VICROADS

## **BUNINYONG - BALLARAT EASTERN LINK** FEASIBILITY STUDY

SEPTEMBER 2018

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PUBLIC



#### Buninyong - Ballarat Eastern Link Feasibility Study

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# **EXECUTIVE SUMMARY**

Buninyong is a small community (approximately 4,700 people)<sup>1</sup> located 10km south of Ballarat. The village centre is mainly located around the intersection of the Midland Highway and Warrenheip Street (Geelong Road), with approximately half the community living to the north of the Midland Highway, and half to the south. The impact of the Midland Highway through traffic (and especially heavy vehicle traffic movements) has become more marked in recent years. The Buninyong and District Community Association worked with VicRoads, Ballarat City Council and Moorabool Shire Council to identify three key problems regarding the current operations of the Midland Highway and its effect on the Buninyong community:

- Physical barriers to movement through the town created by the road network discourage walking and cycling for local trips to the centre;
- A constant flow of heavy vehicles in close proximity to vulnerable pedestrians and cyclists increases the risk of serious and fatal crashes; and,
- Disrupted and often difficult journeys within town for heavy vehicles decreases trip efficiency.

This study undertook a desktop review of the current traffic flows and safety record for the town. The evidence showed that most vehicles travelling on the Midland Highway through Buninyong either begin or terminate their trips in Ballarat. The evidence also suggested that many motorists drive at speeds higher than the 60 km/h posted speed limit.

The crash history around Buninyong showed that over a 4.6 km section of the Midland Highway between Fisken Street, Buninyong and Aubreys Road, Magpie, thirteen crashes occurred in the most recent five-year period (four serious injury, and nine minor injury). Speed was a factor in many of these crashes.

Traffic growth on the Midland Highway has been relatively low in recent years (current average daily traffic flows of 7,500 vehicles (including 8% heavy vehicles). The proposed Ballarat Western Link (once complete) has the potential to divert more traffic to the Midland Highway through Buninyong.

VicRoads and Transport for Victoria have undertaken a recent study (2013-2016) using the Victorian Integrated Transport Model – City of Ballarat (VITM-COB) model of Ballarat, testing several investment and growth scenarios. In the base case, the current model (Phase 4 Preferred Scenario) projects an increase in east-west traffic between southern Ballarat and Federation University / Technology Park. This reflects the survey observations which suggest that Warrenheip Street/ Geelong Road forms an important link to southern Ballarat, and Federation University/ Technology Park. The preferred scenario presumes that by 2041 there would also be parallel investment in upgrades of Yankee Flat Road, Gear Avenue and Recreation Road.

### STUDY FINDINGS

The purpose of this study was to determine how heavy vehicle traffic may be reduced in Buninyong and south-eastern Ballarat. Options such as a new arterial road connecting the Midland and Western Highways to the east of Ballarat, or an upgrade to Yankee Flat Road, and new connecting roads to the Midland and Western Highways were previously suggested through community consultation as potential methods to relieve heavy vehicle traffic in the town. VicRoads also requested that the study include investigation of other initiatives (such as township level, or wider network changes) to see whether these initiatives could reduce heavy vehicle traffic in the town.

Given the feasibility stage of the study, the scope did not include any design, costing or mapping of options. The study was based on available information, although some supplementary traffic surveys were commissioned

<sup>&</sup>lt;sup>1</sup> <u>https://forecast.id.com.au/ballarat</u> - Buninyong population 4,710 in 2018 (dated November 2017).

The study findings are summarised below. This feasibility study identifies four different initiatives (or avenues of investigation) which could address the problems identified in the Investment Logic Map (ILM) (attached as Appendix A-1). These initiatives could be undertaken in parallel as they are not mutually exclusive.

