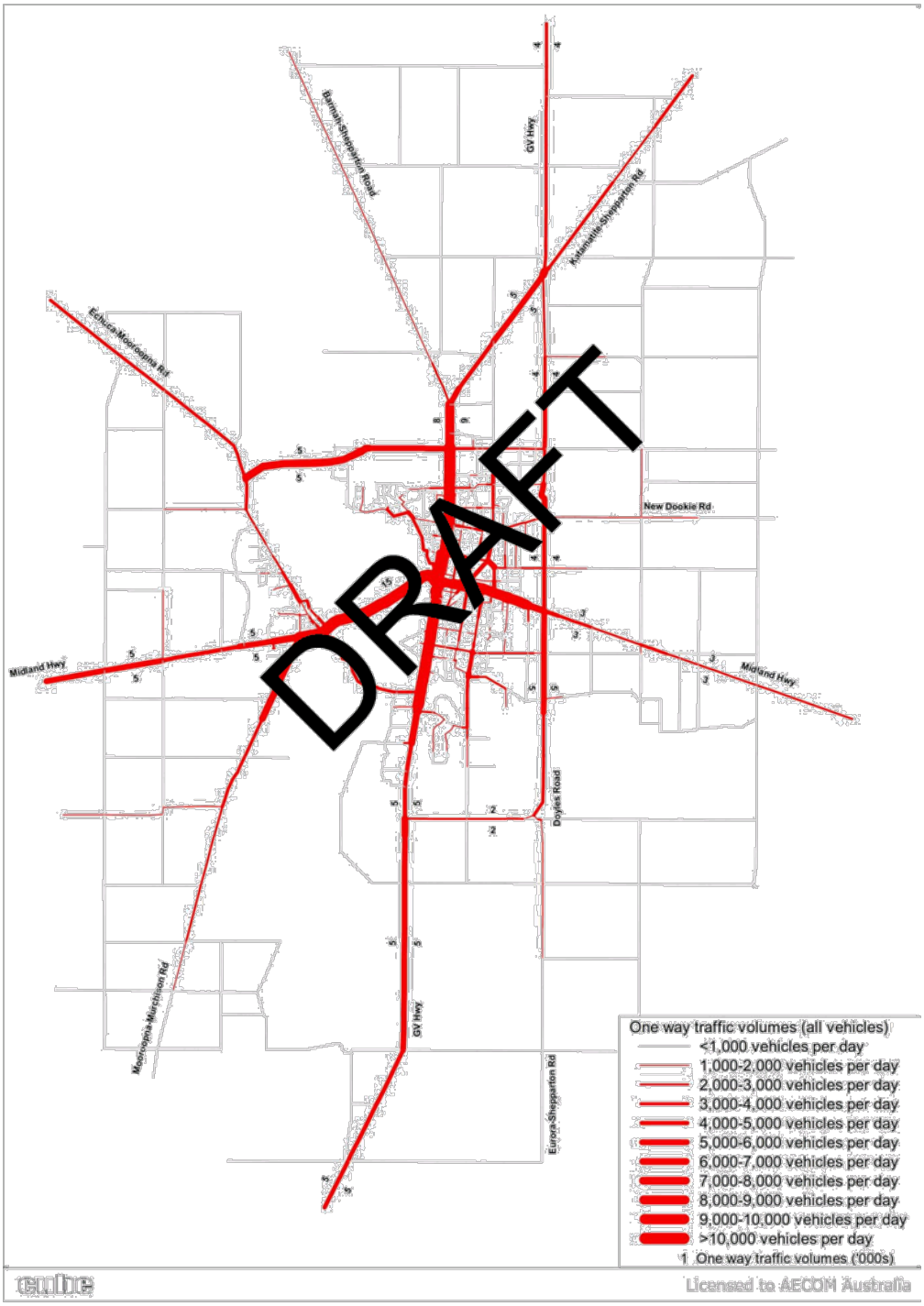

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Figure 9: Difference in daily (24-hour) traffic volumes between 2041 Stage 1A and 2041 Base Case – all vehicles

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Figure 10: 2041 Stage 1A one way traffic volumes ('000s) – Heavy vehicles – Daily

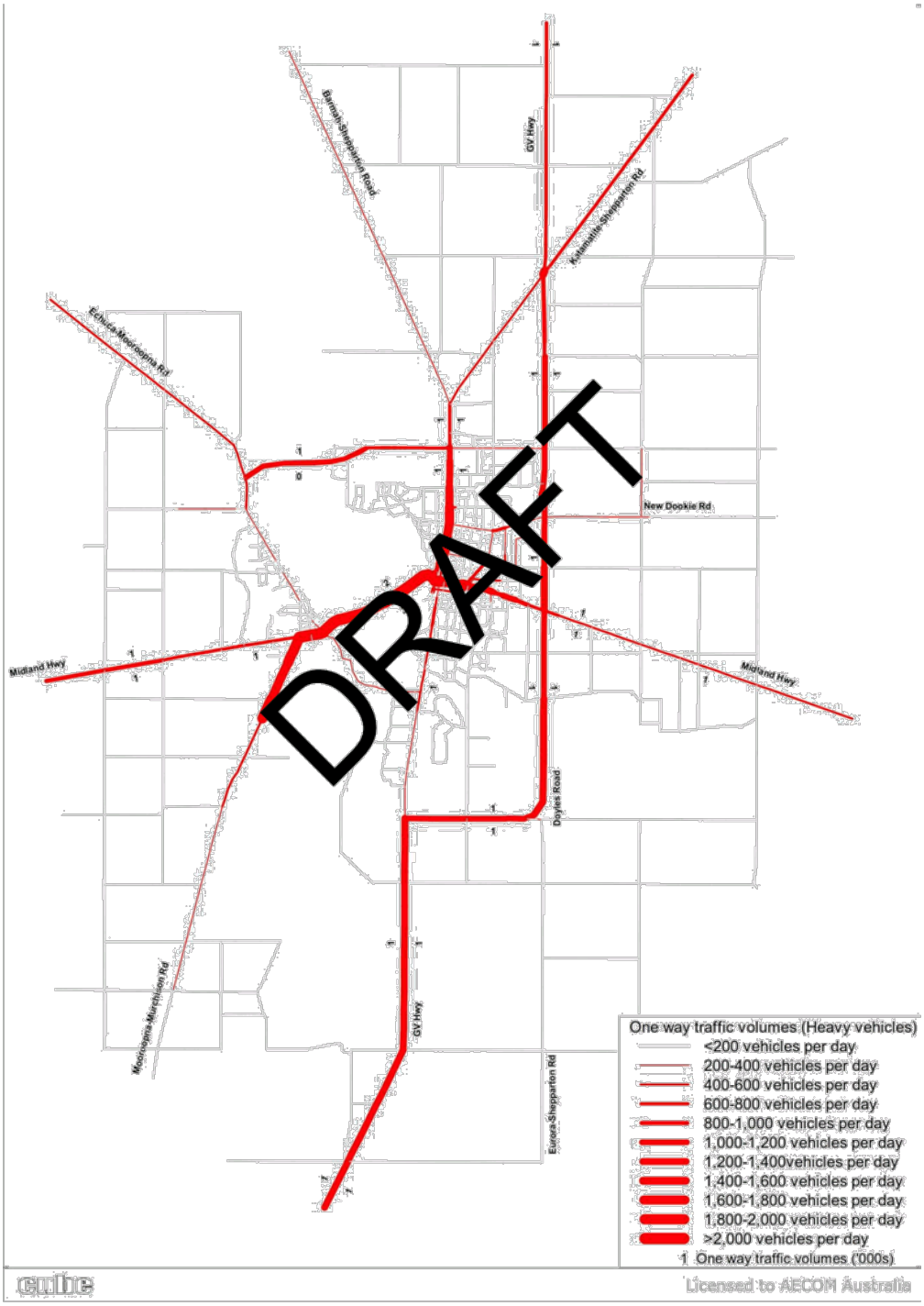

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Figure 11: Difference in daily (24-hour) traffic volumes between 2041 Stage 1A and 2041 Base Case – Heavy vehicles

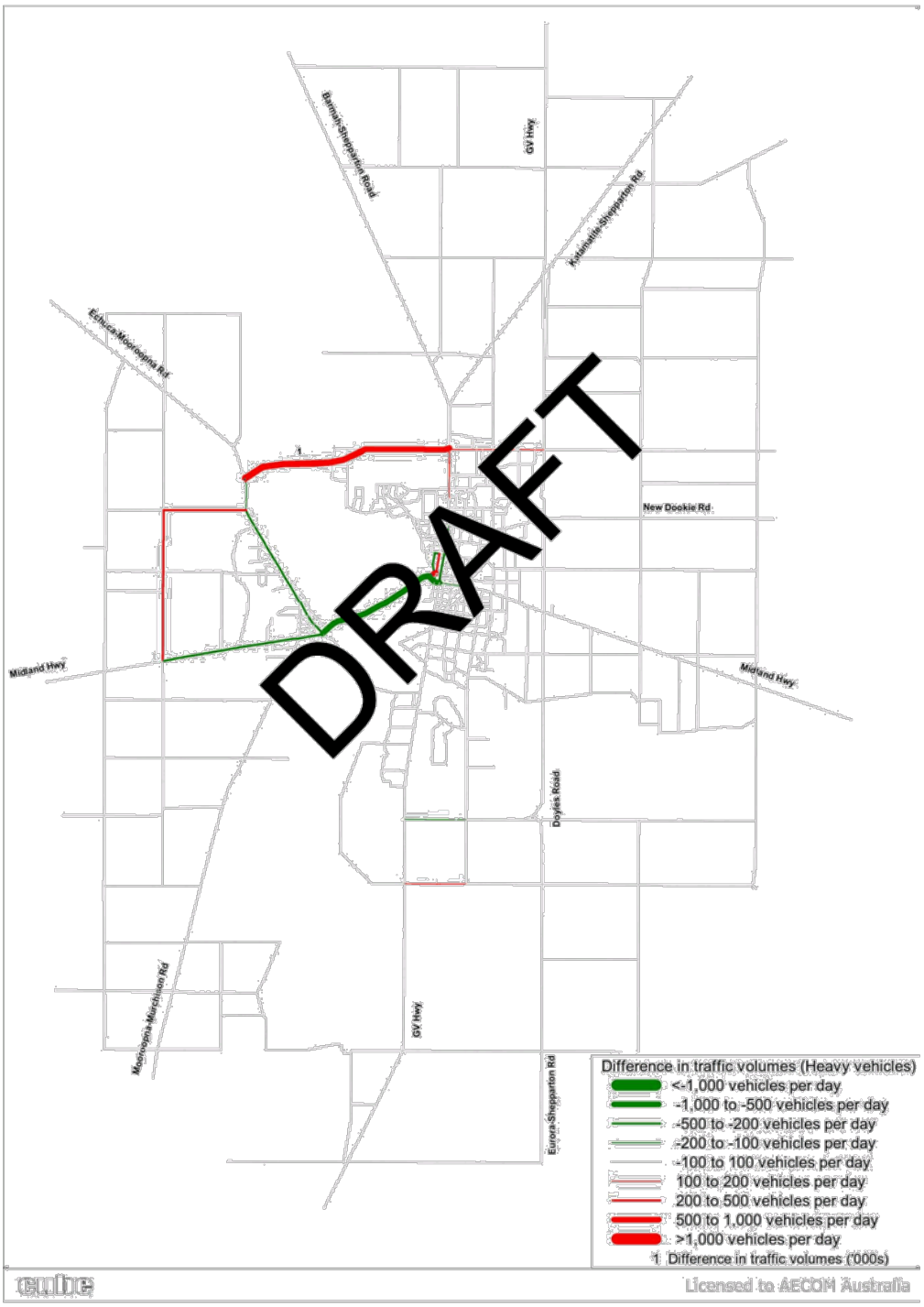

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Table 6: Stage 1A traffic volumes

Road name	Two-Way Daily (24-hour) All Vehicles					Two-Way Daily (24-hour) Heavy Vehicles				
	2011	2016	2021	2031	2041	2011	2016	2021	2031	2041
Shepparton Bypass										
Between Gribben Road and Bridge Road	0	0	0	0	0	0	0	0	0	0
Between Bridge Road and Mooroopna-Murchison Road	0	0	0	0	0	0	0	0	0	0
Between Mooroopna-Murchison Road and Midland Highway	0	0	0	0	0	0	0	0	0	0
Between Midland Highway and Echuca-Mooroopna Road	0	0	0	0	0	0	0	0	0	0
Between Echuca-Mooroopna Road and Wanganui Road	0	0	7,800	8,900	10,000	0	0	900	1,000	1,200
Between Wanganui Road and Shepparton-Barmah Road	0	0	0	0	0	0	0	0	0	0
Between Shepparton-Barmah Road and Goulburn Valley Highway	0	0	0	0	0	0	0	0	0	0
Goulburn Valley Highway										
Between Doyles Road and Karramomus Road	6,500	7,000	7,500	8,700	9,800	1,600	1,800	1,900	2,200	2,500
Between Union Road and Mitchell Road	7,100	7,600	8,100	9,300	10,500	1,700	1,800	2,000	2,300	2,600
Between River Road and Rafferty Road	6,200	6,100	6,500	8,600	9,200	400	400	400	500	600
Between Midland Highway and Fryers Street	9,200	10,800	11,500	13,600	15,100	600	700	700	800	900
Between Wanganui Road and Shepparton-Barmah Road	11,100	11,800	12,900	15,400	17,000	900	900	900	1,200	1,300
Between Shepparton-Barmah Road and Shepparton Alt. Route	7,200	7,600	7,800	9,300	10,100	500	600	600	700	800
Between Zeerust Road and Trewins Road	5,200	5,500	5,700	6,600	7,400	800	900	900	1,100	1,300
Midland Highway										
Between Downer Road and Turnbull Road	7,000	7,400	8,000	9,200	10,500	1,000	1,100	1,100	1,300	1,500
Near Kidstown Adventure Playground (on causeway)	29,200	29,900	24,300	28,200	30,500	2,700	2,900	2,200	4,600	5,100

Road name	Two-Way Daily (24-hour) All Vehicles					Two-Way Daily (24-hour) Heavy Vehicles				
	2011	2016	2021	2031	2041	2011	2016	2021	2031	2041
Between Goulburn Valley Highway and Maude Street	16,200	16,600	15,600	17,400	18,800	2,500	2,500	2,500	3,500	3,700
Between Doyles Road and Orrvale Road	5,300	5,500	5,600	6,300	6,900	800	800	800	1,000	1,100
Shepparton Alternative Route										
Between Archer Road and Central Kialla Road	2,700	2,900	3,300	3,700	4,400	1,400	1,500	1,600	1,800	2,000
Between Poplar Avenue and Midland Highway	6,200	7,600	8,100	8,300	11,700	1,700	1,800	2,000	2,000	2,200
Between New Dookie Road and Ford Road	5,000	5,300	5,700	6,200	7,500	1,600	1,700	1,700	1,900	2,100
Between Knights Road and Goulburn Valley Highway	3,300	3,500	3,900	4,300	5,500	1,300	1,400	1,400	1,600	1,800
Other Links										
Wanganui Road between Shepparton Bypass and GVH	2,000	2,200	8,900	10,000	11,400	100	100	1,000	1,100	1,300
Ford Road between GVH and Shepparton Alternative Route	2,600	3,000	4,300	5,200	6,700	400	400	500	600	700
Ford Road between Verney and Grahamvale Road	2,200	2,300	3,100	3,700	4,600	300	300	500	600	700
Katamatite-Shepparton Road at Congupna	4,200	4,800	5,100	5,800	6,600	900	1,000	1,100	1,200	1,400
Shepparton-Barmah Road North West of Shepparton Bypass	2,300	2,500	2,700	3,200	3,600	300	300	300	400	400
Echuca-Mooroopna Road North West of Shepparton Bypass	4,200	4,500	4,900	5,600	6,400	600	600	600	800	900
Mooroopna-Murchison Road South West of Shepparton Bypass	4,700	4,900	5,400	6,000	6,700	500	500	600	700	800
Shepparton Bypass (applies to options 6-8 only)										
Between Goulburn Valley Highway and River Road	0	0	0	0	0	0	0	0	0	0

3.3 Stage 1B

Figure 12 and Figure 13 illustrate the magnitude of forecast daily traffic volumes in 2041 across the road network under Option 1B, as well as the difference in one way traffic volumes when compared to the 2041 base case. Figure 14 and Figure 15 illustrate a similar picture for heavy vehicle volumes. Table 7 provides further detail on these, with a summary of existing and forecast two way daily traffic volumes along key roads in the study area, including the bypass.

The figures show that Option 1B carries very light traffic volumes of around 300 vehicles per day by 2041, and therefore does not produce any impact to the overall road network. This is due to an insignificant traffic demand between Echuca-Mooroopna Road and Midland Highway west.

Figure 12: 2041 Stage 1B one way traffic volumes ('000s) – All vehicles – Daily

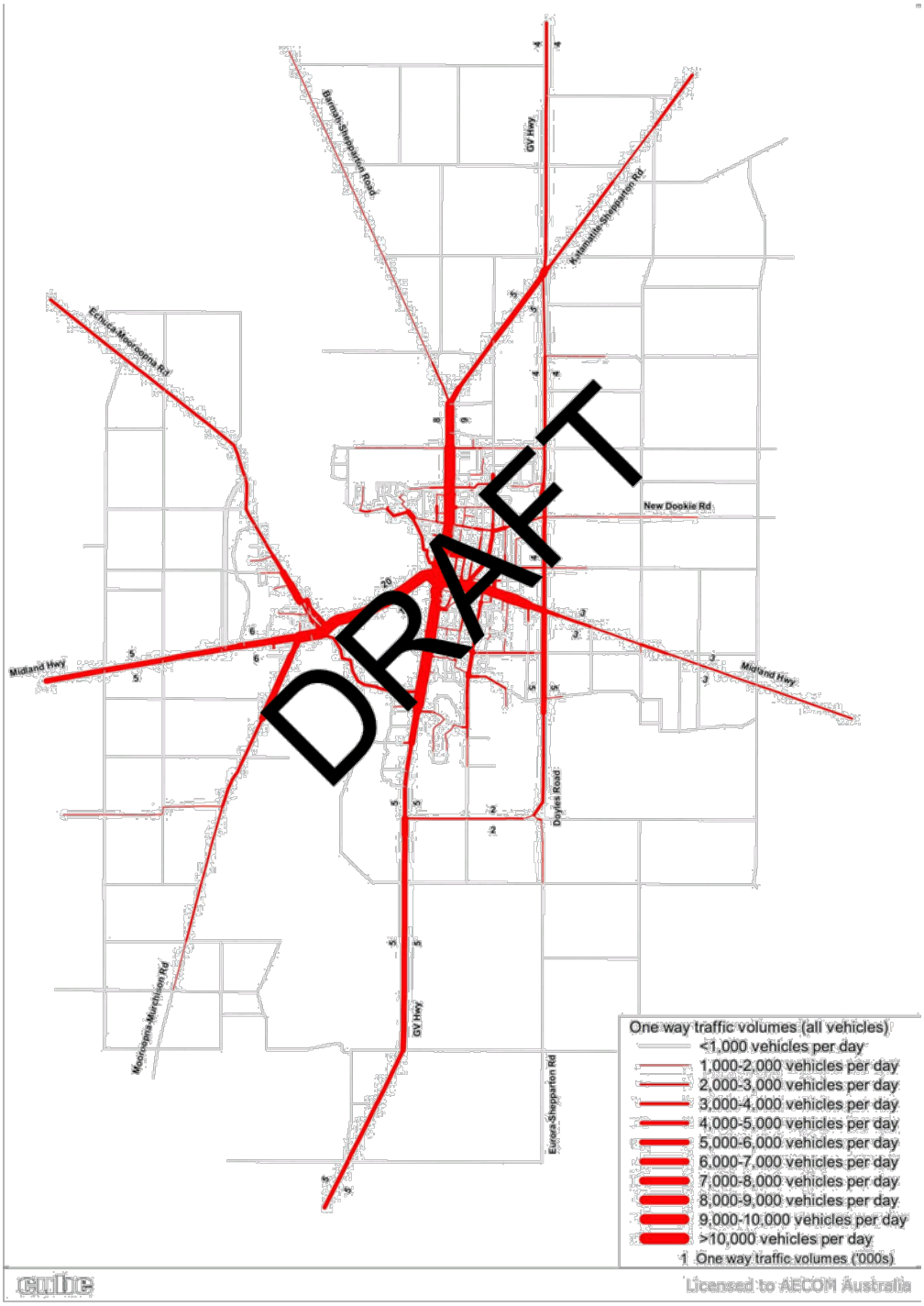

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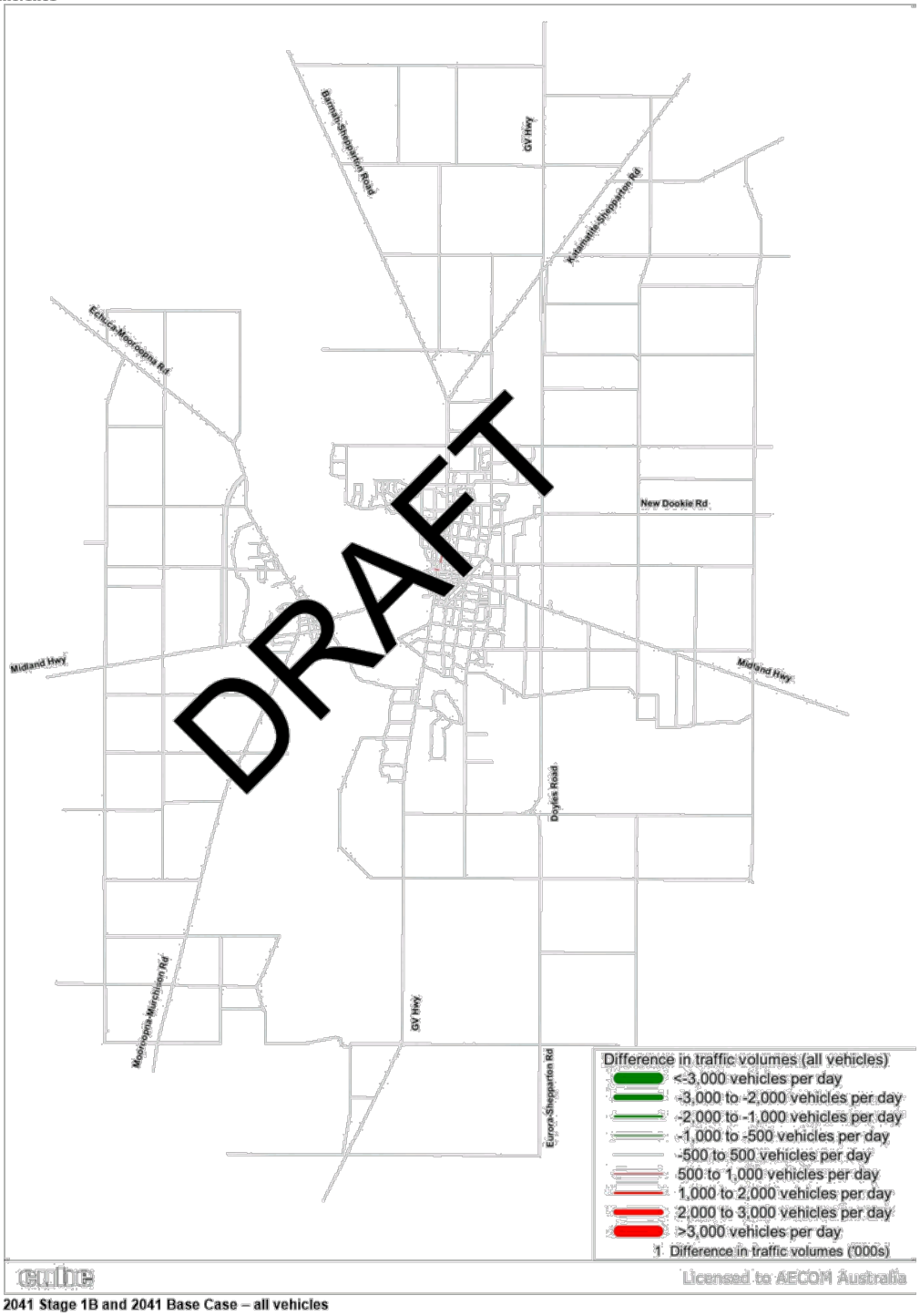
Figure 13: Difference