| INITIATIVE A:   | INITIATIVE B:   | INITIATIVE C:  | INITIATIVE D:   |
|---|---|--|---|
| Work with the Buninyong<br>community to identify local<br>area traffic management | Work with the Buninyong<br>community to develop a<br>Movement and Place | Commission a planning<br>study for the Ballarat area<br>that considers the wider | Work with the Buninyong<br>community to develop a<br>crash register of local non-       |
| initiatives which could<br>reduce speeds on the                                   | framework for Buninyong.<br>This will clarify the network               | implications of planned<br>projects such as the Ballarat                         | injury crashes. Where practicable the local   |
| Midland Highway, and<br>support active transport<br>around the town (walking      | hierarchy and identify<br>opportunities for improved                    | Western Link and the<br>Western Freeway upgrades.                                | community could be asked<br>to keep a crash register of<br>observed crashes, and 'near- |
| and cycling);   | place outcomes in the area.   | informed by using a validated transport model                                    | misses'. Photographs of<br>damage caused in non-injury                                  |
|   |   | such as the Ballarat-COB model.  | crashes could support further investment in problem areas.                              |

The planning study mentioned in Initiative C would be informed by transport modelling using the validated Ballarat VITM–COB model, and allow the development of a long list of complementary measures to support the community's long term aspirations for Buninyong and Ballarat. In the short term, speed compliance and safety concerns within the community could be addressed through local area traffic management measures, such as:

- Gateway treatments on the eastern and western approaches to town where the 60 km/h speed limit begins;
- Traffic calming measures throughout the 60 km/h section of the Midland Highway in Buninyong to reinforce the lower speed limits:
- Upgraded pedestrian crossings (with refuges, signage and road narrowing);
- Improved enforcement mobile speed camera location in town; and,
- Increased compliance through responsive Variable Message Signs.

VicRoads 'Movement and Place' Framework could provide a valuable framework for a planning strategy for Buninyong, and identify opportunities to improve the place outcomes. Working with the community to record non-injury crashes could also provide an improved understanding of the safety concerns affecting the town.

In the medium to long term, infrastructure improvements such as the completed Ballarat Western Link, and an upgraded Old Melbourne Rd/Western Freeway junction have potential to increase traffic in the Buninyong area (and east of Ballarat). A new eastern arterial route (which would connect the Western Freeway to the Midland Highway to the east of Ballarat) would provide an alternative to Yankee Flat Road for Federation University and Technology Park traffic, but would have less impact on reducing east-west movements through Buninyong.

The option of constructing a Buninyong bypass was considered. Stakeholder consultation indicated a preference for a bypass to the south of Buninyong. However, for traffic currently using Warrenheip Street/ Geelong Road to access Ballarat (and the University/ Technology Park) a southern bypass would increase journey times (implying a significant proportion of traffic would continue to travel through town). A bypass to the north of Buninyong village would be more attractive for traffic currently using Warrenheip Street/ Geelong Road, and therefore is more likely to reduce traffic in central Buninyong.

Stakeholder consultation identified community concern over how best to manage the impact of the new Ballarat Western Link on Buninyong. A planning study could model the impact of complementary infrastructure improvements to the south and east of Ballarat, which would be developed in conjunction with the Ballarat Western Link.

# 1 PROJECT BACKGROUND

## 1.1 CONTEXT

Buninyong has a population of approximately 4,700 people<sup>2</sup> (November 2017 estimate) and is located 10km south of Ballarat, as shown in Figure 1. The population of Buninyong is forecast to grow to just over 5,000 by 2036<sup>3</sup>. The unique charm of this historic settlement contributes to its appeal as a recreational/ tourism destination, and the attractive, undulating surrounding landscape has led to it being the location of the annual Cycling Australia Road National Championships for some years.

The village centre of Buninyong is shown in Figure 2 and is mainly located around the intersection of Warrenheip Street (also known as Geelong Road or Ballarat-Buninyong Road) and Learmonth Road (also known as the Midland Highway). Buninyong Primary School is located approximately 200m south of Learmonth Road on Inglis Street/Simpson Street, and educates 580 students (at this campus). A satellite campus at Scotsburn (on the Midland Highway) educates a further 60 students.

The impact of the prevailing through traffic (and especially heavy vehicle traffic movements) on the Buninyong community has become more marked in recent years. The Buninyong and District Community Association has worked with VicRoads, Ballarat City Council and the local Member of State Parliament to explore options for managing the impact of traffic on the community, and the potential for an alternative route around Buninyong.

An Investment Logic Mapping (ILM) process was carried out at VicRoads Wendouree office in December 2017 with members of the Buninyong community, VicRoads staff and representatives from Ballarat City and Moorabool Shire Councils. This process aimed to tease out the key issues in the Buninyong area which would then inform the scope and focus of this feasibility study. The problems identified within the ILM are provided below. The complete ILM is provided in Appendix A-1:

- Physical barriers to movement through the town created by the road network discourage walking and cycling for local trips to the centre;
- A constant flow of heavy vehicles in close proximity to vulnerable pedestrians and cyclists increases the risk of serious and fatal crashes; and,
- Disrupted and often difficult journeys within town for heavy vehicles decreases trip efficiency.

Traffic volumes on the Midland Highway (Learmonth Street) through Buninyong have not increased significantly over recent years. A 2014 VicRoads count recorded a daily traffic volume of 7,700 (west of Warrenheip Street), however, the most recent daily count (which was east of Warrenheip Street in March 2018 (VicRoads count)) recorded a daily traffic volume of 7,519. The 2018 count recorded heavy vehicle traffic through the town as 401 westbound vehicles, and 187 eastbound vehicles (10% of all westbound traffic, 5% of eastbound traffic), equating to a total heavy vehicle percentage of 7.8%.

#### 1.1.1 A300 MIDLAND HIGHWAY (FROM CENTRAL BALLARAT TO GEELONG, VIA BUNINYONG)

The Midland Highway provides the most direct connection between Geelong and Ballarat, running through Lethbridge, Meredith, Buninyong and southern Ballarat to connect with the Western Freeway at Invermay. Further to the north of the Western Freeway the Midland Highway links Ballarat to the regional cities of Bendigo and Shepparton. The section of Midland Highway between Geelong and Ballarat is recognised as a nationally significant freight route<sup>4</sup>.

<sup>&</sup>lt;sup>2</sup> <u>https://forecast.id.com.au/ballarat</u> - Buninyong population 4,710 in 2018 (dated November 2017).

<sup>&</sup>lt;sup>3</sup> <u>https://forecast.id.com.au/ballarat</u> - City of Ballarat population forecast based on 2016 Census data .idcommunity

<sup>&</sup>lt;sup>4</sup> <u>http://maps.infrastructure.gov.au/KeyFreightRoute/</u>

Throughout the rural sections of the route the Midland Highway is most commonly a two-lane single carriageway route, with wide shoulders and 100 km/h speed limit. When passing through Buninyong there is an eastbound overtaking lane beginning east of Inglis Street and heading up a steep incline towards Mount Buninyong Road. Through the rest of the town a two-lane single carriageway is provided, with sealed shoulders approximately one metre wide. Reflecting the built-up surroundings, the speed limit drops from 100 km/h to 80 km/h, and then to 60 km/h as vehicles approach Buninyong township, with a 40 km/h school zone speed limit applied during school pick-up and drop-off times between Cornish Street and Warrenheip Street. Midland Highway through traffic is further slowed by the need to negotiate the Warrenheip Street roundabout in the centre of town.

In 2017, VicRoads changed the line marking at the Mount Buninyong Road intersection to provide a sealed passing area for through traffic to pass right turning vehicles ('Basic Right Turn' treatment).

Throughout Buninyong the Midland Highway has a wide cross-section, with sealed shoulders. The road corridor is planted with mature trees throughout Buninyong.

Between Buninyong and central Ballarat, the Midland Highway passes through the southern suburbs of Ballarat, in a mostly urban environment, with speed limits ranging from 40 km/h to 100 km/h.

Prevailing journey times and average speeds for vehicles travelling west and eastbound through the town were obtained from TomTom Traffic statistics (see Section 2.1.4). This suggests that in Buninyong township itself, based on average speeds, there is currently good compliance with posted speed limits (except for the section between Whykes Road and the Buninyong Golf Club).

However, the 85<sup>th</sup> percentile speeds through the village are well over the posted speed limit, which clearly has an impact on community safety, and community perception of safety. This issue is explained in more detail in Section 2.1.4.