2041 Stage 1B and 2041 Base Case – all vehicles

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Figure 14: 2041 Stage 1B one way traffic volumes ('000s) – Heavy vehicles – Daily

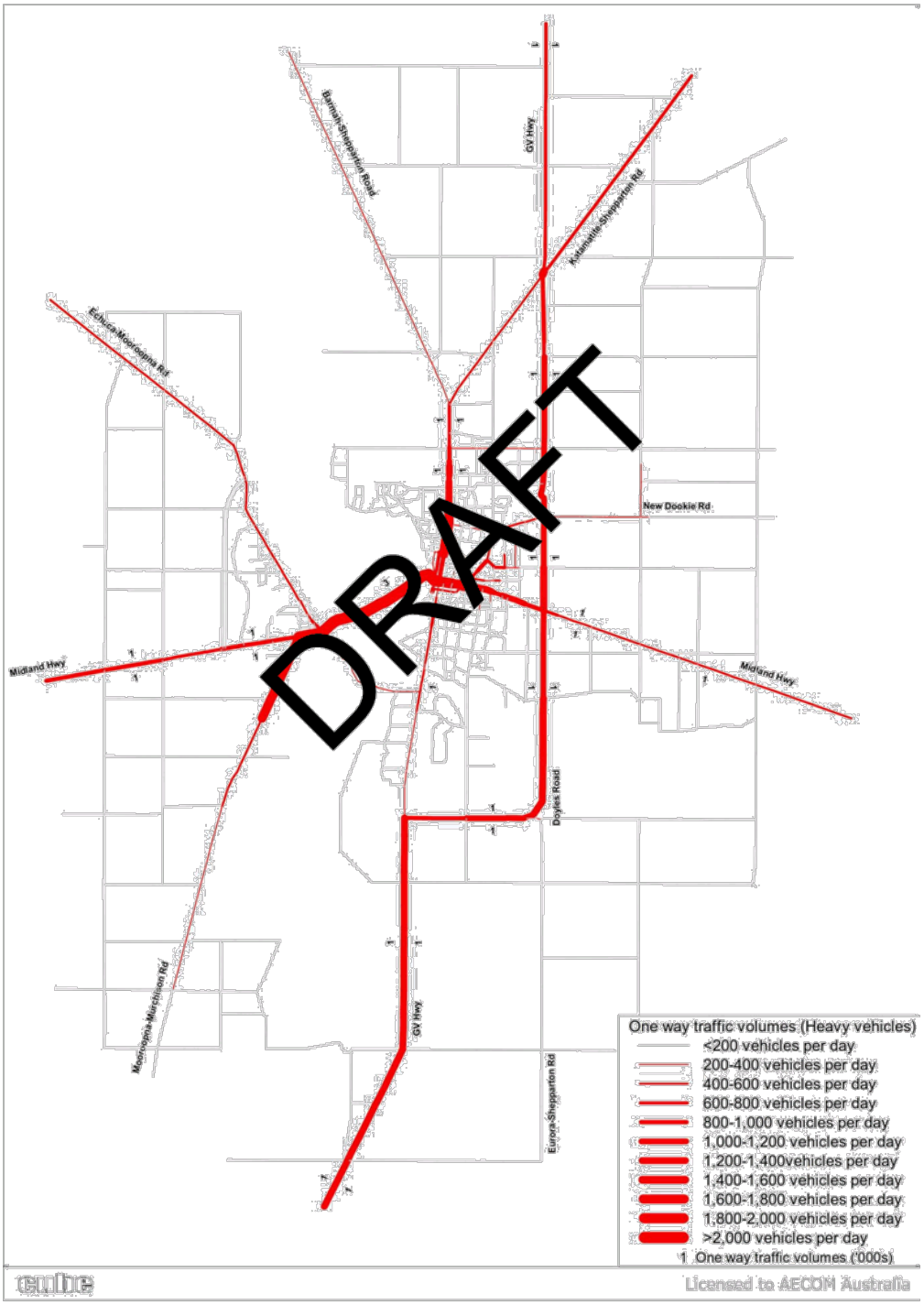

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Figure 15: Difference in daily (24-hour) traffic volumes between 2041 Stage 1B and 2041 Base Case – Heavy vehicles

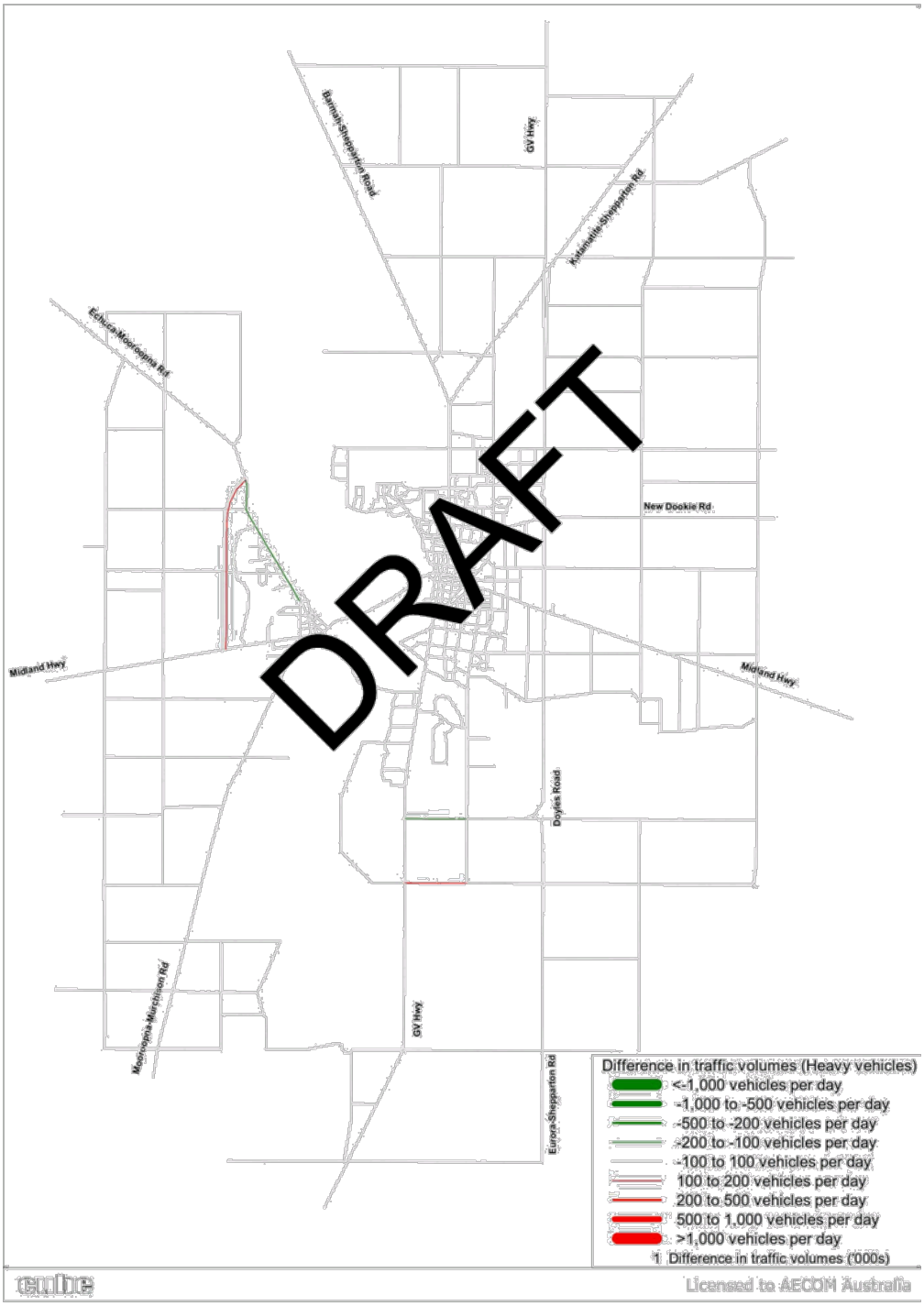

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Table 7: Stage 1B traffic volumes

Road name	Two-Way Daily (24-hour) All Vehicles					Two-Way Daily (24-hour) Heavy Vehicles				
	2011	2016	2021	2031	2041	2011	2016	2021	2031	2041
Shepparton Bypass										
Between Gribben Road and Bridge Road	0	0	0	0	0	0	0	0	0	0
Between Bridge Road and Mooroopna-Murchison Road	0	0	0	0	0	0	0	0	0	0
Between Mooroopna-Murchison Road and Midland Highway	0	0	0	0	0	0	0	0	0	0
Between Midland Highway and Echuca-Mooroopna Road	0	100	100	300	300	0	0	0	200	200
Between Echuca-Mooroopna Road and Wanganui Road	0	0	0	0	0	0	0	0	0	0
Between Wanganui Road and Shepparton-Barmah Road	0	0	0	0	0	0	0	0	0	0
Between Shepparton-Barmah Road and Goulburn Valley Highway	0	0	0	0	0	0	0	0	0	0
Goulburn Valley Highway										
Between Doyles Road and Karramomus Road	6,500	7,500	7,500	8,700	9,800	1,600	1,900	1,900	2,200	2,500
Between Union Road and Mitchell Road	7,100	8,100	8,100	9,300	10,500	1,700	1,900	1,900	2,300	2,600
Between River Road and Rafferty Road	6,200	6,600	6,600	8,700	9,300	400	400	400	500	600
Between Midland Highway and Fryers Street	9,200	11,400	11,400	13,800	14,900	600	800	800	1,100	1,700
Between Wanganui Road and Shepparton-Barmah Road	11,100	12,900	12,900	15,500	17,100	900	900	900	1,200	1,300
Between Shepparton-Barmah Road and Shepparton Alt. Route	7,200	7,800	7,800	9,400	10,100	500	600	600	700	800
Between Zeerust Road and Trewins Road	5,200	5,700	5,700	6,600	7,400	800	900	900	1,100	1,300
Midland Highway										
Between Downer Road and Turnbull Road	7,000	8,000	8,000	9,200	10,500	1,000	1,100	1,100	1,400	1,500
Near Kidstown Adventure Playground (on causeway)	29,200	31,300	31,300	35,900	39,100	2,700	3,000	3,000	5,500	6,100

Road name	Two-Way Daily (24-hour) All Vehicles					Two-Way Daily (24-hour) Heavy Vehicles				
	2011	2016	2021	2031	2041	2011	2016	2021	2031	2041
Between Goulburn Valley Highway and Maude Street	16,200	17,300	17,300	19,300	20,100	2,500	2,500	2,500	3,600	3,900
Between Doyles Road and Orrvale Road	5,300	5,600	5,600	6,300	6,900	800	800	800	1,000	1,100
Shepparton Alternative Route										
Between Archer Road and Central Kialla Road	2,700	3,300	3,300	3,700	4,400	1,400	1,600	1,600	1,800	2,000
Between Poplar Avenue and Midland Highway	6,200	8,000	8,000	8,200	11,400	1,700	1,900	1,900	2,000	2,200
Between New Dookie Road and Ford Road	5,000	5,400	5,400	5,800	7,000	1,600	1,700	1,700	1,800	2,000
Between Knights Road and Goulburn Valley Highway	3,300	3,900	3,900	4,200	5,400	1,300	1,400	1,400	1,600	1,800
Other Links										
Wanganui Road between Shepparton Bypass and GVH	2,000	2,400	2,400	2,600	2,900	100	100	100	100	100
Ford Road between GVH and Shepparton Alternative Route	2,600	3,400	3,400	4,100	5,200	400	300	300	400	500
Ford Road between Verney and Grahamvale Road	2,200	2,400	2,400	2,800	3,500	300	300	300	400	500
Katamatite-Shepparton Road at Congupna	4,200	5,100	5,100	5,800	6,600	900	1,100	1,100	1,200	1,400
Shepparton-Barmah Road North West of Shepparton Bypass	2,300	2,700	2,700	3,200	3,600	300	300	300	400	400
Echuca-Mooroopna Road North West of Shepparton Bypass	4,200	4,900	4,900	5,500	6,300	600	600	600	800	900
Mooroopna-Murchison Road South West of Shepparton Bypass	4,700	5,300	5,300	6,000	6,700	500	600	600	700	800
Shepparton Bypass (applies to options 6-8 only)										
Between Goulburn Valley Highway and River Road	0	0	0	0	0	0	0	0	0	0

3.4 Stage 1A&B

Figure 16 and Figure 17 illustrate the magnitude of forecast daily traffic volumes in 2041 across the road network under Option 1A&B, as well as the difference in one way traffic volumes when compared to the 2041 base case. Figure 18 and Figure 19 illustrate a similar picture for heavy vehicle volumes. Table 8 provides further detail on these, with a summary of existing and forecast two way daily traffic volumes along key roads in the study area, including the bypass.

Using the above information, the following inferences can be made:

- Shepparton Bypass between Echuca-Mooroopna Road and Wanganui Road is expected to carry up to 11,200 vehicles (two ways) including around 1,400 trucks per day by 2041.
- The greatest reductions in traffic on the existing road network with Option 1A&B in place (when compared to the 2041 base case) are expected along the Midland Highway causeway (reduction of around 9,700 vehicles per day)
- The greatest reductions in heavy vehicle traffic on the existing road network with Option 1A&B in place (when compared to the 2041 base case) are also expected along the Midland Highway causeway (reduction of around 1,200 trucks per day by 2041).

Figure 16: 2041 Stage 1AB one way traffic volumes ('000s) – All vehicles – Daily

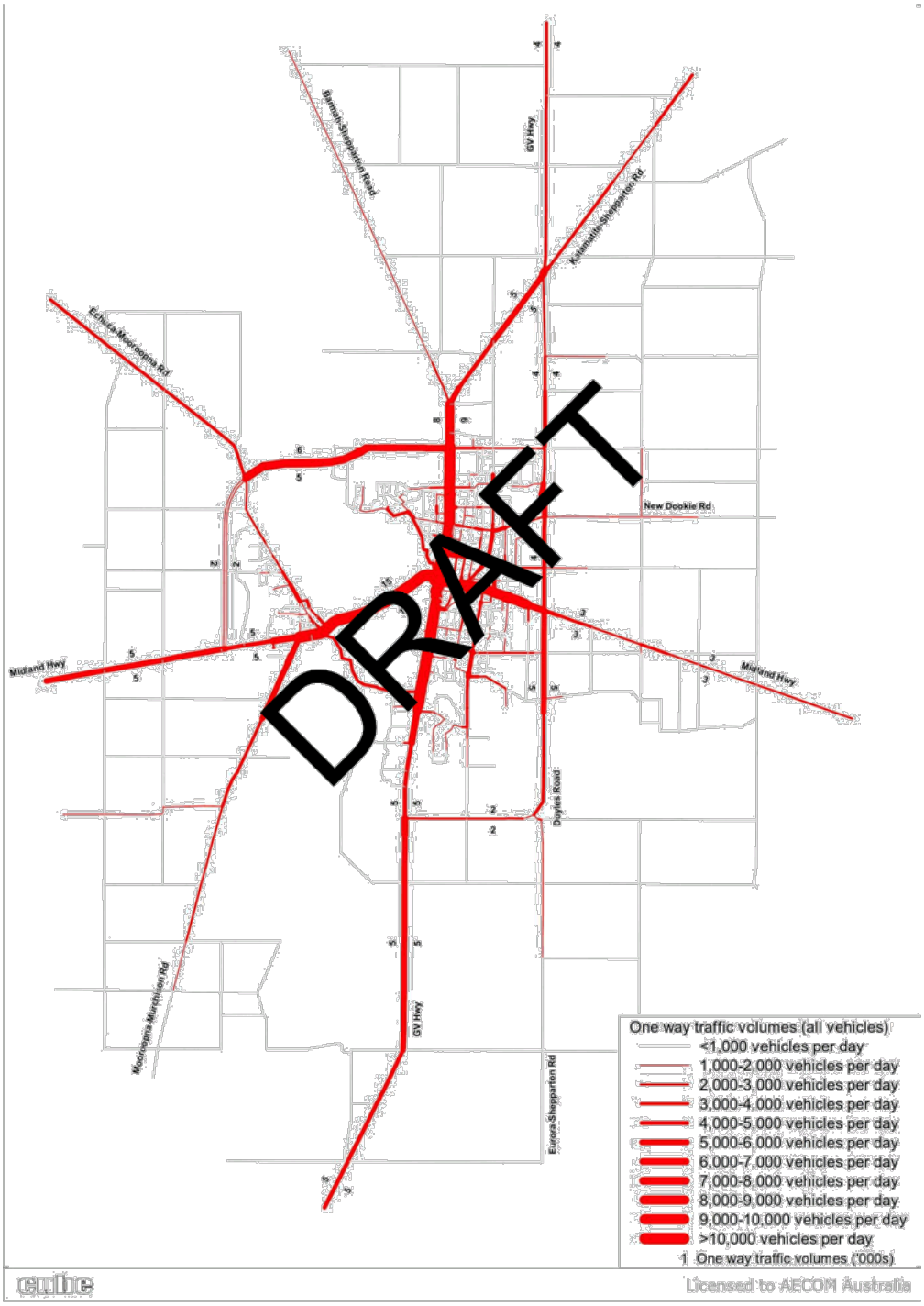

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Figure 17: Difference in daily (24-hour) traffic volumes between 2041 Stage 1AB and 2041 Base Case – all vehicles

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Figure 18: 2041 Stage 1AB one way traffic volumes ('000s) – Heavy vehicles – Daily

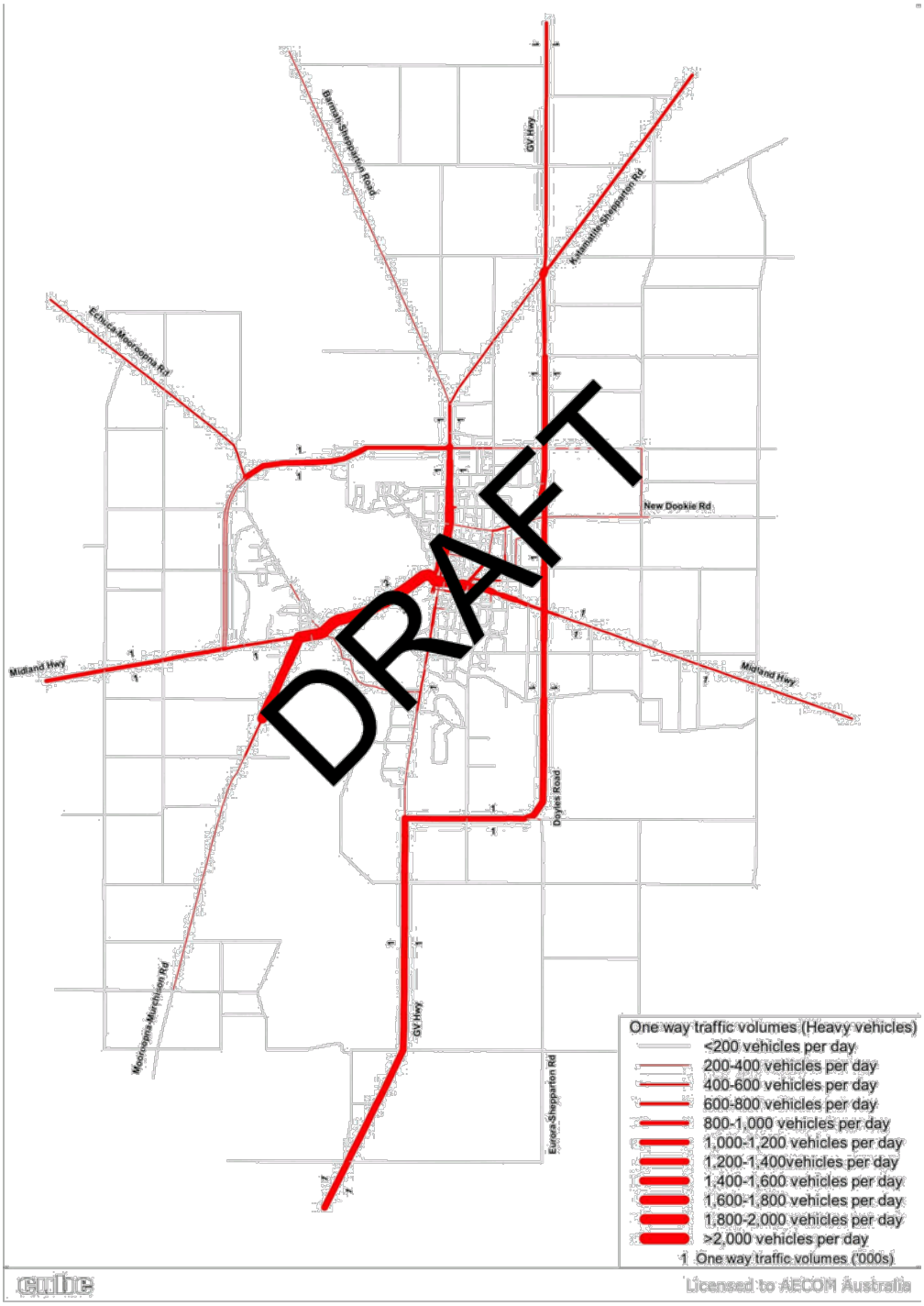

Figure 19: Difference in daily (24-hour) traffic volumes between 2041 Stage 1AB and 2041 Base Case – Heavy vehicles