#### 1.1.2 C294 BALLARAT – BUNINYONG ROAD (FROM CENTRAL BALLARAT TO BUNINYONG VIA WARRENHEIP STREET)

Ballarat – Buninyong Road is termed Warrenheip Street in Buninyong and has a 50 km/h speed limit, with a painted central median. Approximately 700m north of the Midland Highway this road is renamed "Geelong Road", and remains Geelong Road until Elsworth Street where it becomes Main Road. The Geelong Road portion of the route is mainly single carriageway with very limited sealed shoulders. Gear Avenue and University Drive are key intersections on the route providing access to the Ballarat Technology Park traffic and Federation University's Mount Helen campus. In addition, the route is the main point of access to the Midvale Shopping Centre, and several schools (Damascus College, Mount Clear Primary School and Emmaus Catholic Primary School).

#### 1.1.3 YANKEE FLAT ROAD ROUTE (OLD MELBOURNE ROAD JUNCTION ON WESTERN FREEWAY TO MOUNT BUNINYONG ROAD JUNCTION ON MIDLAND HIGHWAY)

The Yankee Flat Road Route is currently a single carriageway route with low standard cross-sections and minimal sealed shoulders. The southern section of the route (Yendon No.1 Road and Mount Buninyong Road) has a narrow cross-section (some sections without shoulders) and has tight curves, resulting in a low speed environment, unsuitable for heavy vehicles. Figure 3 shows the Yankee Flat Road Route.

The Yankee Flat Road Route is not a designated heavy vehicle route, and hence heavy vehicles (B-double size or larger), may not use this route without a permit.

Turning count and origin destination studies show that the Yankee Flat Road Route is busier between Gear Avenue and the Western Freeway, than between Gear Avenue and the Midland Highway. This reflects stakeholder feedback on how the route is being used.







### 1.2 STUDY SCOPE

The purpose of this study was to determine how heavy vehicle traffic may be reduced in Buninyong and south-eastern Ballarat. Stakeholder engagement and community consultation identified options such as a new arterial road connecting the Midland and Western Highways to the east of Ballarat, or an upgrade to Yankee Flat Road. These options were both suggested as potential methods to relieve heavy vehicle traffic in the area. It was also requested that the study include investigation of other initiatives (such as township level, or wider network changes (such as a bypass of Buninyong)) to see whether these initiatives could reduce heavy vehicle traffic in the area.

Given the early stage of the study, the scope did not include any design, costing or mapping of options. The study was based on information available to date, although traffic surveys were commissioned to improve understanding of existing travel and usage patterns in the area.

The study scope was intended to provide a feasibility assessment of how well each of the options would relieve the problems identified in the Investment Logic Mapping Process (Appendix A-1). The study therefore forms a basis for further analysis of options. Following on from this study, VicRoads will work with the local community and the City of Ballarat to investigate the identified opportunities. This approach provides flexibility to pursue localised improvements which could be implemented in the short-term, whilst longer term planning studies operate in parallel.

### 1.3 RECENT STUDIES

Several studies have been commissioned by the City of Ballarat and VicRoads to investigate options to improve transport connections in Ballarat, Buninyong and surrounds. The conclusions of these studies are summarised below (in reverse chronological order), along with the recommendations which have been implemented.

#### 1.3.1 BALLARAT CYCLING ACTION PLAN 2017

The City of Ballarat has prepared a Cycling Action Plan (2017) which establishes a Ballarat Bicycle Network that focusses investment on linking destinations and providing continuous and safe cycling routes. The plan aims to identify and create safe, predominantly off-road or quieter routes which are suitable for families and children,

Where possible, the approach encourages cycling projects to achieve health, economic, amenity and safety improvements (in addition to transport) through integrated designs which include tree planting, traffic calming, quality urban design and finishes, and improvements for pedestrians, wayfinding and accessibility.

The plan prioritises delivery of safe and continuous routes (which will have the greatest impact on increasing the number of everyday cyclists) in preference to supporting individual projects across the city. Figure 4 shows the draft network which includes as one of its 'Strategic Cycling Corridors' the route from the CBD via Sovereign Hill, Midvale, Federation University to Buninyong (along the Yarrowee Creek Trail).



Figure 4 Ballarat Bicycle Network (Draft)

#### 1.3.2 VICTORIAN INTEGRATED TRANSPORT MODEL – BALLARAT (2013-3016)

The Department of Transport, Planning and Local Infrastructure (DTPLI) engaged AECOM to develop the Victorian Integrated Transport Model for the City of Ballarat area (VITM\_COB). The model provides forecast traffic volumes and public transport patronage across the transport network under a range of transport and land use scenarios.

- 1 The model was validated against 2013 demand and traffic conditions. Calibration and validation involved comparing the modelled highway (road) traffic and public transport boardings against observed data obtained from the City of Ballarat and DTPLI. Overall, based on the standard VicRoads and DTPLI model validation criteria, the model was considered to satisfactorily represent existing travel patterns in 2013 and fit for purpose for forecasting future demand under different investment scenarios.
- 2 In 2015, the Scenario Testing Report presented forecast future traffic flows. Figure 5 shows the modelled daily traffic volumes for the 2041 Base Case, (which does <u>not</u> include the Ballarat Western Link). In this scenario, traffic volumes through Buninyong were modelled as increasing by approximately 4% from approximately 7,500 in 2018 (daily two way volumes east of Inglis Street) to 7,900 (west of Warrenheip Street) in 2041.
- 3 Figure 5 provides a useful indication of the potential future traffic volumes through Buninyong in 2041 if the Ballarat Western Link (and a range of other improvements) are not completed. This suggests that the total traffic volumes in Buninyong could be in the order of 7,900 per day (compared to approximately 7,500 average daily traffic now).
- 4 Figure 6 shows forecast 2041 one way daily traffic volumes based on the Ballarat Western Link being completed. This scenario also includes other improvements such as a new sub-arterial road link extending Gear Avenue west to the Midland Highway, upgrading Yankee Flat Road, and upgrading the Midland Highway between Bells Road and Clarendon Lal Lal Road. Note, Appendix A-2 summarises the key assumptions around infrastructure improvements for each model run. In this scenario, traffic volumes through Buninyong were modelled to increase by approximately 10% from approximately 7,500 (2018 two-way traffic volumes) to 8,300 (west of Warrenheip Street) in 2041. Forecast changes in heavy vehicle flows were not provided within this report.



Source:Section of: Figure 8 VITM COB Phase 3B Scenario Testing 2015Figure 5Forecast 2041 One-way Weekday Traffic Volumes Base Case



 Source:
 Section of: Figure 19 VITM COB Phase 3B Scenario Testing 2015

 Figure 6
 Forecast 2041 One-way Weekday Traffic Volumes Scenario 3 – Orbital Transport Improvements (including Ballarat Western Link)

The Phase 3B Scenario Testing Report also considered the potential benefits of a public transport based option. This scenario assumed similar infrastructure improvements as the base case, but also included high frequency public transport corridors in Central Ballarat (5 minute headways). Upgraded 'feeder bus services' (15 minute headways) were modelled along the Midland Highway, and on Yankee Flat Road from the Western Freeway to Gear Avenue, then from Gear

Avenue down Warrenheip Street to Buninyong central. It is important to note that the Ballarat Western Link was not included in this assessment. In this scenario, traffic volumes through Buninyong were modelled to increase by nearly 10% from approximately 7,500 (2018 two-way traffic volumes) to 8,200 (west of Warrenheip Street) in 2041.



 Source:
 Section of: Figure 12 VITM COB Phase 3B Scenario Testing 2015

 Figure 7
 Forecast 2041 One-way Weekday Traffic Volumes Scenario 2 – Public Transport Improvements (excluding Ballarat Western Link)

In 2016, the Preferred Scenario (Final) report presented forecast traffic flows for 2021, 2031 and 2041 in terms of highway traffic volumes and comparisons against the 2013 base.

Table 1 shows a list of selected road network improvements as modelled in the Ballarat VITM-COB model for 2021, 2031 and 2041. It is worth noting these assumptions, as they are directly related to Buninyong and eastern Ballarat. However, it should be noted that these projects are not currently committed works, and therefore could be amended, or removed from future planning policy.

Figure 8 shows the 2031 forecast increase in one way daily volumes (compared to 2013) presuming that the Ballarat Western Link would be partially complete. This forecast suggests that daily traffic through Buninyong could increase by just under 1,000 vehicles (both directions), which is approximately a 13% increase on today's traffic volumes. However, the Midland Highway between Colac-Ballarat Road and Moss Avenue would experience greater increases of more than 2,000 vehicles both directions.