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Table 8: Stage 1AB traffic volumes

Road name	Two-Way Daily (24-hour) All Vehicles					Two-Way Daily (24-hour) Heavy Vehicles				
	2011	2016	2021	2031	2041	2011	2016	2021	2031	2041
Shepparton Bypass										
Between Gribben Road and Bridge Road	0	0	0	0	0	0	0	0	0	0
Between Bridge Road and Mooroopna-Murchison Road	0	0	0	0	0	0	0	0	0	0
Between Mooroopna-Murchison Road and Midland Highway	0	0	0	0	0	0	0	0	0	0
Between Midland Highway and Echuca-Mooroopna Road	0	2,300	2,400	2,700	3,400	0	400	400	500	600
Between Echuca-Mooroopna Road and Wanganui Road	0	8,000	8,500	9,600	11,200	0	1,000	1,000	1,200	1,400
Between Wanganui Road and Shepparton-Barmah Road	0	0		0	0	0	0	0	0	0
Between Shepparton-Barmah Road and Goulburn Valley Highway	0	0	0	0	0	0	0	0	0	0
Goulburn Valley Highway										
Between Doyles Road and Karramomus Road	6,500	7,000	[illegible]	8,700	9,800	1,600	1,800	1,900	2,200	2,500
Between Union Road and Mitchell Road	7,100	7,[illegible]	8,[illegible]	9,300	10,500	1,700	1,800	2,000	2,300	2,600
Between River Road and Rafferty Road	6,200	6,10[illegible]	[illegible]90	8,700	9,300	400	400	400	500	600
Between Midland Highway and Fryers Street	10,200	[illegible],000	11,600	13,700	15,100	600	600	700	800	900
Between Wanganui Road and Shepparton-Barmah Road	11,[illegible]	[illegible]900	12,900	15,400	17,100	900	900	900	1,200	1,300
Between Shepparton-Barmah Road and Shepparton Alt. Route	7,200	7,700	7,800	9,300	10,100	500	600	600	700	800
Between Zeerust Road and Trewins Road	5,2[illegible]	5,400	5,700	6,600	7,400	800	900	900	1,100	1,300
Midland Highway										
Between Downer Road and Turnbull Road	7,00[illegible]	7,400	8,100	9,200	10,500	1,000	1,100	1,100	1,300	1,500
Near Kidstown Adventure Playground (on causeway)	29,[illegible]00	22,600	23,500	27,300	29,400	2,700	1,900	2,100	4,400	4,900
Between Goulburn Valley Highway and Maude Street	16,200	14,800	15,500	17,200	18,500	2,500	2,300	2,500	3,500	3,600
Between Doyles Road and Orrvale Road	5,300	5,500	5,600	6,300	6,900	800	800	800	1,000	1,100
Shepparton Alternative Route										
Between Archer Road and Central Kialla Road	2,700	2,800	3,300	3,700	4,400	1,400	1,500	1,600	1,800	2,000
Between Poplar Avenue and Midland Highway	6,200	7,700	8,000	8,300	11,700	1,700	1,800	2,000	2,000	2,200
Between New Dookie Road and Ford Road	5,000	5,500	5,700	6,200	7,500	1,600	1,700	1,700	1,900	2,100
Between Knights Road and Goulburn Valley Highway	3,300	3,300	3,900	4,300	5,400	1,300	1,300	1,400	1,600	1,800
Other Links										

Road name	Two-Way Daily (24-hour) All Vehicles					Two-Way Daily (24-hour) Heavy Vehicles				
	2011	2016	2021	2031	2041	2011	2016	2021	2031	2041
Wanganui Road between Shepparton Bypass and GVH	2,000	8,900	9,600	10,800	12,500	100	1,100	1,100	1,300	1,500
Ford Road between GVH and Shepparton Alternative Route	2,600	4,100	4,500	5,400	7,100	400	600	500	700	800
Ford Road between Verney and Grahamvale Road	2,200	3,100	3,200	3,700	4,700	300	500	500	700	700
Katamatite-Shepparton Road at Congupna	4,500	4,800	5,100	5,800	6,600	900	1,000	1,100	1,200	1,400
Shepparton-Barmah Road North West of Shepparton Bypass	2,300	2,500	2,700	3,200	3,600	300	300	300	400	400
Echuca-Mooroopna Road North West of Shepparton Bypass	4,200	4,500	4,900	5,600	6,400	600	600	600	800	900
Mooroopna-Murchison Road South West of Shepparton Bypass	4,700	4,500	4,900	5,500	6,200	500	500	500	600	700
Shepparton Bypass (applies to options 6-8 only)										
Between Goulburn Valley Highway and River Road	0	0	0	0	0	0	0	0	0	0

4.0 Economic Assessment

The following section provides detail on the calculation and valuation of economic benefits, and the economic parameters used for the cost-benefit analysis. Details of all economic parameters used in this study are discussed in Appendix A.

4.1 Economic Parameters and Expansion Factors

A key parameter used to estimate travel time saving benefits is the value of travel time (VTT). The VTT for car and truck have been updated in this study based on the 2015 National Guidelines for Transport System Management. The Guidelines base the VTT on June 2013 values and these have been updated to the 2015 values by using the growth of average weekly earnings for a full time adult in Victoria.

The other economic parameters and expansion factors used in the analysis are shown in Table 9.

Table 9: Economic parameters and expansion factors

Parameter	Value	Comment
Discount rate	5.00%	New rate to be applied for all transport projects for funding in 2017/12 budget cycle
First year of construction	2016	
Last year of construction	2022	
Opening year	2023	Year in which traffic is expected to begin using the road
Appraisal period	30 years from opening year	
Base year for discounting	2016	Year in which first capital cost expenditure is incurred
Price base	20	

Three time periods were modelled within the Shepparton Bypass Strategic Transport Model – the AM Peak, PM Peak and Off Peak. When added together these trips represent the whole 24 hour period. Therefore an expansion factor of one is used for each time period to calculate average weekday benefits. A different set of expansion factors has been derived from traffic count data for weekend (days) and public holidays. The factors used are shown in Table 10 and Table 11.

Table 10: Modelling period to daily expansion factors (car)

Modelling period	Weekday expansion factor	Weekend day/public holiday expansion factor
AM	1	0
PM	1	0
Off Peak	1	1.2

Source: AECOM calculation based on traffic counts

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Table 11: Modelling period to daily expansion factors (heavy vehicles)

Modelling period	Weekday expansion factor	Weekend day/public holiday expansion factor
AM	1	0
PM	1	0
Off Peak	1	0.6

Source: AECOM calculation based on traffic counts

To calculate annual benefits, we have applied the factors shown in Table 12 to convert the average weekday and average weekend day totals to yearly totals.

Table 12: Daily to annual expansion factors

Day type	Daily to annual expansion factor
Weekday	252
Weekend and public holiday	112

Source: AECOM assumption, based upon 260 workdays less 8 public holiday

4.2 Economic Costs

4.2.1 Capital costs

The total construction costs of each stage were provided by Greater Shepparton City Council in Table 13 below.

Table 13: Construction costs

Options	Construction costs ($ millions)
Stage 1A	140
Stage 1B	100
Stage 1A and 1B	240
Ford Road Upgrade[1] (3 lane option)	24.6

[1] Ford Road Upgrade – Goulburn Valley Highway to Grahamvale Road

The cost of the Ford Road upgrade was added to Stage 1A, 1B and 1A and 1B together. Total capital costs are expected to be spread across seven years of construction as shown in Table 14 in a profile similar to the previous study. Note that these costs exclude 'real' construction cost escalation, so construction costs are assumed to increase in line with CPI.

Table 14: Capital cost expenditure profile (un-escalated), all values in $ millions

Financial year	Spending Profile	Option 1	Option 2	Option 3
2016	16%	$25.6	$19.4	$41.2
2017	18%	$29.0	$22.0	$46.6
2018	18%	$29.9	$22.7	$48.1
2019	17%	$28.4	$21.5	$45.7
2020	15%	$24.5	$18.5	$39.3
2021	11%	$18.0	$13.6	$29.0
2022	6%	$9.1	$6.9	$14.7
Total	**100%**	$164.6	$124.6	$264.6

4.2.2 Operating and maintenance costs

Operating and maintenance costs (including annual maintenance and periodic rehabilitation/asset renewal) for the roadway were derived from *Review of asset preservation costs* (ARRB Ltd 2009). This study collected maintenance and rehabilitation costs from VicRoads to calculate the annual road preservation costs. From this information, it was estimated an average operating and maintenance cost of $8,000 per lane and per km. Cost modifiers were assumed to be the same as that were used in the 2012 Shepparton study to take into account conditions that would lead to higher than average maintenance costs. For this assessment we have used the maximum cost modifier factor of 1.45 for rural roads to be conservative. The operating costs were then updated to December 2015 value by applying an appropriate CPI index, and the results are shown in Table 15.

Several options contain significant structural works such as bridges and overpasses which are not accounted for in the average preservation costs calculated by ARRB. The annual maintenance costs for these assets have been estimated using 1% of the capital cost of the structural assets.

Table 15: Operating and maintenance costs of roadway

Road Type	Operating and Maintenance Costs (2015)
Cost per lane km	$14,500 per lane km per year

4.3 Economic Benefits

The following benefits have been calculated:

- Road user benefits, including:
  - travel time savings
  - vehicle operating cost savings.
- Non-user benefits (or externality cost savings), including:
  - crash cost savings
  - greenhouse gas emission savings
  - other environmental externality savings (such as air and noise pollution).

Benefits have been calculated using the outputs from the transport model for the Base Case and Options over the AM Peak, PM Peak and Off Peak time periods.

4.4 Economic Results

The results of the economic assessment are shown in Table 16. Option 1A&B, with the inclusion of the Ford Road upgrade, provides the greatest benefits,

Option 1A has the highest Benefit Cost Ratio (BCR) as it generates significant travel time savings relative to its construction costs. Option 1B has the lowest benefits as it represents an isolated option without connection to Goulburn Valley Highway, and the Ford Road upgrade. Furthermore, this option does not provide an attractive alternative to parallel routes such as Echuca Rd or Turnbull Road. Option 1A&B has a BCR of 0.37, which is lower than Option 1A, as the combined benefits increase by only 12% while its costs increase by 58% under this option.

Table 16: Results of the economic assessment

Option	Option 1A	Option 1B	Option 1A&B
Present Value of Costs			
Capital costs ($m)	146.0	110.5	234.7
Operating and maintenance costs ($m)	9.6	2.5	11.3
Present Value of Benefits			
User Benefits			
Vehicle travel time savings ($m)	53.1	1.3	60.0
Vehicle operating cost savings ($m)	14.2	0.4	15.6
Externalities Savings			
Crash cost savings ($m)	-0.[illegible]	[illegible].0	-0.2
CO_2 savings ($m)	[illegible].9	[illegible].0	2.0
Environmental externality savings ($m)	11.[illegible]	0.5	13.1
Overall			
Present value of total costs ($m)	[illegible]5.6	113.0	246.0
Present value of total benefits ($m)	80.8	2.2	90.4
Net Present Value ($m)	-74.8	-110.8	-155.5
Benefit Cost Ratio	0.52	0.02	0.37

4.5 Sensitivity Tests

Table 17 shows the results of the sensitivity tests. A 20% increase in the value of time for both private and heavy vehicles improved the Net Present Value (NPV) and Benefit Cost Ratio (BCR) of all options due to the increase in travel time savings. The lower discount rate of 4% improved the results more than any other sensitivity test; however, due to the large difference between costs and benefits for all options, the sensitivity tests did not change the overall results significantly.

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Table 17: Results of sensitivity tests

Sensitivity Test	Option 1A	Option 1B	Option 1A&B
Standard Results			
Net Present Value ($m)	-74.8	-110.8	-155.5
Benefit Cost Ratio	0.52	0.02	0.37
Discount Rate of 4%			
Net Present Value ($m)	-63.6	-113.3	-144.7
Benefit Cost Ratio	0.60	0.02	0.43
Discount Rate of 6%			
Net Present Value ($m)	-83.3	-108.4	-163.3
Benefit Cost Ratio	0.45	0.02	0.32
Value of time + 20%			
Net Present Value ($m)	-65.2	-110.6	-144.5
Benefit Cost Ratio	0.58	0.02	0.41
Value of time -20%			
Net Present Value ($m)	-84.5	-111.0	-166.4
Benefit Cost Ratio	0.46	0.0	0.32

5.0 Conclusions

This report presents an updated Strategic Transport Model for Greater Shepparton and the applies the Model to assess the traffic and economic impacts of three Goulburn Valley Highway bypass options.

This study has updated the strategic transport model for Greater Shepparton in the following areas.

- The demographic data for the base and all future years were updated with the VIF2014.
- The traffic growth rates at the external cordon of the model were updated in line with the population and employment growth rates.
- The special traffic generators in the model were reviewed and unchanged, except that the Goulburn Valley Freight Logistics Centre was assumed to be opened in 2031 rather than 2021 as advised by Council.
- The road networks were updated with the three options for the Bypass. It was also assumed that Ford Road would be upgraded to be aligned with the proposed bypass at this location, and this was included in the economic evaluation process.

The traffic analysis indicated that Option 1B in isolation would attract very low traffic volumes because it represents an option without connections to Goulburn Valley Highway and Ford Road upgrade. Option 1A&B would attract the highest traffic volume and therefore relieve more traffic on the Midland Highway and Goulburn Valley Highway and within the city centre than the other two options.

The report provides an economic evaluation for all three options using economic evaluation parameters updated to 2015 prices. A sensitivity analysis was conducted by varying some economic parameters.

The economic evaluation indicates that all three options have a benefit cost ratio (BCR) less than 1, with Option 1A providing the highest BCR and Option 1B providing the lowest.

Appendix A

Economic Parameters

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Appendix A Economic Parameters

Travel Time Savings

Light Vehicles

Travel time savings were assessed on a person-trip level using vehicle occupancies specified within the Model for each time period.

Using the Model outputs, the cost of travel time between each origin and destination pair was calculated in the Base and Project Case in each time period, as well as the consumer surplus resulting from the change in travel time. These travel times were calculated separately for two trip purposes: in-work trips (i.e. undertaken on employers' business) and other light vehicle trips (including commuting, shopping and leisure trips).

The value of in-work travel time is significantly higher than that for non-work travel time, since these represent a cost to the economy rather than an individual's 'willingness to pay'. The values of time per person (sourced from (Transport and Infrastructure Council, 2015) are shown in Table 18.

Table 18: Values of travel time per person

Trip type	Value of travel time per person (per hour)	
	(June 2015)	(Nov 2015)
Non-work trips (commuting and other)	$14.99	$15.84
In-work trips	$48.63	$51.37

Source: (Transport and Infrastructure Council, 2015)

Values have been pro-rated to Nov 2015 using the change in average weekly earnings (ABS, 2016)

Heavy Vehicles

The Shepparton Model doesn't disaggregate heavy vehicles into rigid and articulated trucks, which is required due to the different values of travel time. This has therefore been undertaken using the Vehicle Kilometres Travelled (VKT) for rigid and articulated trucks in Victoria (ABS Survey of Motor Vehicle Users, 2010). This breakdown is shown in Table 19.

Table 19: Proportion of rigid and articulated heavy vehicles

Vehicle Type	Proportion of heavy vehicles
Rigid Heavy Vehicles	52.5%
Articulated Heavy Vehicles	47.5%

The value of travel time for heavy vehicles is estimated using a combination of the driver's value of time and the value of time of the freight, as shown in Table 20. As large articulated heavy vehicles carry larger payloads than rigid heavy vehicles the proportion of travel time value attributed to freight time is also significantly higher.

Using these parameters and the Model outputs, the cost of travel time between each origin and destination pair was calculated for rigid and articulated vehicles separately in the Base and Project Case. These costs were then used to calculate the consumer surplus using the methodology.

Table 20: Value of travel time (VTT) for heavy vehicles

Vehicle Type	Driver VTT (Per Hour)	Payload VTT (Per Hour)	Total VTT (Per Hour)
Rigid Heavy Vehicles	$27.17	$4.41	$31.58
Articulated Heavy Vehicles	$28.32	$41.42	$69.75

Source: (Transport and Infrastructure Council, 2015) Driver time values have been pro-rated to Nov 2015 using the change in average weekly earnings (ABS, 2016). Payload time values have been pro-rated to Nov 2016 using CPI (ABS, 2016).

Vehicle Operating Costs

Operating costs of vehicles, such as fuel and maintenance, are related to the speeds travelled on the network and differ by vehicle type. For each origin-destination pair in the network, the average travel speed (km/h) was determined from the model using the distance and travel time. The non-fuel vehicle operating cost (cents/km) and fuel usage (l/100km) for each origin-destination pair could then be determined through the use of the following equation:

$$c = A + \frac{B}{V} + CV + DV^2$$

where:

c = non-fuel vehicle operating cost (cents/km) parameter, fuel usage (l/100km) parameter
A, B, C, D = model coefficients
V = average speed (km/hr)

The values of the model coefficients are shown in Table 21 and Table 22. As can be seen, the model coefficients differ by vehicle type. Fuel usage was converted to monetary value using the current resource cost of fuel.

Table 21: Model coefficients for non-fuel vehicle operating costs (c/km)

Vehicle Type	Coefficients			
	A	B	C	D
Light vehicle (in-work)	1.598	579.148	0.049680031	0.00011887
Light vehicle (non-work)	1.598	0	0	0
Rigid heavy vehicles	14.557	5082.718	0.616632478	-0.000667607
Articulated heavy vehicles	21.645	3466.603	0.525873662	-0.000852921

Source: AECOM analysis, based upon (Austroads, 2008). Coefficients have been adjusted to 2015 levels using CPI (ABS, 2016)

Table 22: Model coefficients for fuel usage (l/100km)

Vehicle Type	Coefficients			
	A	B	C	D
All light vehicle	0.863	542.92	0.01333	0.000585
Rigid heavy vehicles	-7.445	1893.84	0.12777	0.000974
Articulated heavy vehicles	-14.839	3579.6	0.22244	0.001167

Source: (Austroads, 2008)

The 'A' parameter for non-fuel vehicle operating costs represents the costs of oil, tyres and mileage and maintenance related depreciation. The other parameters for non-fuel vehicle operating costs differ for in-work light vehicle travel and non-work light vehicle travel due to the time related effects of depreciation and lump sum payments of insurance and registration. As most work vehicles operate in fleets, if travel times decrease companies will be able to undertake the same task with a smaller number of fleet vehicles and therefore save on time-related depreciation, registration and insurance. Private motorists however, do not change the number of vehicles they own in response to changes in travel time and therefore do not have the ability to save on these time related costs. The exclusion of these components from non-work trip purposes is consistent with the methodology applied in the UK (Department for Transport (UK), 2011).

Crash Cost Savings

Crash cost savings were assessed from the change in vehicle-kilometres travelled (VKT) on each link in the model between the Base and Project Case. Crash cost savings vary by link class (road classification), since some road types have higher crash rates than others. The links used in the model are shown in Table 23.

Table 23: Link classes used in model

Link class	Link description	Hourly directional capacity per l	24-hour directional capacity per lane	Posted speed factor
1	Centroid connector	10,000	150,000	1.00
2	Collector urban unsealed	00	9,000	0.80
3	Collector urban sealed	7	10,500	0.70
4	Collector rural unsealed	700	10,500	0.90
5	Collector rural sealed	800	12,000	0.80
10	Arterial urban unsealed	700	10,500	0.80
11	Arterial urban sealed	900	13,500	0.70
12	Arterial rural unsealed	1,400	21,000	0.80
13	Arterial rural sealed	1,700	25,500	0.80
14	Highway urban undivided	1,100	16,500	0.75
15	Highway urban divided	1,200	18,000	0.80
16	Highway rural undivided	1,800	27,000	0.85
17	Highway rural divided	1,900	28,500	0.90
18	Highway rural divided (1 lane each way)	1,400	21,000	0.9
19	Freeway divided	2,000	30,000	1.00
20	Freeway on/off ramp	900	13,500	0.80

The crash costs and rates applied to each of these link classes are shown in Table 24 to Table 26.

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Table 24: Crash costs by link class

Speed limit (km/h)	Average casualty cost (June 2007)	Average casualty cost (Dec 2015)	Corresponding link class
<50	168,000	$210,444	
50	163,000	$204,181	1,2,3,4
60	167,000	$209,192	10,11
70	197,000	$246,771	15
80	216,000	$270,571	4,5,12,14,16,20
90	324,000	$405,857	
100	319,000	$399,593	13,16,17,18
110	332,000	$415,878	19

Source: (Austroads, 2008) Values have been converted to Dec 2015 prices using CPI (ABS, 2016).

Table 25: Crash rates used – Urban Roads

Urban Road Type	Casualty crashes per million veh-km	Corresponding link class
Old Freeways (Inner City 4 lanes)	0.[illegible]	
South Eastern Art (Toorak to Warrigal)	0.[illegible]	
High Standard Freeways	0.09	
All Freeways	0.11	
Primary Arterials (Divided Trams)	0.40	
Primary Arterials (Undivided Trams)	0.52	
Primary Arterials (Divided No Trams)	0.26	15
Primary Arterials (Undivided No Trams)	0.32	14, 11
All Primary Arterials	0.30	
Secondary Arterials (Divided Trams)	0.66	
Secondary Arterials (Undivided Trams)	0.69	
Secondary Arterials (Divided No Trams)	0.37	
Secondary Arterials (Undivided No Trams)	0.44	3, 1
All Secondary Arterials	0.47	
Primary Arterial/Service Roads	0.23	
All Melbourne Arterials	0.36	

Source: (VicRoads, 1996)

Table 26: Crash rates used – Rural Roads

Rural Road Type	Sub-classification	Casualty crashes per million veh-km	Corresponding link class
Undivided roads (gravel)	MRS 1 Natural surface	0.30	
	MRS 2 Formed roads	0.30	
	MRS 3 Gravel <= 4.5 m	0.35	4, 2
	MRS 4 Gravel >= 4.5 m	0.35	12, 10
Undivided roads (sealed)	MRS 5 Sealed <= 4.5m	0.30	
	MRS 6 Sealed 4.51 – 5.2 m	0.39	
	MRS 7 Sealed 5.21 – 5.8 m	0.40	
	MRS 8 Sealed 5.81 – 6.4 m	0.33	5
	MRS 9 Sealed 6.41 – 7.0 m	0.25	
	MRS 10 Sealed 7.01 – 7.6 m	0.23	
	MRS 11 Sealed 7.61 – 8.2 m	0.21	
	MRS 12 Sealed 8.21 – 8.8m	0.20	13
	MRS 15 Sealed 10.01 – 11.4 m	0.20	
	MRS 16 Sealed 11.61 – 13.7 m	0.19	
	MRS 17 Sealed > 13.7 m	0.21	16,18
Undivided roads	MRS 18 Sealed <= 7.6 m	0.20	
	MRS 19 Sealed 7.61 – 8.2 m	0.20	
	MRS 20 Sealed 8.21 – 8.8 m	0.20	
	MRS 21 Sealed 8.81 – 9.4 m	0.20	
	MRS 22 Sealed 9.41 – 11.6 m	0.20	
	MRS 23 Sealed > 11.6 m	0.20	17
Freeways	MRS 24 Sealed (4 lane) <= 9.4 m	0.06	18,19,20
	MRS 25 Sealed (6 lane) 9.41 – 11.6 m	0.06	
	MRS 26 Sealed (8 lane) >= 11.6 m	0.06	

Source: (VicRoads, 1996)

Greenhouse gas emission savings

For each link in the network, the average travel speed (km/hr) was determined from the model. The vehicle fuel consumption rate (litres/km) for each link could then be determined through the use of the following equation:

$$l = A + \frac{B}{V} + CV + DV^2$$

where:

l = fuel consumption rate (litres/km)

A, B, C, D = model coefficients

V = 24-hour average link speed (km/hr)

The values of the model coefficients are shown in Table 27 and Table 28. As can be seen, the model coefficients differ by whether traffic is subject to arterial stop start conditions or freeway conditions.