Source:Section of: Figure 37 VITM COB Phase 4 Preferred Scenario (FINAL) 2016Figure 8Forecast increase in total one-way vehicle daily volumes between 2031 and base year (2013)

Following on from this, Figure 9 shows the 'preferred scenario' which suggests that by 2041 there could be a significant increase in traffic on Moss Avenue and on the Midland Highway between the Ballarat Western Link, and Moss Avenue, with relatively modest increases in daily traffic volumes on the Midland Highway through Buninyong. These results are based on assumed significant infrastructure investment including a new eastern arterial and upgraded Recreation Road, Gear Avenue and Yankee Flat Road.



Source:Section of: Figure 50 VITM COB Phase 4 Preferred Scenario (FINAL) 2016Figure 9Forecast increase in total one-way vehicle daily volumes between 2041 and base year (2013)

#### 1.3.2.1 SUMMARY

This study is useful in providing an indication of potential traffic flow changes and increases for the Buninyong community, once major improvements (such as the Ballarat Western Link) are complete. Since this study is based on Transport for Victoria (TfV)'s validated Ballarat-COB model it may be assumed to be the best possible assessment of potential transport demand changes within the study area.

The results are presented at a high level, and assume that a range of complementary infrastructure improvements have been constructed. Several scenarios are presented for information, which include different assumptions around timing of complementary infrastructure improvements. The Public transport scenario presented on its own suggests that investment in public transport may delay the need for wider transport infrastructure improvements (such as an orbital link). However, it is important to note the public transport scenario does not include the impact of the Ballarat Western Link.

The study does not present any analysis of the likely impact on heavy vehicle volumes along the Midland Highway. The report presented results at a Ballarat wide level, and does not include a detailed presentation of potential traffic flow changes within Buninyong.

 Table 1
 Ballarat Transport Model (VITM-COB) assumed Road network improvements impacting Buninyong for 2021, 2031 and 2041

| YEAR | BASE CASE  | PREFERRED SCENARIO   |
|------|--|--|
| 2021 | <ul> <li>Ballarat Western Link Road Stage 1 (Western Freeway to Boulevarde Drive – Interim two lane with service road) (note section to Remembrance Drive completed April 2018).</li> <li>Geelong Road <ul> <li>At Mt Clear - Sebastopol Road: Four lane cross section north south from ~230m south of roundabout to ~130m north of roundabout</li> <li>Additional shared lane and signal improvement at Recreation Road</li> <li>Damascus College entrance: 5 lane cross section 200m south to 80m north, extended right turn lane</li> <li>On demand signals at Olympic Avenue</li> </ul> </li> <li>Speed limit 60km/h (change the road segment from rural to urban classification – effectively reduce its speed reduction factor)</li> </ul> | Ballarat Western Link Road to Carngham Road<br>Upgrade Recreation Road from Ballarat-Buninyong Road (Geelong Road) through to<br>Yankee Flat Road to one lane each way 60 km/h<br>Upgrade Gear Avenue from Ballarat-Buninyong Road through to Yankee Flat Road to<br>one lane each way 60 Km/h   |
| 2031 | Ballarat Western Link Road Stages 2, 3 and 5:<br>Cuthberts Road to Ballarat - Carngham Road (Stage 2), Carngham Road to Glenelg<br>Highway (Stage 3), Cherry Flat Road to Midland Hwy (Stage 5) Urban 60km/h 2-lane<br>Western Freeway between Leigh Creek and Woodmans Hill. Upgrade to freeway and<br>interchange, 2 lanes each direction and 110 km/h   | Ballarat Western Link Road Carngham Road to Glenelg Highway<br>Ballarat Western Link Road Cherry Flat Road to Midland Highway<br>Upgrade Yankee Flat Road, one lane each way 80 km/h with connections to Tech<br>Park  |
| 2041 | Ballarat Western Link Road Stage 4:<br>Glenelg Highway to Cherry Flat Road - Urban 60km/h 2-lane   | Ballarat Western Link Road Glenelg Highway to Cherry Flat Road<br>Upgrade Recreation Road from Ballarat-Buninyong Road through to Yankee Flat<br>Road to one lane each way 80 km/h<br>Upgrade Gear Avenue from Ballarat-Buninyong Road through to Yankee Flat Road to<br>one lane each way 80 km/h<br>Upgrade Yankee Flat Road, two lane/two way 80 km/h with connections to<br>Technology Park; and full Eastern Bypass two lanes each way 100 km/h |