Table 27: Model coefficients for vehicle fuel consumption for light vehicles only

Light Vehicles	A	B	C	D
Arterial stop start conditions	0.863	542.92	0.01333	0.0005847
Freeway conditions	-18.433	3006.02	0.15477	0.0003203

Source: (Austroads, 2008)

Table 28: Model coefficients for vehicle fuel consumption for heavy vehicles only

Heavy Vehicles	A	B	C	D
Arterial stop start conditions	[illegible]	1893.84	0.12777	0.0009736
Freeway conditions	-65.056	4156.75	0.49681	0.0006798

Source: (Austroads, 2008)

Once the fuel consumption rates (litres/km) were determined for each link in the network, the annual vehicle fuel consumption (litres) could then be derived for each link by applying the annual Vehicle Kilometres Travelled (VKT) from the model to each link (daily VKT was factored to annual VKT by applying the expansion factor). The annual vehicle fuel consumption for each link was then summed for the network.

The fuel use was converted into CO_2 - equivalent using the National Greenhouse Accounts Factors shown in Table 29. Annual greenhouse gas emission costs were then determined by applying a rate of $60.13/tonne (derived from a 2007 price of $48.00/tonne sourced from Austroads (2008), adjusted to 2015 dollars using CPI (ABS, 2016) to the total amount of annual greenhouse gas emissions.

Table 29: NGA emission factors

Vehicle	Energy content factor GJ/kL	Emission Factors		
		CO_2 kg CO2-e/GJ	CH_4 kg CO2-e/GJ	N_2O kg CO2-e/GJ
All light vehicle	34.2	66.7	0.6	2.3
Rigid heavy vehicles	38.6	69.2	0.2	0.5
Articulated heavy vehicles	34.2	66.7	0.6	2.3

Source: (Department of Climate Change and Energy Efficiency, 2011)

Other environmental externality costs

Other environmental externalities were calculated using the values given in Table 30 for light vehicles and Table 31 for heavy vehicles.

Table 30: Environmental externality parameters – light vehicles (cents/VKM)

Pollutant	June 2007 prices	December 2015 prices	June 2007 prices	December 2015 prices
	Urban	Urban	Rural	Rural
Air pollution (c/km)	2.5	3.18	0.03	0.04
Noise pollution (c/km)	0.82	1.03	0.00	0.00
Water pollution (c/km)	[illegible]	0.48	0.04	0.05
Nature & landscape (c/km)	0.05	0.06	0.47	0.59
Urban separation (c/km)	0.59	0.74	0.00	0.00
Upstream and downstream costs (c/km)	3.42	4.28	3.42	4.28
Total	**7.80**	**9.77**	**3.96**	**4.96**

Source: (Austroads, 2008). Values have been adjusted to 2015 levels using CPI (ABS, 2016)

Table 31: Environmental externality parameters – trucks ($ per 1000 tonne-km)

Pollutant	June 2007 prices	December 2051 prices	June 2007 prices	December 2051 prices
	Urban	Urban	Rural	Rural
Air pollution ($ per 1000 tonne-km)	21.19	26.54	0.21	0.26
Noise pollution ($ per 1000 tonne-km)	3.54	4.43	0.35	0.44
Water pollution ($ per 1000 tonne-km)	3.18	3.98	1.27	1.59
Nature & landscape ($ per 1000 tonne-km)	0.35	0.44	3.54	4.43
Urban separation ($ per 1000 tonne-km)	2.36	2.96	0.00	0.00
Upstream and downstream costs ($ per 1000 tonne-km)	18.86	23.62	18.86	23.62
Total	**49.48**	**61.98**	**24.23**	**30.35**

Source: (Austroads, 2008). Values have been adjusted to 2015 levels using CPI (ABS, 2016)

Appendix B

Demographic data by VIF2014 by small areas

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Appendix B Demographic data by VIF2014 by small areas

Demographic data for trip productions

.id Small Area	Total Population				
	2011	2016	2021	2031	2041
Kialla-Shepparton Surrounds South	5,888	6,206	7,188	9,664	9,468
Mooroopna	7,855	7,800	7,933	8,189	8,349
Rural North East	715	616	671	797	883
Rural North West	325	329	324	318	311
Rural South	1,357	1,377	1,386	1,388	1,357
Shepparton Central	2,769	2,876	3,031	3,427	3,437
Shepparton North Central	6,502	6,740	7,087	8,274	8,136
Shepparton North East	2,974	3,099	3,251	3,688	6,287
Shepparton North West	5,938	6,107	7,[illegible]	8,024	8,148
Shepparton South	6,710	6,[illegible]	7,230	7,535	7,300
Shepparton South East	6,003	6,963	7,638	8,970	13,539
Shepparton Surrounds North	3,146	[illegible]	4,237	5,028	6,571
Total Shepparton	**[illegible]**	**53,104**	**57,103**	**65,302**	**73,786**

.id Small Area	Employed Persons				
	2011	2016	2021	2031	2041
Kialla-Shepparton Surrounds South	3,278	3,450	3,995	5,493	5,415
Mooroopna	4,052	4,017	4,067	4,324	4,409
Rural North East	424	368	401	489	547
Rural North West	174	177	176	181	180
Rural South	814	831	840	869	859
Shepparton Central	1,446	1,508	1,576	1,854	1,866
Shepparton North Central	3,493	3,607	3,758	4,448	4,365
Shepparton North East	1,577	1,638	1,708	1,957	3,534
Shepparton North West	2,834	3,309	3,510	4,043	4,152
Shepparton South	3,339	3,416	3,555	3,795	3,683
Shepparton South East	2,753	3,224	3,481	4,237	6,381
Shepparton Surrounds North	1,826	2,044	2,472	3,012	3,970
Total Shepparton	**26,012**	**27,589**	**29,538**	**34,702**	**39,361**

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Revision C – 30-Aug-2016
Prepared for – Greater Shepparton City Council – ABN: N/A

Shepparton Bypass Strategic Model Update

.id Small Area	Persons in Primary & Secondary Education				
	2011	2016	2021	2031	2041
Kialla-Shepparton Surrounds South	968	991	1,017	1,066	1,117
Mooroopna	1,473	1,494	1,532	1,596	1,676
Rural North East	136	112	107	113	118
Rural North West	51	52	54	56	59
Rural South	323	336	350	375	395
Shepparton Central	366	364	375	392	416
Shepparton North Central	1,056	1,064	1,086	1,129	1,187
Shepparton North East	503	518	534	548	581
Shepparton North West	968	983	1,004	1,047	1,102
Shepparton South	1,197	1,214	1,240	1,285	1,341
Shepparton South East	1,085	1,10[illegible]	[illegible]46	1,205	1,270
Shepparton Surrounds North	781	[illegible]17	850	906	951
Total Shepparton	**8,908**	**9,[illegible]**	**9,295**	**9,718**	**10,213**

.id Small Area	Persons in Further & Tertiary Education				
	[illegible]11	2016	2021	2031	2041
Kialla-Shepparton Surrounds South	[illegible]	155	149	149	152
Mooroopna	365	371	359	356	364
Rural North East	30	27	25	25	26
Rural North West	24	24	24	24	25
Rural South	85	88	87	89	92
Shepparton Central	205	209	203	203	209
Shepparton North Central	364	368	355	352	361
Shepparton North East	157	162	159	156	162
Shepparton North West	283	289	280	279	286
Shepparton South	390	394	380	375	382
Shepparton South East	311	321	313	315	324
Shepparton Surrounds North	145	148	144	149	154
Total Shepparton	**2,509**	**2,557**	**2,479**	**2,473**	**2,538**

Demographic data for trip attractions

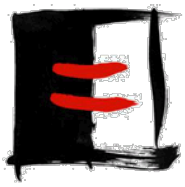
.id Small Area	Total Jobs				
	2011	2016	2021	2031	2041
Kialla-Shepparton Surrounds South	1,321	1,320	1,406	1,577	1,803
Mooroopna	1,944	2,066	2,579	2,942	3,401
Rural North East	109	115	97	110	126
Rural North West	149	151	157	169	190
Rural South	469	503	548	634	732
Shepparton Central	10,987	11,603	12,297	13,695	15,646
Shepparton North Central	5,075	5,410	5,779	6,578	7,596
Shepparton North East	2,247	2,342	2,570	2,871	3,283
Shepparton North West	1,940	2,082	2,290	2,600	3,001
Shepparton South	1,167	1,261	1,350	1,554	1,807
Shepparton South East	2,563	2,80[illegible]	[illegible]172	3,506	3,989
Shepparton Surrounds North	2,416	[illegible]465	2,390	2,589	2,910
Total Shepparton	**30,386**	**32,[illegible]**	**34,635**	**38,825**	**44,484**

.id Small Area	Wholesale & Retail Jobs				
	[illegible]1	2016	2021	2031	2041
Kialla-Shepparton Surrounds South	32[illegible]	330	344	359	395
Mooroopna	[illegible]171	176	185	193	213
Rural North East	9	9	7	8	8
Rural North West	-	-	-	-	-
Rural South	37	38	12	13	14
Shepparton Central	2,860	2,928	3,058	3,189	3,509
Shepparton North Central	201	205	213	222	239
Shepparton North East	177	181	188	196	216
Shepparton North West	259	265	276	288	317
Shepparton South	-	-	-	-	-
Shepparton South East	1,074	1,101	1,150	1,199	1,320
Shepparton Surrounds North	299	304	315	327	359
Total Shepparton	**5,409**	**5,535**	**5,749**	**5,994**	**6,588**

Shepparton Bypass Strategic Model Update

.id Small Area	Primary & Secondary Enrolments				
	2011	2016	2021	2031	2041
Kialla-Shepparton Surrounds South	57	61	537	539	560
Mooroopna	1,325	2,632	2,660	2,796	2,985
Rural North East	93	94	96	102	110
Rural North West	43	46	48	52	57
Rural South	234	253	262	286	306
Shepparton Central	466	451	468	486	488
Shepparton North Central	3,255	3,219	3,334	3,557	3,592
Shepparton North East	257	271	279	301	307
Shepparton North West	1,249	1,203	1,269	1,326	1,326
Shepparton South	1,955	2,035	2,099	2,258	2,436
Shepparton South East	-	-	323	321	331
Shepparton Surrounds North	2,019	2,057	117	2,224	2,340
Total Shepparton	**10,953**	**[illegible],322**	**13,493**	**14,248**	**14,838**

.id Small Area	Further & Tertiary Enrolments				
	201	2016	2021	2031	2041
Kialla-Shepparton Surrounds South	-	-	-	-	-
Mooroopna	-	-	-	-	-
Rural North East	-	-	-	-	-
Rural North West	-	-	-	-	-
Rural South	-	-	-	-	-
Shepparton Central	7,076	6,811	6,684	6,620	7,410
Shepparton North Central	3,563	3,429	3,365	3,333	3,731
Shepparton North East	-	-	-	-	-
Shepparton North West	2,754	2,645	2,600	2,583	2,890
Shepparton South	-	-	-	-	-
Shepparton South East	-	-	-	-	-
Shepparton Surrounds North	-	-	-	-	-
Total Shepparton	**13,392**	**12,885**	**12,649**	**12,537**	**14,030**



ESSENTIAL ECONOMICS

Goulburn Valley Highway

Shepparton Bypass Stage 1 Project

Economic Impact Assessment

FINAL REPORT

Prepared for

Greater Shepparton City Council

by

Essential Economics Pty Ltd

September 2016

Authorship

Report stage	Author	Date	Review	Date
Draft report	John Noronha	2 June 2016	John Henshall	4 June 2016
Final draft	John Noronha	9 June 2016		
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EXECUTIVE SUMMARY

Greater Shepparton City Council engaged Essential Economics Pty Ltd to undertake an Economic Impact Assessment (EIA) of the Goulburn Valley Highway Shepparton Bypass Stage 1 Project (Stage 1 Bypass Project). The Study confirms a pressing need for a new east-west link, a second river crossing and road infrastructure that can adequately cater for the anticipated increased in use of High Performance Freight Vehicles and other larger and longer vehicle combinations.

The development of the Goulburn Valley Highway Shepparton Bypass has been identified by Council as a priority transformational project. Council and the State Government have both demonstrated their commitment towards the project.

Stage 1 of the Bypass will:

- Deliver a Road User Benefit Cost Ratio of 0.7 over 25 years
- Increase national and regional economic output by $590 million during the construction phase
- Deliver 3,170 additional regional and national jobs during the construction phase

The Stage 1 Project aims to increase road capacity, efficiency and safety and reduce costs for freight operators, while also reducing industry risk. The outcome would be the diversion of significant volumes of heavy vehicle movements from Shepparton's CBD.

1 Key Opportunities arising from the Stage 1 Project include:

- Improved efficiencies for heavy vehicle operators, including reduced travel times and vehicle maintenance savings
- Provision of adequate long-term road capacity for industry, which is important in terms of certainty for industry development and future planning and investment for businesses
- Reduced risk to industry by the provision of a second heavy vehicle river crossing
- Improved safety for drivers and visitors to Shepparton CBD, with road user conflicts significantly reduced

BOOST TO CBD

The improvements in safety and amenity (reduced noise, pollution, conflicts) are expected to support existing Council-led project initiatives. CBD Revitalisation and leveraged investment will deliver the following positive outcomes:

- 6,410m^2 of existing vacant CBD shopfront floorspace becoming reoccupied
- 225 new ongoing CBD jobs created and a further 180 jobs supported indirectly in the regional economy
- $315 million in additional value-added output (Net Present Value) generated for the regional economy over 25 years.

2 Other economic benefits include:

- Support for the region's expanding export markets by improving efficiency of movement of goods and services
- Planning certainly for land owners, investors, existing businesses and Council with regard to long-term decision-making
- Impetus for investment in dormant development sites
- Support for the commercial office property market
- Stimulus to potentially activate other major regional projects, including the proposed Goulburn Valley Intermodal Freight Terminal (GV Link).

INTRODUCTION

Background

The Goulburn Valley (GV) Highway is an integral transport route connecting the Goulburn Valley Region with Melbourne, and forms a vital link in the national highway system between Melbourne and Brisbane. The Goulburn Valley Highway also joins Melbourne and central Victoria with inland New South Wales and Queensland.

Sections of the GV Highway in and around Greater Shepparton can no longer adequately cater for the large and increasing traffic volumes that use the highway daily.

A solution to address the inadequacies of the highway has been proposed since 1995; however, the necessary funding commitments from State and Federal Governments have yet to be secured. The full 36km four-lane Shepparton Bypass is estimated to cost approximately $1.3 billion (2016 dollars). The project has therefore been split into distinct stages in order to more realistically obtain funding to get the project underway, including a single carriageway in the first instance.

Greater Shepparton City Council are now seeking initial investment for Stage 1 of the Bypass Project (which includes sub-stages 1A and 1B) and have engaged Essential Economics Pty Ltd to undertake and Economic Impact Assessment of the proposed project as input to future funding requests.

Stage 1A will provide a second river crossing between Shepparton and Mooroopna (GV Highway to Echuca Road), and road improvements leading to the Shepparton Alternate Route (SAR) will also be required. In addition, Stage 1B will provide a new link between Echuca-Mooroopna Road to the Midland Highway.

The estimated cost of the Stage 1 Bypass Project is $260 million (2016 dollars), with this investment aimed at:

- reducing heavy traffic flows and improving safety, amenity and commercial performance in Shepparton's Central Business District (especially along High Street); and
- catering for the long-term traffic growth of Greater Shepparton, strengthening the supply chain of the Goulburn Valley's food processing and manufacturing enterprises and improving freight movements from the Goulburn Valley to domestic and export markets.

The Hume Regional Growth Plan identifies the GV Highway Shepparton Bypass Project as an important infrastructure project in terms of regional transport access and connectivity.

Objectives

The main objectives of this study are:

- To highlight existing challenges and constraints associated with the existing heavy-vehicle east-west road link
- To identify, quantify and clearly articulate the benefits arising from the Stage 1 project.
- To highlight the return on investment the project will deliver.

This Report

This report contains the following chapters:

1 **Project Context** – provides a regional socio-economic overview, an assessment of the long-term regional freight task, and a summary of Greater Shepparton's priority transformational infrastructure projects.

2 **Project Description and Catchment** – presents a description of the Full Bypass Project, and a detailed summary of the construction phase of the Stage 1 Bypass Project, including alignment and estimated costing.

3 **Issues and Opportunities Assessment** – highlights constraints to business and industry arising from the existing situation and identifies potential opportunities and benefits associated with the construction of Stage 1 Bypass Project.

4 **Road User and Externality Impact Assessment** – quantifies long-term road user and externality impacts arising from the Stage 1 Bypass Project, including travel time savings, vehicle operating cost savings and environmental savings, total costs, and presents a Benefit Cost Ratio for the project from a road user perspective.

5 **Economic Impact Assessment** – provides an assessment of impacts associated with investment, economic output, employment, commercial performance, industry risk and regional economic development.

6 **Key Findings** – presents a summary of the main findings of the report.

1 PROJECT CONTEXT

1.1 Regional Overview

Population

Latest State Government population projections (Victoria in Future 2015) show steady population growth is expected in the Goulburn Valley (GV) Region between 2016 and 2031. Over this period the Region's population is projected in increase by 0.9% pa, an increase of 19,460 persons, with the Region's population level estimated to reach 160,320 persons by 2031. These projections are shown in Table 1.1.

Table 1.1: GV Regional – Population Projections by Municipality, 2014 to 2031

Municipality	2016	2026	2031	Change 2014-2031	AAGR 2014-2031
Greater Shepparton City Council	64,800	73,340	77,[illegible]0	+14,700	+1.2%
Campaspe Shire Council	36,960	38,66[illegible]	39,580	+2,700	+0.4%
Moira Shire Council	29,160	30,7[illegible]	31,660	+2,830	+0.6%
Strathbogie Shire Council	9,940	10,700	11,110	+1,300	+0.7%
Region	**140,860**	**153,[illegible]**	**160,320**	**+19,460**	**+0.9%**

Source: Victoria in Future 2015, Department of Environment, Land, Water and Planning (2015)

Labour Market

As of December 2015, unemployment in the GV Region was 5.9%, and this is slightly higher than the regional Victoria average (5.[illegible]%), with approximately 4,200 job seekers being unemployed. As Table 1.2 shows, Greater Shepparton's unemployment rate of 6.5% is well above regional, metropolitan and state averages, with 2,150 residents unemployed.

Table 1.2: GV Region – Unemployment Rates by Municipality, December 2015

	Employed	Unemployed	Labour Force	% Unemployed
Greater Shepparton City Council	31,110	2,150	33,260	6.5%
Campaspe Shire Council	18,050	1,010	19,050	5.3%
Moira Shire Council	13,370	780	14,150	5.5%
Strathbogie Shire Council	4,930	260	5,190	5.0%
Region	**67,450**	**4,200**	**71,650**	**5.9%**
Regional Victoria	**669,800**	**41,000**	**710,800**	**5.8%**
Melbourne	**2,282,700**	**150,300**	**2,433,000**	**6.2%**
Victoria	**2,952,500**	**191,300**	**3,143,800**	**6.1%**

Source: Australian Government Department of Employment – Small Area Labour Markets, December 2015

Industry Structure

Greater Shepparton forms an integral part of the 'Food Bowl of Australia', which accounts for 25 per cent of the total value of Victoria's agricultural production (www.victoriasfoodbowl.com.au). Greater Shepparton is a national centre for dairy and horticulture, exporting premium quality fresh and value-added produce via innovative practices and a world-class irrigation system. Greater Shepparton is also the transport hub of regional Victoria due to its strategic location and the resulting agglomeration of road transport industry activities.

Primary production underpins the economy of Greater Shepparton and the surrounding area, with the GV Region producing 25% of Victoria's horticultural produce. Much of this produce is value-added via a nationally significant cluster of food manufacturing and food processing industries in Greater Shepparton and the Goulburn Valley. These products are then transported to domestic and international markets by transport and logistics providers. Greater Shepparton is a significant hub in the national freight and logistics chain.

Greater Shepparton is home to several multinational and iconic companies, including Campbell's Soups, SPC Ardmona, Tatura Milk Industries (Bega), Unilever, Visy, Fonterra, Pental Soaps, and Pactum Dairy (Australian Consolidated Milk). Several multinational companies also reside in the broader GV Region, including Nestle, Murray Goulburn and Bega. These companies utilise Shepparton as their major transport and logistics hub.

The industry structure of the GV Region, which is presented in Table 1.3 and Figure 1.1, shows a large proportion of jobs are associated with sectors which are associated with major food activities (primary and secondary) and which have a direct or indirect reliance on transportation.

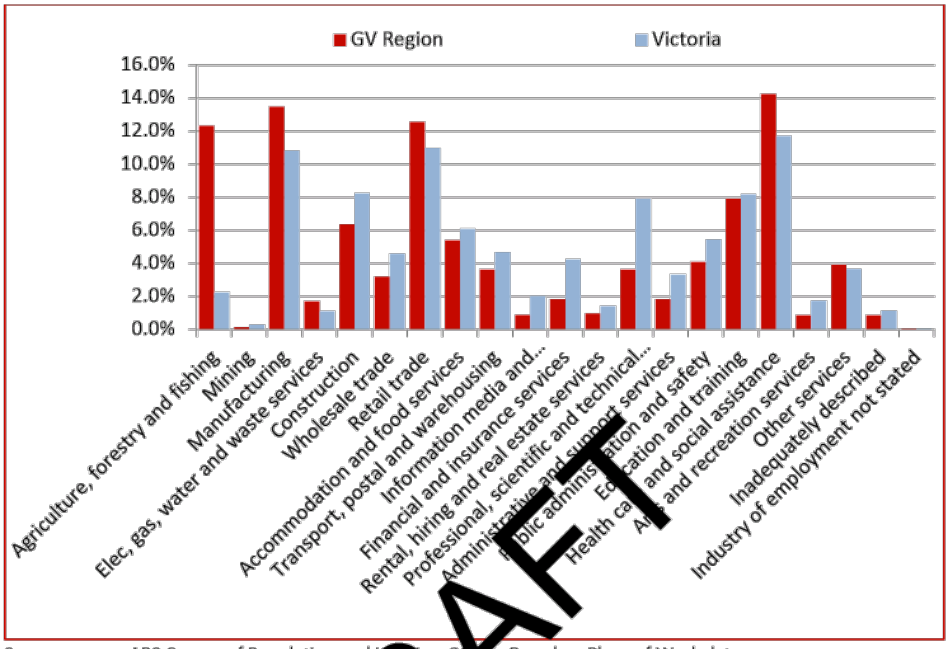
For example approximately 11% of all jobs in the GV Region are associated with agriculture, forestry and fishing; mining; manufacturing, electricity, gas, water and waste services; construction; wholesale trade; and transport, postal and warehousing. In contrast, only 32% of jobs are associated with these sectors on a State-wide basis, highlighting the relatively high concentration of transport-reliant industries in the GV Region.

Table 1.3: GV Region – Industry Structure by Municipality, 2011

	Greater Shepparton	Campaspe Shire	Moira Shire	Strathbogie Shire	GV Region	Victoria
Agriculture, forestry and fishing	7.5%	13.6%	18.9%	26.3%	12.3%	2.2%
Mining	0.1%	0.2%	0.1%	0.4%	0.2%	0.3%
Manufacturing	12.6%	14.9%	14.8%	9.9%	13.5%	10.8%
Electricity, gas, water and waste services	2.8%	0.6%	0.7%	0.3%	1.7%	1.1%
Construction	6.5%	6.0%	6.7%	6.5%	6.4%	8.2%
Wholesale trade	3.6%	2.8%	3.0%	2.3%	3.2%	4.6%
Transport, postal and warehousing	3.9%	3.4%	3.3%	3.8%	3.6%	4.7%
Sub-total	**34.2%**	**41.5%**	**47.5%**	**49.5%**	**40.9%**	**31.9%**
Retail trade	13.0%	13.3%	11.9%	8.2%	12.6%	11.0%
Accommodation and food services	4.7%	5.9%	5.8%	7.9%	5.4%	6.1%
Information media and telecommunications	1.2%	0.6%	0.6%	0.5%	0.9%	2.0%
Financial and insurance services	1.9%	2.1%	1.6%	0.9%	1.8%	4.2%
Rental, hiring and real estate services	0.9%	1.1%	1.0%	0.8%	1.0%	1.4%
Professional, scientific and technical services	4.1%	3.5%	2.7%	3.2%	3.6%	7.9%
Administrative and support services	2.2%	1.4%	1.8%	2.1%	1.9%	3.3%
Public administration and safety	4.6%	3.7%	2.7%	5.5%	4.1%	5.5%
Education and training	8.6%	7.4%	7.3%	6.1%	7.9%	8.2%
Health care and social assistance	16.3%	13.4%	12.2%	9.3%	14.3%	11.7%
Arts and recreation services	0.7%	0.9%	0.8%	2.4%	0.9%	1.7%
Other services	4.1%	4.4%	3.4%	2.4%	3.9%	3.7%
Inadequately described	0.8%	0.8%	0.8%	1.0%	0.9%	1.2%
Industry of employment not stated	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Source: ABS Census of Population and Housing, 2011 – Based on Place of Work data.

Figure 1.1: Industry Structure Comparison – GV Region v Victoria



Source: ABS Census of Population and Housing, 2011 – Based on Place of Work data.

Business Structure

The business structure of the GV Region highlights the region's reliance on agriculture, forestry and fishing, with almost one in three businesses (32%) associated with the sector, and this share is four times the Victorian average (8%). These patterns are presented in Table 1.4 and Figure 1.2.

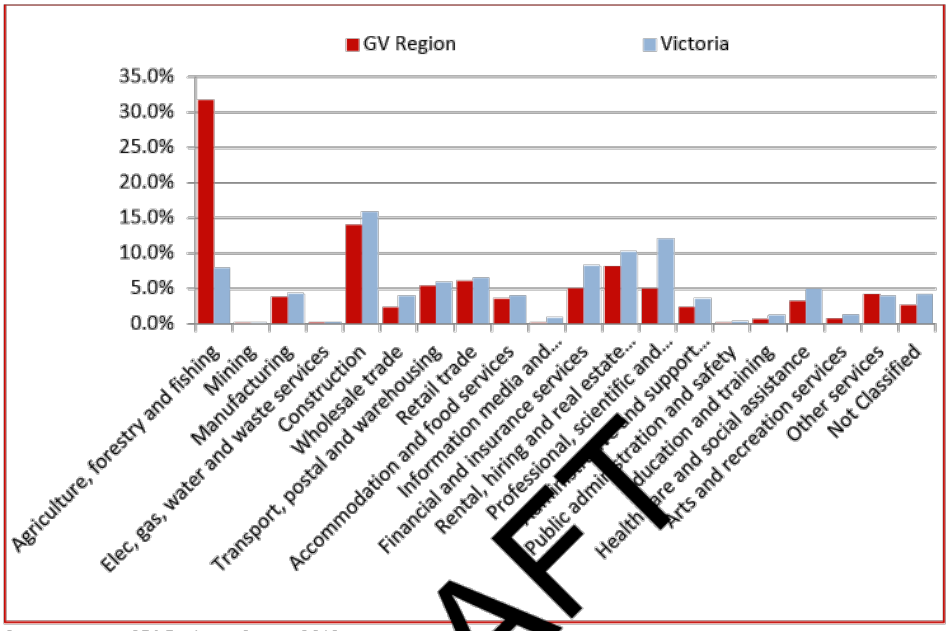
Approximately 58% of businesses located in the GV Region have a direct or indirect reliance on transportation services (agriculture, forestry and fishing; mining; manufacturing, electricity, gas, water and waste services; construction; wholesale trade; and transport, postal and warehousing), compared to 38% of businesses across Victoria .

Table 1.4: GV Region – Business Structure by Municipality, 2013

	Greater Shepparton	Campaspe Shire	Moira Shire	Strathbogie Shire	GV Region	Victoria
Agriculture, forestry and fishing	22.1%	34.9%	40.4%	46.6%	31.7%	7.9%
Mining	0.1%	0.1%	0.2%	0.2%	0.1%	0.2%
Manufacturing	4.0%	4.0%	3.6%	3.4%	3.9%	4.3%
Electricity, gas, water and waste services	0.3%	0.2%	0.2%	0.0%	0.2%	0.3%
Construction	14.9%	14.2%	13.0%	11.8%	14.0%	15.9%
Wholesale trade	2.8%	2.1%	2.1%	1.8%	2.3%	4.0%
Transport, postal and warehousing	5.7%	5.0%	5.7%	4.9%	5.4%	5.9%
Sub-total, industries with a reliance on Transport	**49.9%**	**60.3%**	**65.2%**	**68.6%**	**57.7%**	**38.4%**
Retail trade	6.3%	6.8%	5.8%	3.1%	6.1%	6.5%
Accommodation and food services	3.4%	3.9%	3.7%	3.0%	3.6%	4.0%
Information media and telecommunications	0.2%	0.2%	0.1%	0.0%	0.2%	0.9%
Financial and insurance services	6.1%	5.0%	3.6%	3.6%	5.0%	8.3%
Rental, hiring and real estate services	10.6%	[illegible]%	6.0%	4.7%	8.2%	10.2%
Professional, scientific and technical services	6.3%	4.1%	3.4%	5.6%	5.0%	12.1%
Administrative and support services	3.2%	1.9%	[illegible]8%	1.6%	2.4%	3.6%
Public administration and safety	0.1%	0.2%	0.2%	0.3%	0.2%	0.3%
Education and training	0.8%	0.6%	0.7%	0.7%	0.7%	1.2%
Health care and social assistance	[illegible]%	[illegible].7%	2.4%	1.6%	3.2%	5.0%
Arts and recreation services	[illegible]%	0.8%	0.6%	1.3%	0.8%	1.3%
Other services	[illegible]%	4.1%	3.7%	2.7%	4.3%	4.0%
Not classified	[illegible]%	1.8%	2.8%	3.3%	2.7%	4.2%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Source: ABS Business Co[illegible]s 2013.

Figure 1.2: GV Region – Business Structure by Municipality, 2013



Source: ABS Business Counts 2013.

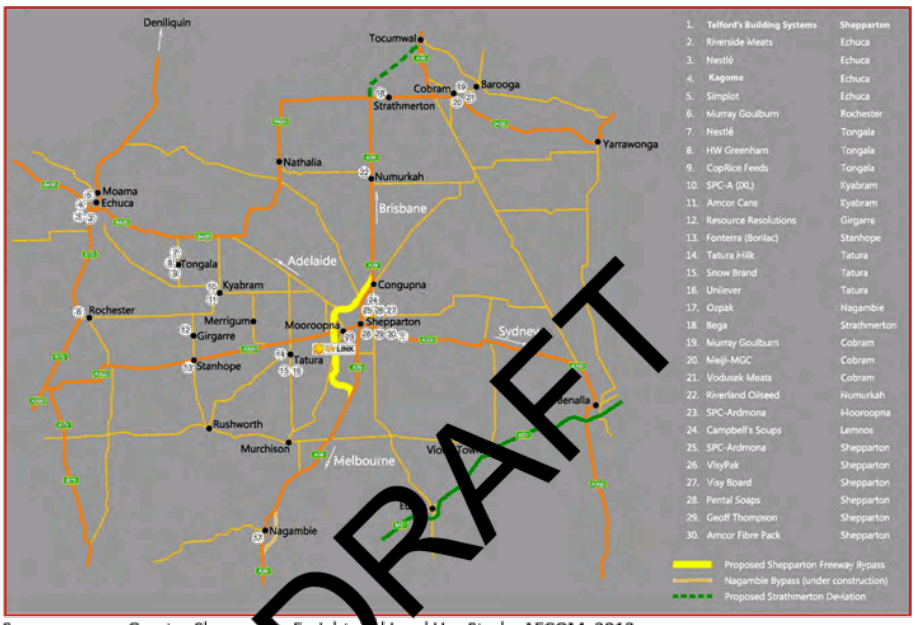
1.2 Regional Freight Task

The Greater Shepparton Freight and Land Use Study 2013 (the 'Study)' identified industry, freight and land use trends in the municipality to inform infrastructure network planning decision-making and prioritisation. The Study characterised existing freight operations as follows:

- **Trans-national or international –** by sea or air modes (e.g. goods heading to ports and airports)
- **Inter capital –** between capital cities by road, rail, sea or air
- **Up country –** from a capital city to a rural region, down country from a rural region to a capital city by road, rail, air of coastal shipping
- **Inter-regional –** between origin and destination modes in non-capital city regions, primarily by road but also rail, air coastal shipping or pipeline
- **Intra-regional –** between origin and destination modes within a region outside of a capital city; primarily by road but also rail, air coastal shipping or pipeline
- **Intra-capital –** between origin and destination modes within a capital city, primarily by road
- **Intra city –** local movements within Shepparton by road.

A significant number of major manufacturers, food processors, dairy operators and other freight-generating businesses are located in the GV Region. Locations include Cobram, Echuca, Kyabram, Nagambie, Numurkah, Rochester, Strathmerton, Shepparton and Tatura, as shown in Figure 1.3.

Figure 1.3: Manufacturers Located in the GV Region



Source: Greater Shepparton Freight and Land Use Study, AECOM, 2013

The Study notes that the regional freight task continues to expand, with evidence from consultation with key operators indicating freight growth is exceeding economic and population growth. Efficient and effective transport movement, particularly of freight within, to and from the Greater Shepparton region, is identified as critical to ongoing growth and competitiveness of the city and of the surrounding region.

The Study also forecasts a shift from smaller trucks to B-Doubles and larger approved heavy vehicles (HPFVs – High Productivity Freight Vehicles) to provide greater efficiency and reduced carbon emissions. As freight generators demand lower costs and freight operators increasingly adopt the usage of HPFVs, there will also be an overall reduction in the amount of vehicles needed to transfer the same freight task. The introduction of B-Doubles and other approved heavy combinations will reduce the proportionate number of vehicles required to move freight, particularly as freight volumes expand overall and as more heavy vehicles are required. The Study highlights the need for future freight network planning to consider the impact of larger freight vehicles on existing and proposed roads.

Key findings in relation to discussions with freight generators/freight service providers of relevance to the Bypass Project as identified in the Study are as follows:

- East-west movements (Shepparton to Mooroopna, via High Street/Midland Highway) are seen as a real problem, generally not efficient and unsafe.
- Additional east-west link desperately needed over the Goulburn River, noting the reliance of a single river crossing for heavy vehicles.
- Need for another east-west connection, particularly to service customers west of CBD.
- A more viable east-west connection that avoids the CBD is urgently required, especially to provide better connectivity between key industrial areas in Shepparton/Mooroopna and Tatura/Kyabram.
- All major freight generators recognised the strategic importance of Greater Shepparton as part of their national supply chain.
- A high number of freight generators and service providers anticipate the increased use of HPFVs and other specific larger and longer vehicle combinations. The road network will have to be designed to accommodate the increased use of larger vehicles.
- There is a desire for clarification around the timing of the proposed Goulburn Valley Highway Bypass Project.

1.3 Greater Shepparton City Council Priority Transformational Projects

The Greater Shepparton City Council has identified seven priority transformational infrastructure projects which are aimed at unlocking the potential of the municipality (and broader region), leveraging investment and stimulating economic development. These priority projects are:

1 Water Security for Irrigated Agriculture

2 A New Shepparton Arts Museum (SAM)

3 Goulburn Valley Highway Shepparton Bypass

4 Goulburn Valley Health Radiotherapy Services

5 Improved Passenger Rail Services Between Shepparton and Melbourne

6 High Speed Rail – Sydney to Melbourne via Shepparton

7 Food Bowl Inland Rail Route

An important ongoing Council initiative is the Shepparton CBD Revitalisation Project which consists of the following three major infrastructure projects:

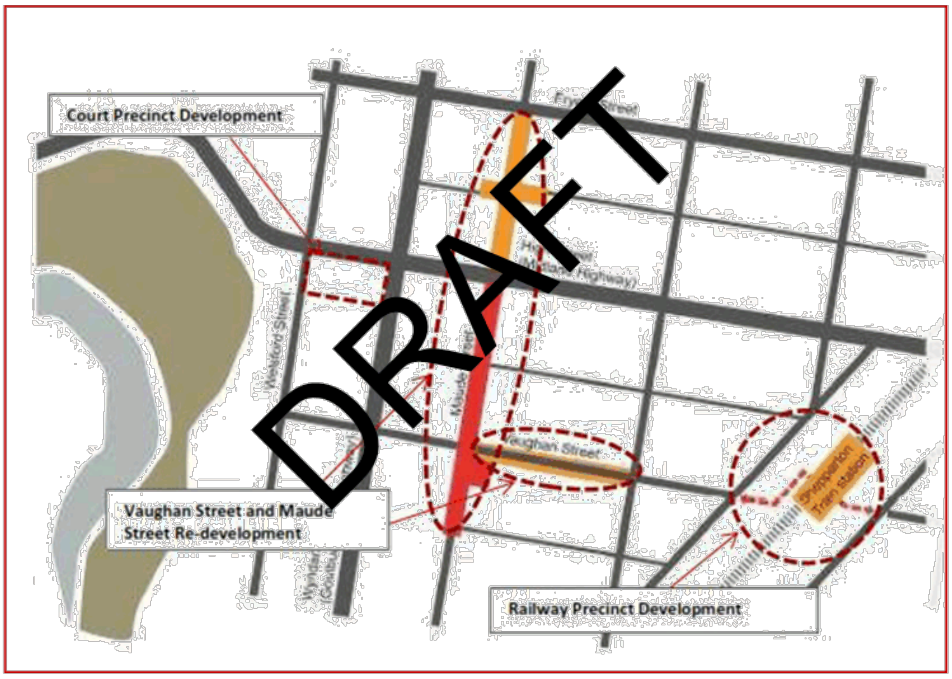
- Vaughan Street and Maude Street Redevelopment
- Court Precinct Development
- Railway Precinct Development

The Shepparton CBD Revitalisation Project and the Goulburn Valley Highway Shepparton Bypass are especially inter-related, with significant economic benefits likely to arise for Shepparton's CBD through the reduction of heavy vehicles along High Street as a result of the completion of Stage 1 Bypass Project.

As Figure 1.4 highlights, High Street intersects with the Court Precinct and Maude Street (including Maude Street Mall) projects, with flow-on benefits from heavy vehicle reductions along High Street likely to be experienced in nearby Vaughan Street and the Railway Precinct.

Improved CBD commercial and economic outcomes associated with the Bypass Project are described in Chapter 5.

Figure 1.4: Shepparton CBD Revitalisation Project



Source: Greater Shepparton City Council

1.4 Summary

1 The Goulburn Valley (GV) Region has a population of approximately 141,000 persons (2016), which is projected to increase to 160,000 persons by 2031.

2 The GV Region has an above-average unemployment rate (Australian Government Department of Employment – Small Area Labour Markets, December 2015), which is particularly pronounced for the City of Greater Shepparton where the rate of 6.5% is well above the regional Victorian average of 5.8%.

3 The GV Region forms an integral part of the 'Food Bowl of Australia', which accounts for 25 per cent of the total value of Victoria's agricultural production, with many multinational food processors located in the region (www.victoriasfoodbowl.com.au).

4 The industry and business structure of the GV Region highlights this strong focus, with an estimated 41% of jobs (compared to 32% of jobs across the State) and 58% of businesses (compared to 38% of businesses across the state) associated with transport-reliant industries. Many of these jobs and businesses are linked with the food production, processing and distribution activities and other major sectors, including construction and manufacturing. This situation highlights the vital importance of efficient local and regional road networks in supporting the GV economy.

5 The Greater Shepparton Freight and Land Use Study highlights the significant number of major manufacturers, food processors, dairy operators and other freight-generating businesses that are located in the GV Region. The Study forecasts the regional freight task will expand at a faster rate than economic and population expansion. The Study also notes efficient and effective transport movement – particularly of freight within, to and from the Greater Shepparton region – is critically important to ongoing growth and competitiveness of the city and of the broader GV Region.

6 The Study also confirms a pressing need for a new east-west link between Shepparton and Mooroopna, a second river crossing that can accommodate heavy vehicles, and road infrastructure that can adequately cater for the anticipated increase in use of High Performance Freight Vehicles and other larger and longer vehicle combinations.

7 The development of the GV Highway Shepparton Bypass has been identified by Greater Shepparton Council as a priority transformational project.

8 The Stage 1 Bypass Project will complement the Shepparton CBD Revitalisation Project, a major Council infrastructure initiative. The CBD Revitalisation Project will benefit in terms of improved safety and amenity from the removal of a large proportion of heavy vehicle traffic from High Street.

2 PROJECT DESCRIPTION

2.1 Project Overview

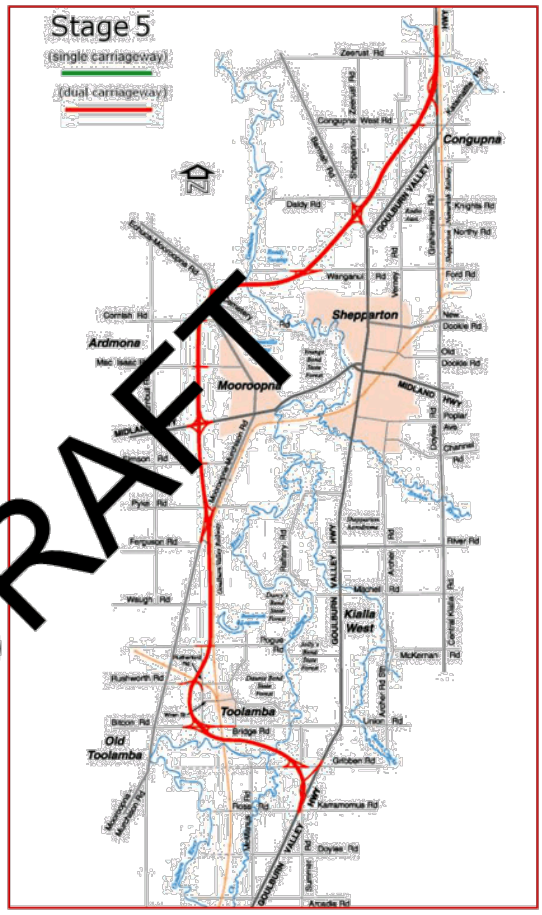
The full Goulburn Valley Highway Shepparton Bypass project will provide a 36km new dual carriageway road link from Karramomus Road (south of Shepparton) to Zeerust Road (north of Shepparton), and forms part of a broader upgrading of the Goulburn Valley Highway between Seymour (Victoria) and Tocumwal (NSW).

The Shepparton Bypass is the next logical stage in the upgrade of this important Melbourne-Brisbane national road link, with the Nagambie Bypass, to Shepparton's south, completed in recent years.

The alignment of the Full Bypass is shown in Figure 2.1.

In view of the estimated cost of the full duplication project ($1.3 billion, in 2016 dollars), a staged approach is now being sought which will initially provide a single carriageway connection between the Goulburn Valley Highway and the Midland Highway in Shepparton.