#### 1.3.3 BUNINYONG TRAFFIC IMPACT STUDY (2013)

In 2013 VicRoads and the City of Ballarat engaged ESR Transport Planning to prepare a study on options to forecast future traffic volumes in Buninyong, and suggest measures to mitigate against those increases. The study focussed on localised improvements, and did not consider larger scale changes, such as Ballarat Western Link, a Buninyong bypass, or an improved Ballarat East corridor between the Midland Highway and the Western Freeway.

The study forecast that by 2030, traffic volumes on Warrenheip Street could be nearly 8,700 vehicles per day (vpd), whilst on Learmonth Street (Midland Highway) the traffic volumes were forecast to grow from 2013 levels of 6,300 vpd to nearly 10,000 vpd. The study emphasised that the forecast traffic volumes were not based on a transport model, and based on the assumption that traffic growth rates would continue at historic levels.

Notwithstanding the future traffic volumes, the study focussed on recommendations to improve pedestrian amenity, traffic management and road safety in the Buninyong community, as below:

- Consider introducing a 50 km/h speed limit on Warrenheip Street (completed July 2014).
- Consider introducing a 40 km/h school zone on the Learmonth Street/ Midland Highway during school pick up and drop off times (completed October 2014, including electronic '40' signs and extending the 60 km/h zone to Fisken Street, and the 80 km/h zone to Mount Buninyong Road).
- Changes to the Warrenheip Street cross section for the provision of central refuges and a painted median (painted median from Learmonth Street to Eyre Street completed July 2014).
- New kerb, bus stop, footpath and verge area at the De Soza bus stop (completed April 2017).
- A range of measures to modify Learmonth Street between Warrenheip Street to Inglis Street, predominantly
  focussing on improved service road traffic management and pedestrian facilities (Ballarat City Council completed
  significant landscaping works east of roundabout in 2015/16 including new entry to service road southwest corner of
  Learmonth Street / Warrenheip Street intersection and changing entries to south east service road).
- A mountable annulus expansion of the roundabout island to reduce vehicle speeds (completed mid 2016).
- Modifications to reduce potential conflict and increase car parking provisions within the Learmonth Street service road near the Crown Hotel (concept plan has been prepared, and funding being sought).
- A typical treatment concept to designate other service roads along Learmonth Street to one way operation reducing
  potential conflicts and improving traffic management (scheduled for completion 2018/19 financial year).
- Construction of footpaths to fill network gaps and road surfacing to replace gravel (Ballarat City Council have sealed several bellmouths on the Midland Highway east and west of Buninyong, still missing sections).
- Improvements to bus stops (planning underway, working with TfV to access funding).

#### 1.3.3.1 SUMMARY

This study provides useful insight into a range of relatively low-cost improvements which have (in the most part) been completed by VicRoads and Ballarat City Council since the study was completed. The initiatives identified in 2013 were opportunities for immediate improvement. However, this study which was not based on a transport model run did not consider the impact of probable future Buninyong traffic volumes once major improvements (such as the Ballarat Western Link) are complete.

#### 1.3.4 BALLARAT – BUNINYONG UPGRADE AND YANKEE FLAT ROAD ECONOMIC ANALYSIS (2009)

This strategy considers the detailed traffic management strategy prepared for the upgrading of the Ballarat – Buninyong Road between Barkly Street, Ballarat and Midland Highway, Buninyong in 2008, and provides an economic analysis of the proposed options for improvement.

The study concluded that:

- Works are required to upgrade intersections on the Ballarat-Buninyong Road as traffic growth will cause the peak hour operation of the route to fail at a number of locations by about 2015. The Ballarat – Buninyong Road/ Mount Clear – Sebastopol Road/ Recreation Road intersection is already at capacity for short sections of the peak.
- If works are not undertaken traffic demands will continue to grow resulting in increasing congestion, delays, spreading of peak hours and possible trip diversion to alternative parallel routes such as Yankee Flat Road.
- Regardless of whether works are undertaken on the Ballarat-Buninyong Road to increase its capacity, it is estimated that the Yankee Flat Road traffic demands will increase by about 85% over the next 20 years.
- The proposed works had a strong case for investment, with positive Net Present Values, and Benefit Cost Ratios of 7 or more.

#### 1.3.4.1 SUMMARY

This study is useful in explaining the process for developing improvement options for Yankee Flat Road and for the Ballarat – Buninyong Road / Mount Clear Sebastopol/ Recreation Road intersection (several of the improvements proposed have since been completed).

#### 1.3.5 BALLARAT ROAD TRANSPORT STRATEGY (2007)

VicRoads commissioned Ratio Consultants Ltd to develop a Ballarat Road Transport Strategy in 2007. The Ballarat Road Transport Strategy was developed with consideration to the future growth aspirations of Ballarat (forecasting population growth in the region from 88,000 in 2001 to 115,000 in 2031). Note, these growth forecasts have been superseded<sup>5</sup>. Key links within Ballarat that were identified as potential concerns included the Midland Highway (Creswick Road), and Geelong Road at Federation University. The study considered four potential major road infrastructure projects which are depicted at a high level in Figure 10:

- A A new arterial route around the western outskirts of Ballarat (the Ballarat Western Link);
- **B** A new arterial route through the southern areas of Ballarat (a continuous high speed route from Woodmans Hill, via Whitehorse Road/ Bridge Road and Bells Road to the Glenelg Highway);
- C A new arterial route around the eastern areas of Ballarat (Upgrading Yankee Flat Road and connections between Woodmans Hill and Geelong Road/ Gear Avenue);
- **D** Duplicating existing arterial roads (Sturt Street West, Gillies Street (south of Sturt Street and north of Norman Street), Wiltshire Lane and Geelong Road West).

<sup>&</sup>lt;sup>5</sup> <u>https://forecast.id.com.au/ballarat</u> - Ballarat population forecast to grow from 107,647 in 2018 to 144,108 in 2036 Buninyong population forecast to grow from 4,710 in 2018 to 5,011 in 2036, (dated November 2017).



Source:Ballarat Road Transport Strategy 2007 – section of Figure 4.2Figure 10Modelled Road Improvement Options

The Ballarat Strategic Transport Model was then used to model each potential improvement for the future year of 2031. Based on this analysis Option A (the Ballarat Western Link) was identified as the priority for investigation, and concluded with the following "Summary of Recommended Projects and Initial Actions for Implementation":

- Future Western Arterial provide alternative north-south route through Ballarat (works underway on Stage 1, planning on Stage 2)
- Geelong Road Upgrade (Elsworth Street to Federation University) traffic management review of corridor (works complete)
- Yankee Flat Road extra intersection capacity and safety, roadside hazard reduction (two sections rehabilitated in 2015/16 600m section and 1.2km section, along with resealing works at the Yankee Flat Road / Navigators Road intersection).

The results of these assumptions were tested in a model run, which is summarised in Figure 11. It is important to note that this model run has effectively been superseded by more detailed and more recent transport models (as outlined in Section 1.3.2). For example, it is not clear that the transport model shown in Figure 11 includes Moss Avenue. Nonetheless, it is noted that this model run suggests that by 2031 there could be significantly higher traffic flows on the Midland Highway near Buninyong (suggested here to be 14,000 vpd) than observed today (approximately 7,500 vehicles in March 2018).



Project : 7029 March 2007



Source:Based on the 2007 Ballarat Road Transport Strategy (Section of Figure 4.3)Figure 11Forecast 2031 traffic flows after Ballarat Western Link

#### 1.3.5.1 SUMMARY

This study is useful in terms of understanding the priorities for investment in the Ballarat region, as forecast in 2007, and was instrumental in identifying the Ballarat Western Link as a priority project for the City of Ballarat.

It is interesting to note that this study also tested options for introducing an 'orbital link' (Study Option B) which could potentially bypass Buninyong to the North.

The study does not present any analysis of the likely impact on heavy vehicle volumes along the Midland Highway. It also does not provide a detailed presentation of potential traffic flow changes within Buninyong.