Figure 2.1: Full GV Highway Bypass Alignment

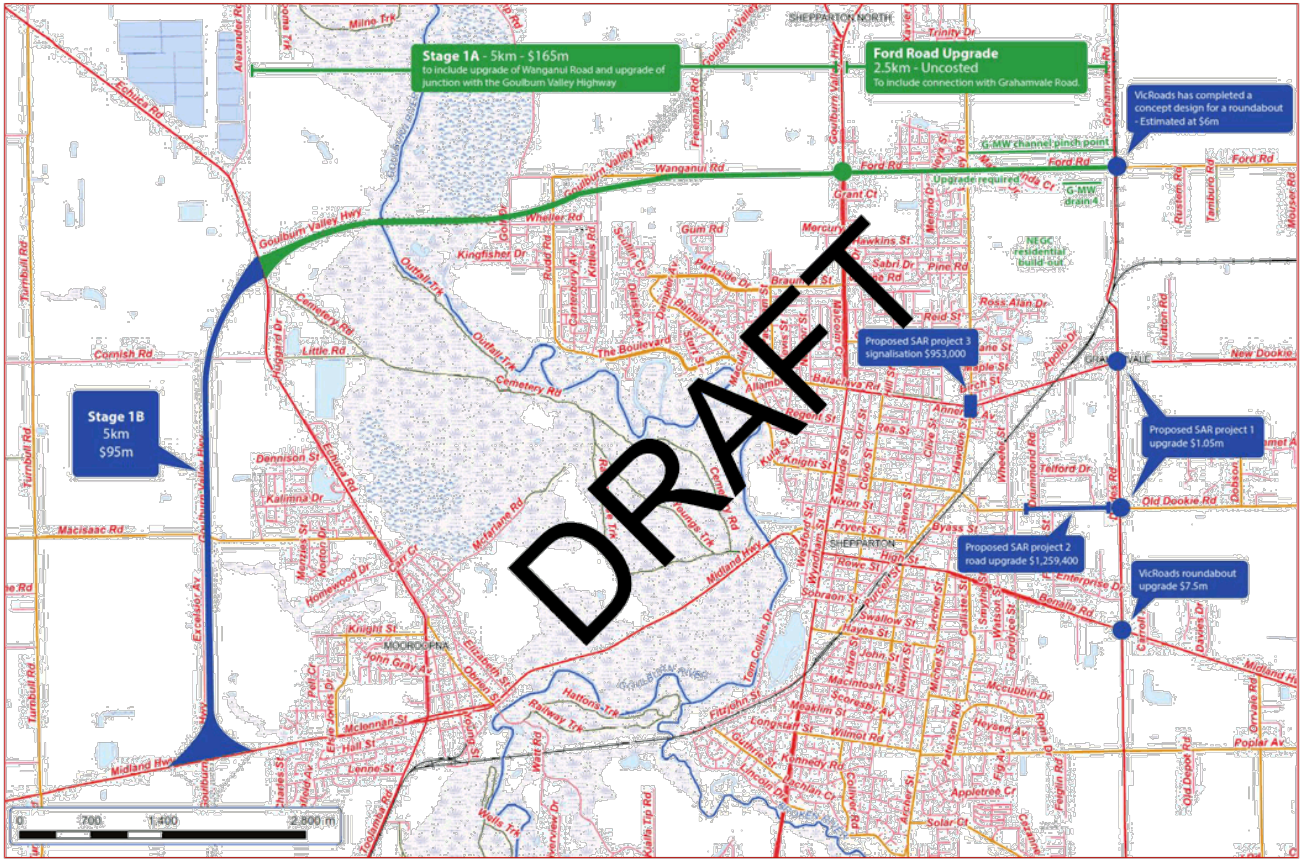


This project, which is referred to as Stage 1 – Goulburn Valley Highway Shepparton Bypass Project (or the Stage 1 Bypass Project in this report), consist of the following two sub-stages:

- Stage 1A – Echuca-Mooroopna Road to Goulburn Valley Highway
- Stage 1B – Echuca Mooroopna Road to Midland Highway

An overview of the Stage Bypass Project 1 is provided in Figure 2.2, with the alignments for sub-stages 1A and 1B shown in Figures 2.3 and 2.4 respectively.

Figure 2.2: GV Highway Shepparton Bypass Project – Stage 1A and Stage 1B and SARS



Source: Greater Shepparton City Council and VicRoads

2.2 Stage 1A Section Description

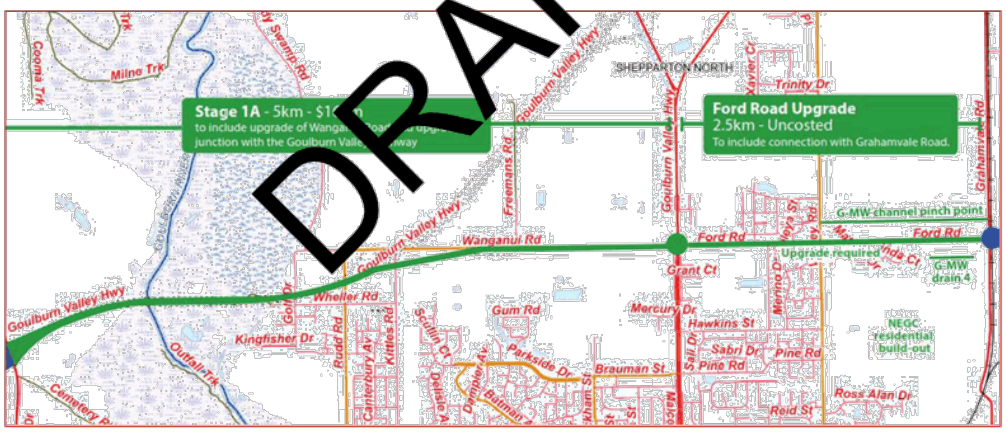
Stage 1A - Echuca-Mooroopna Road to Goulburn Valley Highway

Construction of a two-lane single carriageway Road, including:

- Length: 5.0 km
- New crossing of Goulburn River
- New intersection at Echuca-Mooroopna Road.
- Upgrade Wanganui Road
- New intersection at Goulburn Valley Highway
- Estimated cost of $165 million (2016 dollars), preliminary - to be confirmed.

Additionally, Ford Road will need to be upgraded as a separate project; however the Ford Road upgrade does not for part of Stage 1A project.

Figure 2.3: Stage 1 Bypass Project, Stage 1A – Road Alignment



Source: Greater Shepparton City Council and VicRoads

2.3 Stage 1B Section Description

Stage 1B - Echuca-Mooroopna Road to Midland Highway

Construction of a two-lane single carriageway Road, including:

- Length: 5.0 km
- New link between Echuca-Mooroopna Road and Midland Highway
- New intersection at Echuca-Mooroopna Road.
- New intersection at Midland Highway.
- Estimated Cost of $95 million (2016 dollars), preliminary, to be confirmed.

Figure 2.4: Stage 1 Bypass Project, Stage 1B – Route Alignment

Source: Greater Shepparton City Council and VicRoads

2.4 Summary

1 The proposed Goulbourn Valley Highway Shepparton Bypass Stage 1 Project (Stage 1 Bypass Project) forms part of the larger overall GV Bypass project which will eventually link Seymour (Victoria) and Tocumwal (NSW) as part of the overall enhancement of the national Melbourne-Brisbane road link.

2 The Stage 1 Bypass Project consist of the following two sub-stages:

- Stage 1A: 5km link between Echuca-Mooroopna Road to the Goulburn Valley Highway, including a second river crossing and improvements to the existing Wanganui Road. Estimate cost is $165 million (2016 dollars).
- Stage 1B: 5km link between Echuca-Mooroopna Road to the Midland Highway, including a new intersection at the Midland Highway. Estimated cost is $95 million (2016 dollars).

3 The Stage 1 Bypass Project aims to increase road capacity and ensure efficiency, safety and cost-reduction for freight operators, while also reducing industry risk and diverting significant volumes of heavy vehicle movements from Shepparton's CBD.

Issues relating to the existing road situation, and opportunities facilitated by the Stage 1 Bypass Project, are explored in the following Chapter.

3 ISSUES AND OPPORTUNITIES ASSESSMENT

3.1 Consultation Process

Consultation has been undertaken with a number of stakeholders as part of this assessment of issues and opportunities. Participants included representatives from the following organisations:

- Greater Shepparton Council officers (Economic Development, Planning, Transport)
- Shepparton Bypass Action Group
- Committee for Greater Shepparton
- Shepparton Chamber of Commerce and Industry
- VicRoads
- Freight operators (Hicks Transport Group, Kreslas Bros. Transport)
- AECOM (developer of Bypass transport model for VicRoads)

A summary of findings from these consultations are presented in the following sections, including a number of testimonials relating to the proposed Stage 1 Bypass Project.

3.2 Key Issues and Constraints

The consultation process revealed the following issues and constraints associated with the existing road and traffic situation:

- Uncertainty for industry regarding long-term road capacity and road alignments.
- Safety concerns for drivers and pedestrians associated with heavy vehicle conflicts along High Street.
- Wear and tear on heavy vehicles through the need to negotiate traffic lights, roundabouts etc.
- Travel times are compromised when travelling along High Street due to speed restrictions, congestion/traffic volumes, traffic signals, roundabouts etc.
- Risks associated with reliance on a single bridge crossing (Peter Ross Edwards Causeway), with significant industry impacts arising from partial or full closure of the crossing and noting that the nearest alternative heavy-vehicle crossing is located 35km away at Murchison. Under the existing situation, this risk factor will increase overtime as the freight task increases.

- Shepparton's High Street cannot fulfil its commercial potential until negative impacts of significant daily heavy-vehicle volumes are considerably reduced. These impacts include pollution, noise, parking/heavy vehicle conflicts, and pedestrian/heavy vehicle conflicts

3.3 Key Opportunities

The consultation process revealed the following opportunities associated with the completion of the Stage 1 Bypass Project:

- Supports export-oriented operators in the GV Region who are reporting expanding market growth in Asia, especially in China in relation to dairy and food products. Providing more efficient freight movements to export ports will enhance existing GV businesses looking to benefit from expanding export markets. Greater Shepparton's international exports have increased from $390 million in 2009/10 to $465 million in 2014/15 (economy.id), driven principally by agriculture and food processing.
- Provides certainty for industry/land owners (including City of Greater Shepparton) with regard to long-term land use and operational planning, including investment and development of industrial land.
- Enables the revitalisation of High Street through improved amenity, safety, parking, traffic calming, landscaping etc to bring it in line with Fryers Street and Vaughan Street where similar revitalisation has resulted in a considerable uplift in investment and commercial performance.
- Opportunities to encourage a broader mix of activities (retail and non-retail) along High Street once amenity and safety is improved, such as outdoor dining.
- Revitalisation of the broader CBD, recognising key linkages between High Street and other major commercial areas such as Maude Street, Maude Street Mall, Wyndham Street, and Vaughan Street etc.

3.4 Testimonials

Transport Operator Perspective

Hicks Transport Group

Hicks Transport Group operates a fleet of 50 trucks, ranging in size from small rigid tray bodies, up to 26 metre, 68 tonne B Doubles.

The firm have depots in Shepparton, Cobram to the north, and also Melbourne. Hicks Transport Group run up to 30 truck movements per day from the Shepparton depot, which is located just to the east of the city centre, through the middle of town along High Street and across the causeway to Mooroopna.

In its current format, these vehicle movements present a heightened level of risk associated with every truck movement along the causeway, as drivers are required to travel through the

busy heart of Shepparton and Mooroopna. Along High Street, it is not a good combination to have a strip predominantly designed for cars and businesses, but with pedestrians and young families visiting the retail outlets, cafes and restaurants, while B Doubles pass through and with cars looking for car parks.

"We have had many instances where we have seen a truck take a car door off", said one company driver, with "some motorists simply do not look before stopping in front and opening their car doors." It is extremely hard to stop a 68 tonne vehicle in a hurry, even at slow speed.

Along with the on-road risks, this creates the issue of fatigue and stress on truck drivers as they travel through the busy shopping precinct, as well as the increased stress on equipment and truck brakes.

Having the Shepparton Bypass stage 1A and 1B open would relieve a significant amount of risk and stress on truck drivers, car drivers, pedestrians and families alike.

Everyone I have discussed with agreed, including another company B Double driver "that bypass 1A and 1B is the best idea I have heard all year; it has been around for too long, it is time we action it and get trucks out of the city."

Kreskas Bros. Transport

The east-west corridor through Shepparton is via the busy High Street. High Street forms part of the main central business district of the city and is a busy shopping precinct between Wyndham Street and the railway line. High Street is a two-lane carriageway with parking on the left and a central medium strip. It is regarded by heavy vehicle drivers as a dangerous strip of roadway because of the proximity of pedestrians and other manoeuvring vehicles.

There is no reasonable alternative east-west route for B-Double configurations through Shepparton, other than High Street.

West of High Street is the Peter Ross Edwards Causeway. A meandering four-lane carriageway, with undulating road surface and minimal areas for emergency parking. If this stretch of roadway is closed because of a major incident the alternative to the Causeway is a 75km extra travelling via Murchison to the south.

Stage 1 of the Goulburn Valley Shepparton Bypass is not something for the future, but a badly overdue necessity for the region.

This first stage (Stage 1), from the Midland Highway to Grahamvale Road- Shepparton Alternate Route (the current north-south heavy vehicle by-pass), will give the transport industry an opportunity to avoid High Street and provide an alternative river crossing to the causeway, significantly reducing industry risk.

The GV Highway Shepparton Bypass Stage 1 Project therefore represents a win not only for industry, but for businesses and visitors to Shepparton's CBD.

Shepparton Chamber of Commerce and Industry

The Board of Shepparton Chamber would like to support the proposed Stage 1 Bypass Project as we feel getting more semi-trailers out of the CBD and surrounds would benefit drivers and pedestrians using the CDB, in particular High Street and Wyndham Street.

The Chamber gets a lot of feedback from members and the public on how dangerous it is to park on both of these streets when they have large semi-trailers bearing down on them and will often keep going as they are too intimidated to park.

With this Bypass in place it would allow Council to progress on desperately needed street-scaping and focus on the revitalization plan for the CBD.

3.5 Conclusions

Key issues associated with the existing situation are identified as follows:

1 Safety concerns for heavy vehicle drivers using High Street (Midland Highway) due to conflicts with pedestrians, other vehicle users and parking cars.

2 Inefficiencies for industry including time costs, vehicle wear and tear associated with speed restrictions, numerous traffic signals and roundabouts on the east-west Midland Highway link between Shepparton and Mooroopna.

3 Concerns regarding the capacity of the existing east-west link to accommodate increasing heavy vehicle volumes and larger vehicles, including High Performance Freight Vehicles in the future.

4 Commercial risks relating to the availability of a single river crossing for heavy vehicles (Peter Ross Edwards Causeway), which results in costs to operators if the crossing is impacted due to traffic incidents or maintenance, noting that the nearest alternative crossing involves an hour-round trip.

Key opportunities arising from the completion of the GV Highway Shepparton Stage 1 Project are as follows:

5 Improved efficiencies for heavy vehicle operators, including reduced travel times, vehicle maintenance savings.

6 Provision of adequate long-term road capacity for industry (including exporters), which is important in terms of certainty and future planning and investment.

7 Reduced risk to industry by the provision of a second heavy vehicle river crossing.

8 Improved safety for drivers and visitors to Shepparton CBD, with road user conflicts significantly reduced.

9 Boost to CBD revitalisation in Shepparton and Mooroopna due to improvements in safety and amenity (reduced noise, pollution) which supports existing Council-led project initiatives.

4 ROAD USER AND EXTERNALITY IMPACT ASSESSMENT

4.1 Introduction

This Chapter provides a road user and externality impact assessment for the Stage 1 Bypass Project (and for sub-stages 1A and 1B). The analysis been prepared by AECOM, through an update of the Shepparton Bypass Strategic Transport Model in August 2016.

4.2 Economic Parameters and Expansion Factors

A key parameter used to estimate travel time saving benefits is the value of travel time. The travel time for car and truck have been updated in this study based on the 2015 National Guidelines for Transport System Management. The Guidelines provide value of time based on June 2013 values which have been updated to the 2015 values using the growth of average weekly earnings for a full time adult in Victoria.

The other economic parameters and expansion factors used in the analysis are shown in Table 4.1.

Table 4.1: Economic Parameters and Expansion Factors

Parameter	Value	Comment
Discount rate	5.0	New rate to be applied for all transport projects for funding in 2011/12 budget cycle
First year of construction	2016	
Last year of construction	2022	
Opening year	2023	Year in which traffic is expected to begin using the road
Appraisal period	30 years from opening year	
Base year for discounting	2016	Year in which first capital cost expenditure is incurred (Australian Transport Council, 2006, p. 75)
Price base	2015	

Source: AECOM

Three time periods were modelled within the Shepparton Bypass Strategic Transport Model – the AM Peak, PM Peak and Off Peak. When added together these trips represent the whole 24 hour period. Therefore an expansion factor of one is used for each time period to calculate average weekday benefits. A different set of expansion factors has been derived from traffic count data for weekend (days) and public holidays. The factors used are shown in Tables 4.2 and 4.3.

Table 4.2: Modelling Period to Daily Expansion Factors (car)

Modelling period	Weekday expansion factor	Weekend day/public holiday expansion factor
AM	1	0
PM	1	0
Off Peak	1	1.2

Source: AECOM calculation based on traffic counts

Table 4.3: Modelling Period to Daily Expansion Factors (heavy vehicles)

Modelling period	Weekday expansion factor	Weekend day/public holiday expansion factor
AM	1	0
PM	1	0
Off Peak	1	0.6

Source: AECOM calculation based on traffic counts

To calculate annual benefits, factors shown in Table 4.4 have been applied to convert the average weekday and average weekend day totals to yearly totals.

Table 4.4: Daily to Annual Expansion Factors

Day type	Daily to annual expansion factor
Weekday	252
Weekend and public holiday	112

Source: AECOM assumption, based upon 252 workdays less 8 public holidays

4.3 Economic Costs

Capital Costs

Total construction costs were provided by Shepparton City Council as summarised below:

- Stage 1A: $140 million
- Stage 1B: $100 million
- Stage 1A and 1B together: $240 million
- Ford Road Upgrade - GV Highway to Grahamvale Road - three lane option: $24.6 million

The cost of the Ford Road upgrade was added to Stage 1A, 1B and 1A and 1B together. Total capital costs are expected to be spread across seven years of construction as shown in Table 4.5 in a profile similar to the previous study. Note, these costs exclude 'real' construction cost escalation, so construction costs are assumed to increase in line with CPI.

Table 4.5: Capital Cost Expenditure Profile (un-escalated), all values in $ millions

Financial year	Spending Profile	Stage 1A	Stage 1B	Stage 1 (1A and 1B)
)2016	16%	$25.6	$19.4	$41.2
2017	18%	$29.0	$22.0	$46.6
2018	18%	$29.9	$22.7	$48.1
2019	17%	$28.4	$21.5	$45.7
2020	15%	$24.5	$18.5	$39.3
2021	11%	$18.0	$13.6	$29.0
2022	6%	$9.1	$6.9	$14.7
Total	**100%**	**$164.6**	**$124.6**	**$264.6**

Source: AECOM

Operating and Maintenance Costs

Operating and maintenance costs (including annual maint nance as well as periodic rehabilitation/asset renewal) for the roadway were derived fr *Review of asset preservation costs* (ARRB Ltd 2009). This study collected maintenance and reh ilitation costs from VicRoads to calculate the annual road preservation costs. From this information, an average operating and maintenance cost of $8,000 per lane and per km was estimated. Cost modifiers were assumed to be the same as those used in the 2012 Shepparton study to take into account conditions that would lead to higher than average maintenance costs. For this assessment the maximum cost modifier factor of 1.45 for rural roads has been used to be conservative. The operating costs have been updated to December 2015 values, by applying an appropriate CPI index, and the results are shown in Table 4.6.

The options contain significant structural works such as bridges and overpasses which are not accounted for in the average preservation costs calculated by ARRB. The annual maintenance costs for these assets has been estimated using 1% of the capital costs of the structural assets.

Table 4.6: Operating and Maintenance Costs of Roadway

Road Type	Operating and Maintenance Costs (2015)
Cost per lane km	$14,500 per lane km per year

Source: AECOM

4.4 Economic Benefits

The following benefits have been calculated:

- Road user benefits, including:
  - travel time savings
  - vehicle operating cost savings.
- Non-user benefits (or externality cost savings), including:

- crash cost savings
- greenhouse gas emission savings
- other environmental externality savings (such as air and noise pollution).

Benefits have been calculated using the outputs from the transport model for the Base Case and Options over the AM Peak, PM Peak and Off Peak time periods.

4.5 Economic Results

The results of the economic assessment are shown in Table 4.7. The option which delivers the greatest benefits is the Stage 1 Bypass Project (Stages 1A and 1B combined including the Ford Road upgrade).

Stage 1A has the highest Benefit Cost Ratio (BCR) as it generates significant travel time savings relative to its construction costs. Stage 1B has the lowest benefits as it represents an isolated option without connection to Goulburn Valley Highway, and Ford Road upgrade. Additionally, this option does not provide an attractive alternative to its parallel route like Echuca Rd or Turnbull Road.

The Stage 1 Bypass Project (Stages 1A and 1B) has a BCR of 0.37 which is lower than Stage 1A, as the combined benefits of Stages 1A and 1B increase by just 13%, while its costs increase by 58% under this option.

Table 4.7: Economic Assessment Results

	Stage 1A	Stage 1B	Stage 1 (1A and 1B)
Present Value of Costs			
Capital costs ($m)	146.0	110.5	234.7
Operating and maintenance costs ($m)	9.6	2.5	11.3
Present Value of Benefits			
User Benefits			
Vehicle travel time savings ($m)	51.3	-0.4	58.5
Vehicle operating cost savings ($m)	16.3	-0.2	17.8
Externalities Savings			
Crash cost savings ($m)	-0.0	0.0	-0.2
CO_2 savings ($m)	1.9	0.0	1.9
Environmental externality savings ($m)	11.3	0.6	12.7
Overall			
Present value of total costs ($m)	155.6	113.0	246.0
Present value of total benefits ($m)	80.7	0.1	90.8
Net Present Value ($m)	-74.9	-112.9	-155.2
Benefit Cost Ratio	**0.52**	**0.00**	**0.37**

Source: AECOM

4.6 Conclusions

The Stage 1 Bypass Project (Stages 1A and 1B combined with the Ford Road upgrade) provides the following economic results from a road user and externality perspective:

- Benefits (Net Present Value):
  - Travel time savings: $58.5 million
  - Vehicle operating cost savings: $17.8 million
  - Crash cost savings -$0.2 million
  - CO2 savings $1.9 million
  - Environmental externality savings $12.7 million`
- *Total Benefits (Net Present Value)* *$90.8 million*
- *Total Costs (Net Present Value)* *$246.0 million*
- Stage 1 Project Return – Net Present Value $155.2 million
- Stage 1 Project – Benefit Cost Ratio 0.37

5 ECONOMIC IMPACT ASSESSMENT

5.1 Investment

Project investment of $260 million is expected to be required to complete Stage 1 of the Goulburn Valley Highway Shepparton Bypass Project. As noted earlier in this report, Stage 1 will comprise:

- Stage 1A – $165 million (including project planning)
- Stage 1B – $95 million

These are preliminary estimates which are subject to more detailed planning and design studies. Ford Road will also need to be upgraded through a separate project.

This estimated investment will provide a significant economic stimulus for the GV Region, as described in the following sections.

5.2 Construction Phase Economic Stimulus

The proposed Stage 1 Bypass Project will stimulate significant economic output and employment for the region (and wider economy).

These factors have been modelled using the *economy id economic impact assessment* tool (for the City of Greater Shepparton), based on the investment value identified in 5.1.

Output

Total Output

The direct stimulus of $260.0 million in the Construction sector of the City of Greater Shepparton economy would lead to an increase in indirect demand for intermediate goods and services across related industry sectors. These indirect industrial impacts (Type 1) are estimated to be an additional $76.4 million in Output, representing a Type 1 Output multiplier of 1.29.

An additional contribution to the City of Greater Shepparton economy would be generated through consumption effects as, correspondingly, additional wages and salaries are spent in the local economy. This would result in a further increase in Output estimated at $129.2 million.

The combination of all direct, industrial and consumption effects would result in total estimated rise in Output of $465.6 million in the City of Greater Shepparton economy, representing a Type 2 Output multiplier of 1.79.

These impacts would not be limited to the local economy. Industrial and consumption effects would flow outside the region to the wider Australian economy, involving $122.0 million in Output.

The combined effect of economic multipliers in the City of Greater Shepparton and the wider Australian economy is estimated to be $587.6 million added to the National Output.

Wages and Salaries Income

The direct addition of $260.0 million annual output in the Construction sector of the City of Greater Shepparton economy is estimated to lead to a corresponding direct increase in income from Wages and Salaries of $82.3 million in the local Construction sector. A further $23.0 million in Wages and Salaries would be generated from the employment created in related intermediate industries. This represents a Type 1 Income multiplier of 1.28.

As these Wages and Salaries flow through the economy, it will increase local consumption, creating more jobs and adding an estimated $45.6 million in Wages and Salaries in consumption industries, such as the retail sector.

The combination of all direct, industrial and consumption effects would result in a total estimated increase in income through Wages and Salaries of $150.93m in the City of Greater Shepparton. This represents a Type 2 Income multiplier of 1.83.

These income impacts would not be limited to the local economy. Industrial and consumption effects would flow outside the region to the wider Australian economy, creating a further $47.2 million in Wages and Salaries.

The combined effect of economic multipliers in the City of Greater Shepparton and the wider Australian economy is estimated to be an addition of $198.1 million in Wages and Salaries.

Value-Added Output

The direct addition of $260.0 million annual output in the Construction sector of the City of Greater Shepparton economy would lead to a corresponding direct increase in Value-added of $71.4 million. A further $25.5 million in Value-added would be generated from related intermediate industries. These indirect industrial impacts represent a Type 1 Value-added multiplier of 1.36.

An additional contribution to the City of Greater Shepparton economy through consumption effects would result as more wages and salaries are spent in the local economy. This would result in a further increase in Value-added estimated at $63.3 million.

The combination of all direct, industrial and consumption effects would result in an estimated addition in Value-added of $160.3 million in the City of Greater Shepparton economy, representing a Type 2 Value-added multiplier of 2.24.

These impacts would not be limited to the local economy. Industrial and consumption effects would flow outside the region to the wider Australian economy, amounting to $56.1 million in Value-added.

The combined effect of economic multipliers in the City of Greater Shepparton and the wider Australian economy is estimated to involve a $216.4 million contribution to Australia's Value-added, as shown in Table 5.1.

Table 5.1: Goulburn Valley Shepparton Bypass – Stage 1, Construction-Related Output

Summary	Output ($m)	Value-added ($m)	Wages & salaries ($m)
Construction	414	114	131
All industries	5,515	2,542	1,800
Impacts on City of Greater Shepparton economy			
Direct impact on Construction sector	260	71	82
Industrial impact	76	25	23
Consumption impact	129	63	46
Total impact on City of Greater Shepparton economy	**466**	**160**	**151**
Type 1 multiplier (direct & industrial)	1.29	1.36	1.28
Type 2 multiplier (direct, industrial & consumption)	1.79	2.24	1.83
Impact on Australian economy			
Total impact outside City of Greater Shepparton	122	56	47
Total impact on Australian economy	***588***	***216***	***198***

Source: National Institute of Economic and Industry Research (NIEIR) ©2015. Compiled and presented in economy.id by.
Figures rounded

Employment

Total and Local Employment

The direct addition of $260.0 million annual output in the Construction sector of the City of Greater Shepparton economy is estimated to lead to a corresponding direct addition of 1,315 jobs in the local Construction sector (full-time, part-time and casual). From this direct expansion in the economy it is anticipated that flow-on effects would be experienced in other related intermediate industries, creating an additional 385 jobs. This represents a Type 1 Employment multiplier of 1.29.

This addition of jobs in the local economy would lead to a corresponding increase in wages and salaries, a proportion of which would be spent on local goods and services, creating a further 860 jobs through consumption impacts.

The combination of all direct, industrial and consumption effects would result in a total estimated increase of 2,560 jobs located in the City of Greater Shepparton. This represents a Type 2 Employment multiplier of 1.95.

Employment impacts would not be limited to the local economy. Industrial and consumption effects would flow outside the region to the wider Australian economy creating a further 608 jobs.

The combined effect of economic multipliers in the City of Greater Shepparton and the wider Australian economy is estimated to be an addition of 3,169 jobs.

Employment by Sector

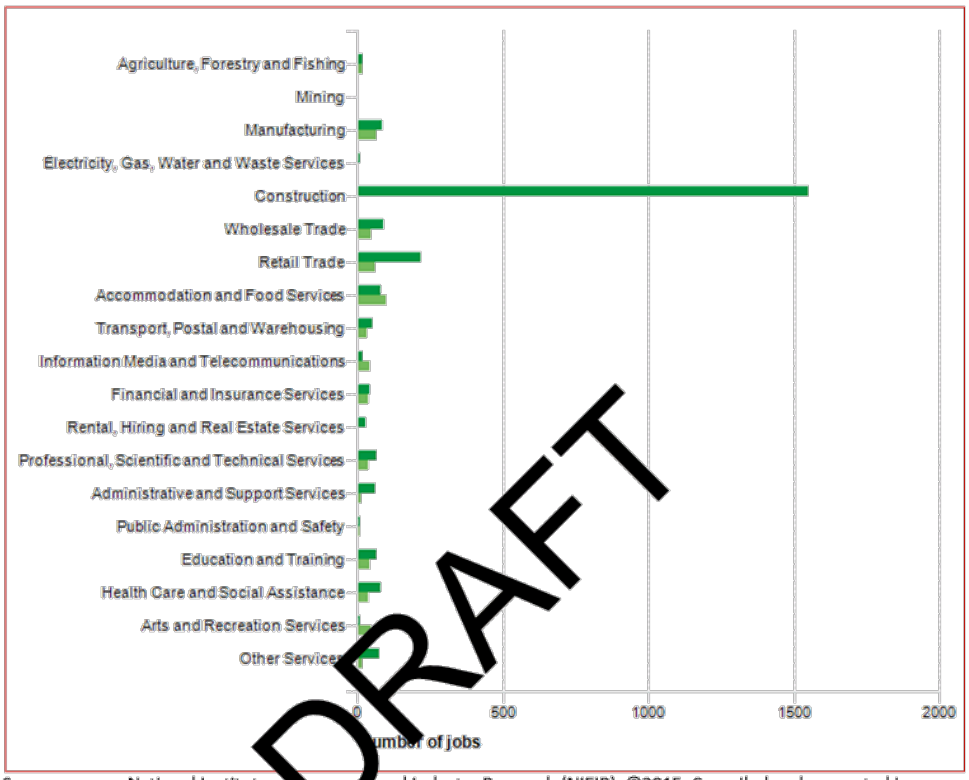
Estimated employment by industry sector is presented in Tables 5.2 and Figure 5.1.

Table 5.2: Goulburn Valley Shepparton Bypass – Construction-Related Employment by Industry Sector

Industry sectors	Jobs created in City of Greater Shepparton	Jobs created outside City of Greater Shepparton	Total Jobs Supported by the Project	Jobs created for City of Greater Shepparton residents
Agriculture, Forestry and Fishing	19	17	36	19
Mining	2	2	3	1
Manufacturing	84	66	149	85
Electricity, Gas, Water and Waste Services	8	5	13	6
Construction	1,548	0	1,548	1,312
Wholesale Trade	88	46	133	80
Retail Trade	217	62	279	197
Accommodation and Food Services	82	100	182	85
Transport, Postal and Warehousing	52	31	82	45
Information Media and Telecommunications	19	41	60	20
Financial and Insurance Services	42	36	78	40
Rental, Hiring and Real Estate Services	27	0	27	27
Professional, Scientific and Technical Services	65	38	103	60
Administrative and Support Services	63	15	78	56
Public Administration and Safety	10	8	18	8
Education and Training	65	41	107	60
Health Care and Social Assistance	81	37	118	72
Arts and Recreation Services	11	45	56	11
Other Services	78	20	97	75
Total industries	**2,560**	**608**	**3,169**	**2,258**

Source: National Institute of Economic and Industry Research (NIEIR) ©2015. Compiled and presented in economy.id.
Figures rounded

Figure 5.1: Goulburn Valley Shepparton Bypass – Construction-Related Employment by Industry Sector



Source: National Institute of Economic and Industry Research (NIEIR) ©2015. Compiled and presented in economy.id.

Project Participation Opportunities

Employment

The occupational structure of the GV Region highlights the relatively high proportion of regional labour force participants occupied in construction-related activities, as shown in Table 5.3.

For example, approximately 36% of all occupations in the GV Region are related to technicians and trades, machinery operators and drivers, and labourers. In contrast, on a State-wide basis, only 29% of occupations are associated with these activities.

This data indicates the GV Region is well-positioned to meet the demand for many jobs created during the construction phase of the project.

Table 5.3: Goulburn Valley Region – Occupational Structure, 2011

	GV Region		Victoria	
	No.	%	No.	%
Technicians and Trades Workers	8,344	14.3%	350,760	13.9%
Machinery Operators and Drivers	4,181	7.2%	154,544	6.1%
Labourers	8,695	14.9%	227,185	9.0%
Sub-total	*21.220*	*36.4%*	*732,489*	*29.0%*
Managers	10,271	17.6%	332,927	13.2%
Professionals	8,432	14.4%	564,778	22.3%
Community and Personal Service Workers	5,362	9.2%	234,383	9.3%
Clerical and Administrative Workers	6,444	11.0%	364,498	14.4%
Sales Workers	5,512	9.4%	245,334	9.7%
Inadequately Described / Not Stated	1,170	2.0%	56,224	2.2%
Total	**58,411**	**100.0%**	**2,530,633**	**100.0%**

Source: ABS Census of Population and Housing, 2011 – Based on Place of Work data.

Business

Approximately 2,100 construction businesses are located in the GV Region, according to ABS Business Counts for 2013 which are shown in Table 5.4. The distribution of these construction businesses (which include individual contractors) is widespread across the region and indicates project participation opportunities (assuming appropriate skills match) are likely to benefit the economies of each of the four municipalities in the study area.

Table 5.4: Goulburn Valley Region – No. of Construction Businesses, 2013

Area	No. of Construction Businesses	Total No. of Businesses	Construction Businesses as proportion of Total Businesses
Shepparton	927	6,226	14.9%
Campaspe	599	4,215	14.2%
Moira	403	3,094	13.0%
Strathbogie	158	1,341	11.8%
GV Region	**2,087**	**14,876**	**14.0%**

Source: ABS Counts of Businesses 2013.

5.3 Improved CBD Commercial Performance

5.3.1 Shepparton CBD Overview

The removal of significant heavy vehicle movements from Shepparton's CBD has the potential to contribute to:

- Improved safety
- Enhanced amenity

- Uplift in property values and rentals along High Street
- Improved retail / commercial mix as identified 'market gaps' are filled
- Attraction of higher-order uses and national/international retailers
- Reduced commercial vacancy rates in High Street and adjoining streets
- New opportunities for outdoor dining along High Street
- Improved parking
- Activating several large development sites in the area which have been dormant for many years
- Stimulating further investment to complement recent CBD investments in Vaughan Street, Maude Street and Shepparton Mall
- Attracting tourists to Shepparton CBD, noting the proposed development of a nationally-significant visitor attraction – Shepparton Arts Museum (SAM) – in the coming years.

The City of Greater Shepparton's recently adopted Commercial Activities Centres Strategy (Essential Economics, 2016) highlights long-term challenges and constraints associated with Shepparton's CBD. These are summarised as follows:

- Approximately 70 vacant shopfront tenancies, accounting for 11.25% of leasable premises (or 12,520m^2 of vacant floorspace).
- This vacancy rate represents a relatively poor outcome for the Shepparton CBD. The typical range of vacancies for a well-performing street-based activity centre of between 4% and 6% has been identified across Australia.
- Significant market gaps, including:
  - A lack of food and dining in the Maude Street Mall
  - Despite recent growth, a general under-provision of quality cafes and restaurants
  - Limited general night-time economy, excluding licenced venues
  - Limited quality footwear shops (male and female) and menswear fashion stores
  - An under-representation of ethnic food and grocery stores
  - No representation of international retailers which have recently entered the Australian market (e.g. Uniqlo, Apple, Daiso, Top Shop)
  - No signature cultural events of national profile (e.g. Princess Grace Kelly and Marylyn Monroe clothing exhibitions in Bendigo were a major boost to local retail in that city)
  - No permanent fresh food market or precinct which otherwise creates opportunities to support and engage with local primary producers.

Figure 5.2 provides an overview of vacant shopfront tenancies by use category, namely retail, non-retail and office. The spread of vacancies is mainly clustered either side of High Street or on adjoining streets with connectivity to High Street.

Figure 5.3 provides images of current vacant shopfront tenancies (April 2016) along High Street (CBD area only), which shows that a wide range of sizes and uses remain vacant along this strip which is highly impacted by heavy traffic.

Two major development sites are located along this strip, each of which has been dormant for many years. These sites, shown in Figure 5.4, are the former Shepparton Hotel site (approximately 2,000m^2) which is located at the intersection of Wyndham and High Streets, and an undeveloped lot at 155-165 High Street (approximately 9,000m^2).

Both sites are subject to significant heavy traffic flows, but provide prime exposure in a commercial context.

Figure 5.2: Greater Shepparton CBD tenancy Mix and Vacancies in Core Areas

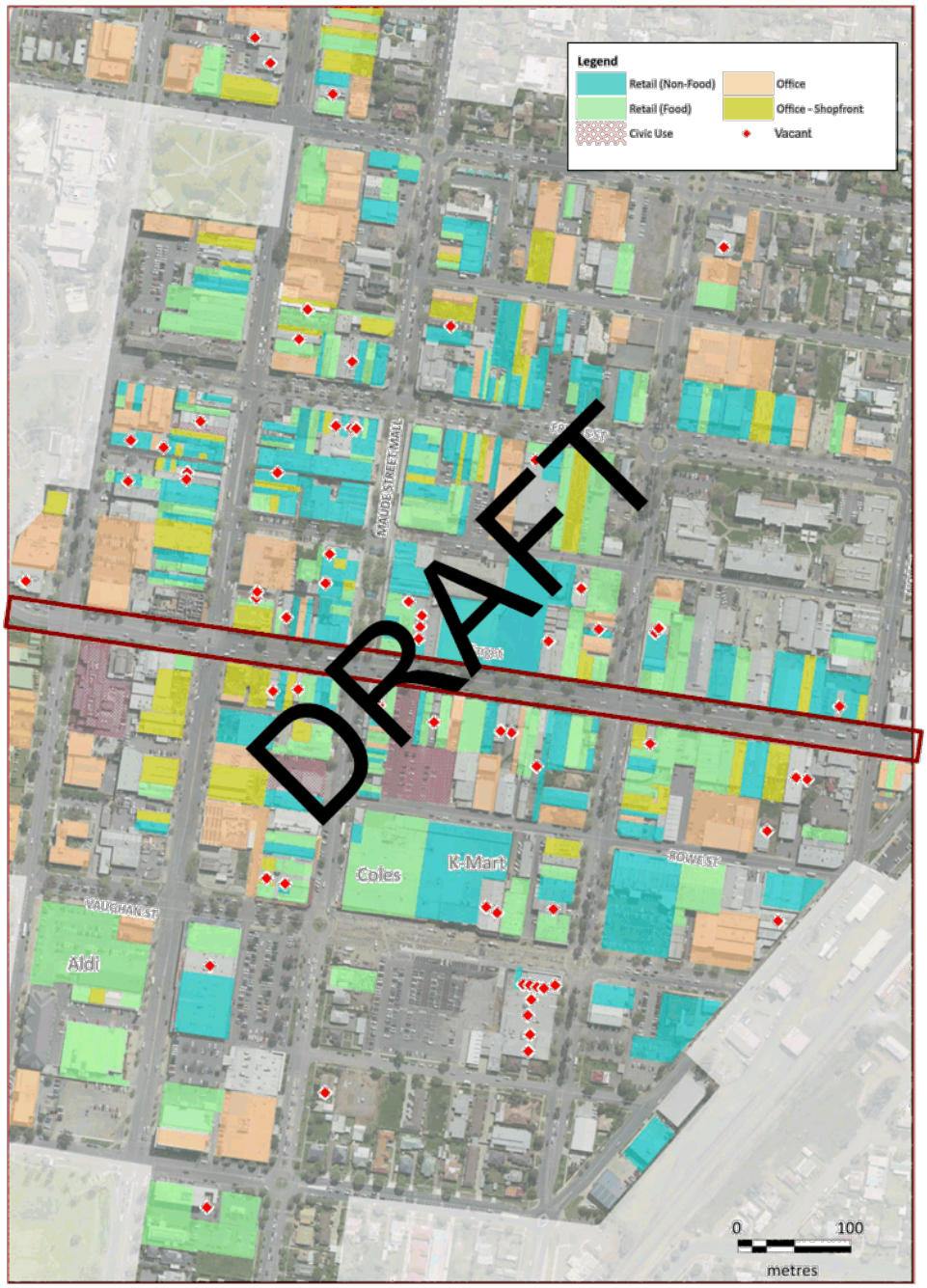
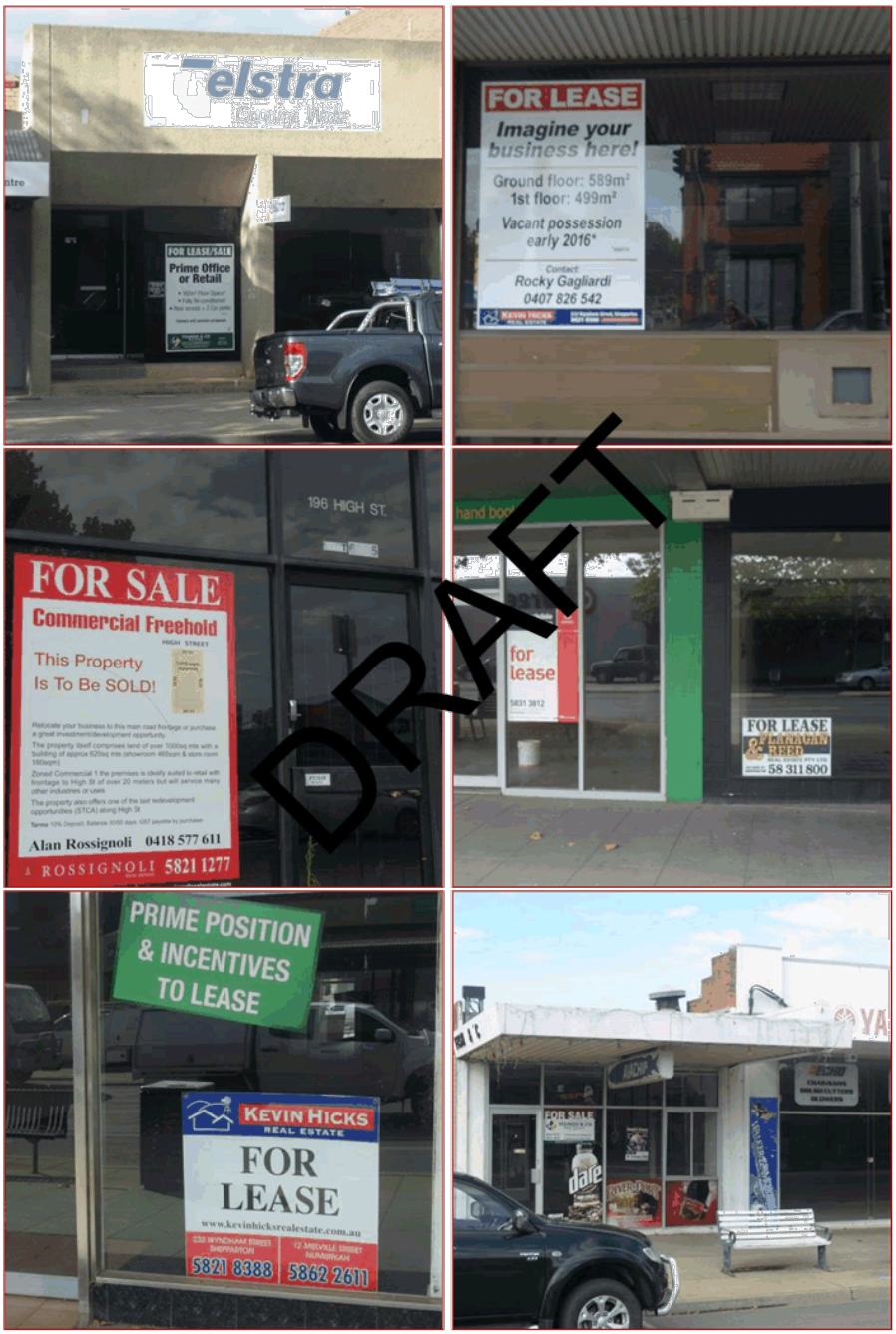


Figure 5.3: Selected Vacant Commercial Premises – High Street, April 2016



Source: Greater Shepparton City Council (April 2016)

Figure 5.4: Vacant Development Sites – High Street, April 2016

Source: Greater Shepparton City Council (April 2016)

5.3.2 Mooroopna CBD Overview

The Mooroopna CBD is classified as a sub-regional centre, with major shopfront tenancies located on either side of the Midland Highway. The role and function of the CBD is principally to serve the food and grocery and general convenience shopping needs of residents of Mooroopna and rural and regional communities in Greater Shepparton's western areas (eg, Murchison, Tatura).

The City of Greater Shepparton Commercial Activities Centres Strategy makes the following points in relation to Mooroopna's CBD:

- The CBD contains a total of approximately 12,750m^2 of shopfront floorspace, including approximately 11,270m^2 of retail tenants.
- Mooroopna CBD has a limited role in providing higher-order retail and commercial functions.
- The CBD has a vacancy rate of approximately 5% (or 650m^2 of vacant shopfront floorspace); this reflects in part some tenancies that are out-dated in terms of their ability to meet modern shopper needs, and thus require a re-fit or replacement. Nonetheless, the current vacancy rate is within normal expectations for a centre of this type and function.
- Mooroopna CBD has a pleasant street-based shopping environment that benefits from plentiful on-street parking and the amenity provided by the large median strip on the Midland Highway. Opportunities for improvement to the streetscape and shopping exist, although in an overall sense the benefits arising from such changes would likely be only incremental.
- The northern and southern sides of the Mooroopna CBD are separated by a large median. This means that the Woolworths and ALDI stores on the south side create customer traffic that does not directly benefit those specialty shops which are concentrated to the north of the median strip.

These findings indicate that the Stage 1 Bypass Project will have some beneficial outcomes for Mooroopna CBD, especially if accessibility and connectivity between the north and south components of the CBD are improved. In this regard, the removal of a large proportion of heavy traffic from Mooroopna CBD affords an opportunity for urban design initiatives that will increase connectivity and functionality of the centre.

While vacancy rates and overall performance are considered reasonable for Mooroopna CBD, a small reduction in vacancy rates is included in the modelling to reflect the beneficial outcomes of improved CBD connectivity facilitated by the Stage 1 Bypass Project.

5.3.3 Estimation of Economic Benefit of the Stage 1 Bypass Project

As noted above, the completion of the Stage 1 Bypass Project will have the effect of removing a significant proportion of existing and future heavy vehicle movements from High Street in the Shepparton CBD and this will be beneficial for traders, other businesses, workers, shoppers

and visitors alike. Significant improvements in safety and amenity (reduction in noise, pollution etc) will allow High Street to be regenerated into a vibrant commercial strip. This will assist in the revitalisation of adjoining areas, including the Maude Street Mall, especially if the Mall is partially or fully reopened to traffic, thereby allowing connectivity between Fryers and High streets.

The following assumptions have been made with regard to the likely impact of the Stage 1 Bypass Project on Shepparton CBD commercial performance

- The analysis is based on a 25-year timeframe, with Year 1 representing the completion of the Bypass works.
- Shopfront vacancy rates are based on values contained in the Shepparton Commercial Activities Centres Strategy.
- Shopfront vacancy rates are assumed to decline by 50% over a 10-year period, which brings Shepparton CBD in line with vacancy rates in other Victorian Regional Centres at around 5%.
- From Year 11 onwards, it is assumed the full initial impact of the Stage 1 Bypass Project on the CBD has been realised; however, vacancy rates remain at regional averages, thus recognising the ongoing positive impact of the Bypass on the CBD.
- Employment creation in occupied shopfront tenancies is based on industry averages by floorspace use.
- Economic output is based on value added output and is derived from information contained in the economy.id model (prepared by National Economics) for the City of Greater Shepparton.

Based on these assumptions, the full impact of the Stage 1 Bypass Project on Shepparton's CBD would see a reduction vacant floorspace in shopfront tenancies of 6,260m^2 by Year 10 (with these tenancies remaining occupied thereafter on an ongoing basis). The majority of re-occupied floorspace (approximately 75%) would be associated with retail activities and the remainder associated with non-retail activities (approximately 25%) which include small offices, community service providers, consultancies etc.

In terms of employment, an estimated 220 jobs (rounded) will be supported directly by these new tenancies, comprising 160 retail jobs and 60 non-retail jobs. These jobs include full-time, part-time, casual and temporary positions.

Mooroopna CBD will also benefit from the reduction of a significant proportion of heavy vehicles travelling through its CBD by allowing for better accessibility, connectivity and functionality of the centre through urban design initiatives. A nominal reduction in vacancy rates from 5% to 4% has been factored in across the 25-year lifecycle to represent commercial benefit, which would support 5 jobs in these occupied tenancies through reduced floorspace vacancies of 150m^2.

Additional jobs will be supported in the region through the employment multiplier effect, and this is detailed in Table 5.6.

The estimated impact of the Stage 1 Bypass Project on shopfront vacancies and associated direct employment generation is shown in Table 5.5.

Table 5.5: Impact of Bypass Project on Floorspace Vacancies and Jobs

Category	Vacant Floorspace	Bypass Impact on leased floorspace	Jobs / floorspace ratio	New Jobs Supported (full impact)
Shepparton CBD				
Retail shopfront	9,600m^2	4,800m^2	1 job per 30m^2	160 jobs
Non-retail shopfront	2,920m^2	1,460m^2	1 job per 25m^2	60 jobs
Shepparton CBD Total	12,520m^2	6,260m^2	1 job per 22m^2	220 jobs
Mooroopna CBD Total	*660m^2*	*150m^2*	*1 job per 30m^2*	*5 jobs*
Regional Total	**13,180m^2**	**6,410m^2**	**1 job per 28m^2**	**225 jobs**

Source: City of Greater Shepparton Commercial Activities Centres Strategy 2016; National Institute of Economic and Industry Research (NIEIR) ©2015. Compiled and presented in economy.id; Essential Economics
Figures rounded

The employment data outlined in Table 5.5 has been utilised to derive value added output for the Greater Shepparton economy on a lifecycle (25-year basis) and includes impacts on both Shepparton and Mooroopna CBDs. The data is based on the economy.id model prepared for Greater Shepparton and outcomes are show in Net Present Value (NPV) terms, which is based on a 5% Discount Rate.

The results show:

- Total employment impact of 405 additional regional jobs, including 225 direct jobs and 180 indirect jobs (which include full-time, part-time, casual and temporary roles).
- An increase in regional value-added output of $316 million (NPV) over 25 years comprising:
  - $192 million in additional value-added associated with retail activities
  - $124 million in additional value-added associated with non-retail activities

Table 5.6: Regional Economic Impacts of Bypass Project, Annually (NPV)

Category	New Direct Jobs Supported In Region FULL IMPACT	New Indirect Jobs Supported In Region FULL IMPACT	Total New Regional Jobs FULL IMPACT	Additional Regional Value-Added Output Over 25 years
	No.	*No.*	*No.*	*Net Present Value*
Retail	165	110	275	$192.1 million
Non-Retail	60	70	130	$124.1 million
Total	**220**	**180**	**405**	**$316.2 million**

Source: City of Greater Shepparton Commercial Activities Centres Strategy 2016; National Institute of Economic and Industry Research (NIEIR) ©2015. Compiled and presented in economy.id; Essential Economics
Figures rounded

5.3.4 Non-Quantified Commercial Benefits

Commercial Office Floorspace

Approximately 60,000m^2 of stand-alone (dedicated) office floorspace is currently provided in Shepparton's CBD. Unlike shopfront floorspace – which is mainly driven by resident and visitor needs – office floorspace can be considered somewhat 'footloose', although a core component is required to service population-based growth (public administration, health and community services etc). Vacancy rates and data relating to specific office-based activities are not available and therefore the impact of the Stage 1 Bypass Project has not been quantified for this report. However, in the longer term a general uplift in CBD safety, amenity, activity and visitation is likely to have a positive impact on the office market in terms of desirability for business location, and rental/property values.

Development Sites

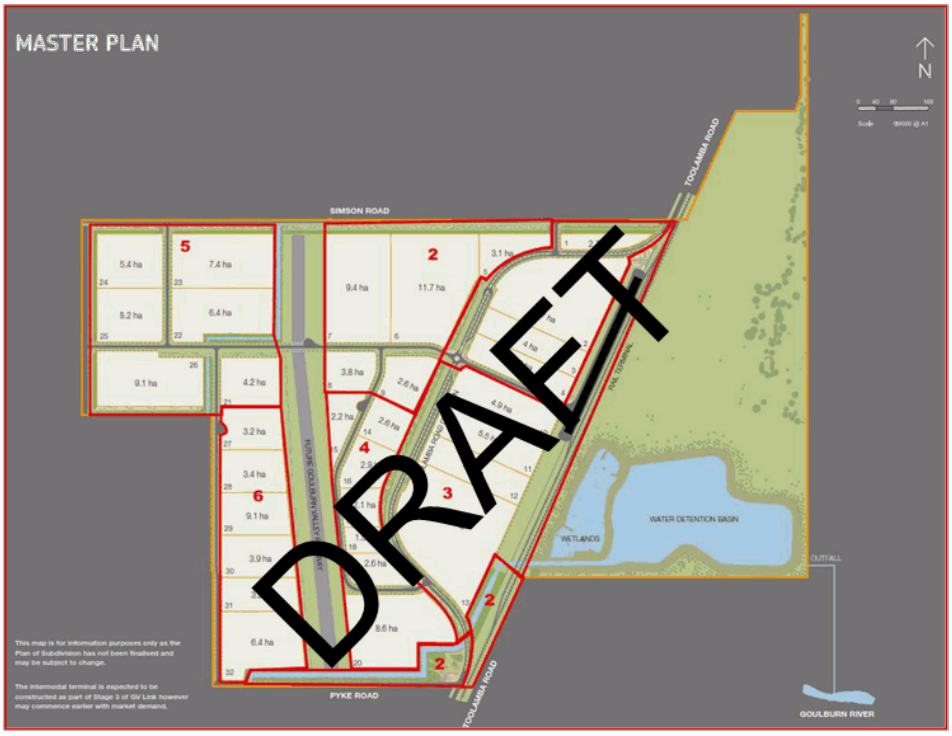
As noted earlier, two major development sites are located with frontage to High Street, with these sites lying dormant for many years. While many factors contribute to the development or otherwise of such sites (owner preferences, financing, market conditions, planning controls etc), improved safety and amenity along High Street would be expected to provide a beneficial environment for a range of development uses on these sites. Such uses (subject to planning approval) could include high-density residential (apartments), commercial office, retail, and café/restaurant/entertainment. For example, the former Shepparton Hotel Site is located in Court Precinct which is currently the subject of significant investment, potentially providing a stimulus for the development of the currently unused site, especially if safety and amenity ion this general area are improved through the significant reduction in heavy vehicle volumes.

Support to GV Link Project

GV Link is a proposed Intermodal Freight Hub located in Toolamba, approximately 5km south-west of Shepparton. The 331ha site has been acquired by Council, and a Master Plan has been prepared for the site, as shown in Figure 5.5.

A key driver of investment in GV Link is for the site to be connected to the GV Highway Bypass which will provide critical linkages for freight and logistics operators to national and export markets. While the Stage 1 Bypass Project does not provide a link to the site, the completion of this stage has the potential to generate interest in GV Link, with the Stage 1 Bypass Project seen as a precursor to the construction of the full Bypass.

Figure 5.5: GV Link Site Layout



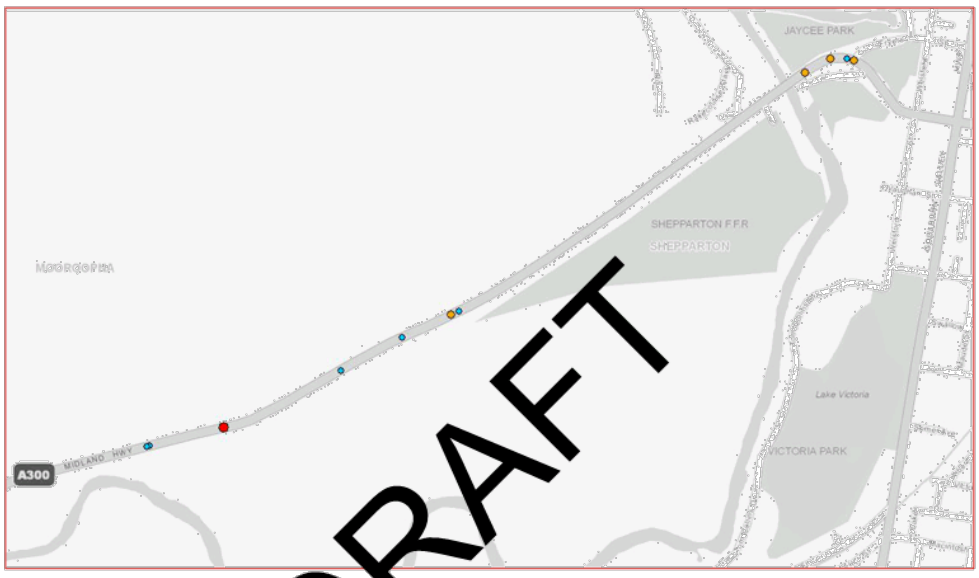
5.4 Reduced Commercial Risk through Provision of a Second Bridge Crossing

The Peter Ross Edwards Causeway represents the only viable river crossing for heavy vehicles travelling in an east-west direction (Shepparton to Mooroopna). The closest alternative route for heavy vehicles crossing is at Murchison and this involves a 70km (or one hour) round trip. When incidents occur on the Causeway requiring partial or complete closure of the crossing, significant costs for industry are incurred, by either through delay or circumvention via the alternative route.

This situation presents a considerable cost risk to commercial operators and is likely to be exacerbated in the future as the region's freight task and usage of the Causeway increases significantly. The Causeway is also under constant threat of flooding, which is a further important consideration in favour of the Bypass.

Peter Ross-Edwards Causeway has been subject to major disruptions in recent times; including 17 reported road traffic incidents involving injury between 2008 and 2015 (as shown by the dots in Figure 5.6). Additionally, the Causeway is impacted regularly by non-reported accidents (ie where no injury is involved) and maintenance works.

Figure 5.6: Peter Ross-Edwards Causeway – Serious Road Traffic Incidents, 2008-2015



The Shepparton Bypass Strategic Transport Model shows that under the Base Case Scenario, two-way heavy traffic crossing the Causeway will increase from an average of 2,800 daily movements in 2016 to 5,800 daily movements by 2041. This represents a more than doubling of existing heavy traffic volumes across the Causeway and amounts to approximately 1.1 million additional heavy vehicle Causeway crossings annually by 2041, compared to the 2016 situation.

The economic benefit of providing a second bridge crossing through the Stage 1 Bypass Project has been calculated with reference to the following assumptions:

- Forecast heavy vehicle Causeway volumes are sourced from the SBSTM Base Case for the 25-year period 2016 to 2041
- A one-hour delay is factored-in for each month of the forecast period (or 12 hours of delay per year over 25 years). These delays represent a mix of major and minor incidents and works.
- An hourly rate of $200 per vehicle (2016 dollars) has been assigned and this is based on information sourced from *WA Department of Transport – Road Freight Industry Transport Council Cost Calculator*.

Based on these parameters, the total savings over 25 years from reduced commercial risk to industry through the provision of a second bridge crossing are estimated at $13.1 million or $7.2 million in NPV terms.

5.5 Regional Economic Development

The GV Shepparton Bypass Project supports regional economic development in a number of ways, which include:

- Ensures improved efficiency and productivity for businesses involved in the region's significant food production, food processing and food transportation activities; noting strong and expanding export markets (eg China) for the region's produce.
- Provides certainty to industry with regard to land use planning and future investments in the region.
- Generates significant regional employment and participation opportunities for construction-related businesses and the regional labour force over the two-year construction phase.
- Stimulates improved commercial performance and investment in Shepparton and Mooroopna CBDs, leading to business and employment growth and increase in value - added output.
- Contributes to potential to increase level of business interest in the planned Goulburn Valley (GV) Link Intermodal Freight Terminal project, which is reliant on the Full Bypass Project to activate the site.

5.6 Conclusions

The key findings of this Economic Impact Assessment are as follows:

1 Construction Phase

- Increase in National Economic Output: $590 million (2016 dollars)
  - Increase in Regional Economic Output $465 million (2016 dollars)
  - Increase in Economic Output in other locations $125 million (2016 dollars)
- Increase in Value-Added National Output: $215 million (2016 dollars)
  - Increase in Regional Economic Output $160 million (2016 dollars)
  - Increase in Economic Output in other locations $55 million (2016 dollars)
- Increase in National Employment (direct and indirect): 3,170 jobs
  - Increase in Regional Employment 2,560 jobs
  - Increase in Employment in other locations 610 jobs

2 Operational Phase

At full impact (assumed to by 10 years after the Bypass is operational) the following regional benefits are estimated, which include impacts for both Shepparton and Mooroopna:

- 6,410m^2 of existing vacant CBD shopfront floorspace becomes re-occupied.
- 225 CBD jobs are created directly and a further 180 jobs supported indirectly in the regional economy.
- $316.2 million in Net Present Value (NPV) over 25 years is generated in additional value-added output is generated.
- Savings of $7.2 million (NPV) over 25 years in avoided freight costs associated with partial / total closure of Peter Ross Edwards Causeway due to incidents/maintenance.

3 Other economic benefits include:

- Support for the region's growing export markets by improving efficiency of movement of goods and services.
- Planning certainly for land owners, investors, existing businesses and Council with regard to long-term decision-making.
- Impetus for investment in dormant CBD development sites.
- Support for the commercial office property market.
- Stimulus to potentially activate other major regional projects, including the proposed Goulburn Valley Intermodal Freight Terminal (GV Link).

6 KEY FINDINGS

Project Context

1 The Goulburn Valley (GV) Region has a population of approximately 141,000 persons (2016) which is projected to increase to 160,000 persons by 2031.

2 The GV Region has an above-average unemployment rate (Australian Government Department of Employment – Small Area Labour Markets, December 2015), which is particularly pronounced for the City of Greater Shepparton where the rate of 6.5% is well above the regional Victorian average of 5.8%.

3 The GV Region forms an integral part of the 'Food Bowl of Australia', which accounts for 25 per cent of the total value of Victoria's agricultural production, with many multinational food processors located in the region (www.victoriasfoodbowl.com.au).

4 The industry and business structure of the GV Region highlights this strong focus with an estimated 41% of jobs (compared to 32% of jobs across the State) and 58% of businesses (compared to 38% of businesses across the state) associated with transport-reliant industries, many of which are linked with the food production, processing and distribution activities and other major sectors, including construction and manufacturing. This highlights the vital importance of efficient local and regional road networks in supporting the GV economy.

5 The Greater Shepparton Freight and Land Use Study highlights the significant number of major manufacturers, food processors, dairy operators and other freight-generating businesses that are located in the GV Region. Forecasts indicate that the regional freight task will expand at a faster rate than economic and population expansion, and notes efficient and effective transport movement – particularly of freight within, to and from the Greater Shepparton Region – is critical to ongoing growth and competitiveness of the Greater Shepparton and of the surrounding region.

6 The Study confirms a pressing need for a new east-west link, a second river crossing and road infrastructure that can adequately cater for the anticipated increased in use of High Performance Freight Vehicles and other larger and longer vehicle combinations.

7 The development of the GV Highway Shepparton Bypass has been identified by Greater Shepparton Council as a priority transformational project.

8 The Stage 1 Bypass Project will complement the Shepparton CBD Revitalisation Project, a major Council infrastructure initiative. The CBD Revitalisation Project will benefit in terms of improved safety and amenity from the removal of a large proportion of heavy vehicle traffic from High Street.

Project Description

9 The proposed Goulbourn Valley Highway Shepparton Bypass State 1 Project forms part of the larger overall Goulbourn Valley Highway Bypass project which will eventually link

Seymour (Victoria) and Tocumwal (NSW) as part of the overall enhancement of the national Melbourne-Brisbane road link.

10 The Stage 1 Project consist of the following two sub-stages:

- Stage 1A: 5km link between Echuca-Mooroopna Road to the Goulburn Valley Highway, including a second river crossing and improvements to the existing Wanganui Road. Estimate cost is $165 million. Ford Road will also be upgraded as a separate project.
- Stage 1B: 5km link between Echuca-Mooroopna Road to the Midland Highway, including a new intersection at the Midland Highway. Estimated cost is $95 million.

11 The Stage 1 Project aims to increase road capacity, efficiency and safety and reduce costs for freight operators, while also reducing industry risk. The outcome would be the diversion of significant volumes of heavy vehicle movements from Shepparton's CBD.

Issues and Opportunities Assessment

12 Key Issues with existing situation:

- Safety concerns for heavy vehicle drivers using High Street (Midland Highway) due to conflicts with other vehicle users, parking manoeuvres, and pedestrian traffic.
- Inefficiencies for industry, including higher costs, vehicle wear and tear associated with speed restrictions, numerous traffic signals, and roundabouts on the east-west Midland Highway link between Shepparton and Mooroopna.
- Concerns regarding the capacity of the existing east-west link to accommodate increasing heavy vehicle volumes and larger vehicles, including High Performance Freight Vehicles in the future.
- Risks to local businesses relating to the availability of a single river crossing for heavy vehicles (Peter Ross Edwards Causeway) which results in costs to operators if the crossing is impacted due to traffic incidents or maintenance, noting the nearest alternative crossing involves an hour round trip.

13 Key Opportunities arising from the Stage 1 Project:

- Improved efficiencies for heavy vehicle operators, including educed travel times and vehicle maintenance savings
- Provision of adequate long-term road capacity for industry, which is important in terms of certainty for industry development and future planning and investment for businesses
- Reduced risk to industry by the provision of a second heavy vehicle river crossing
- Improved safety for drivers and visitors to Shepparton CBD, with road user conflicts significantly reduced
- Boost to CBD revitalisation in Shepparton and Mooroopna due to improvements in safety and amenity (reduced noise, pollution) which supports existing Council-led project initiatives.

Road User and Externality Impact Assessment

14 Based on analysis prepared by AECOM with regard to the updated Shepparton Strategic Transport Model, the Stage 1 Bypass Project (which includes Stages 1A and 1B) provides the following economic results from a road user and externality perspective:

- Benefits (Net Present Value):
  - Travel time savings: $58.5 million
  - Vehicle operating cost savings: $17.8 million
  - Crash cost savings -$0.2 million
  - CO2 savings $1.9 million
  - Environmental externality savings $12.7 million`
- *Total Benefits (Net Present Value)* *$90.8 million*
- *Total Costs (Net Present Value)* *$246.0 million*
- Stage 1 Project Returns – Net Present Value -$155.2 million
- **Stage 1 Project – Benefit Cost Ratio** **0.37**

Economic Impact Assessment

15 Construction Phase Impacts:

- *Increase in National Economic Output:* *$590 million (2016 dollars)*
  - Increase in Regional Economic Output $465 million (2016 dollars)
  - Increase in Economic Output in other locations $125 million (2016 dollars)
- *Increase in Value-Added National Output:* *$215 million (2016 dollars)*
  - Increase in Regional Economic Output $160 million (2016 dollars)
  - Increase in Economic Output in other locations $55 million (2016 dollars)
- *Increase in National Employment (direct and indirect):* *3,170 jobs*
  - Increase in Regional Employment 2,560 jobs
  - Increase in Employment in other locations 610 jobs

16 Operational Phase Impacts:

At full impact (assumed to be 10 years after the Bypass is operational) the following regional benefits are estimated (which include impacts for both Shepparton and Mooroopna):

- 6,410m^2 of existing vacant CBD shopfront floorspace becomes reoccupied.
- 225 CBD jobs are created directly and a further 180 jobs supported indirectly in the regional economy.

- $316.2 million (NPV) over 25 years is generated in additional value-added output.
- Savings of $7.2 million (NPV) over 25 years in avoided freight costs associated with partial / total closure of Peter Ross Edwards Causeway due to incidents/maintenance.

17 Other economic benefits include:

- Support for the region's expanding export markets by improving efficiency of movement of goods and services
- Planning certainly for land owners, investors, existing businesses and Council with regard to long-term decision-making
- Impetus for investment in dormant development sites
- Support for the commercial office property market
- Stimulus to potentially activate other major regional projects, including the proposed Goulburn Valley Intermodal Freight Terminal (GV Link).