



**Mansfield Heavy Vehicle  
Alternative Routes Planning Study  
Final Report  
November 2010**

**Client:**

**VicRoads**

**This report has been prepared from the offices of CPG Traffic & Transport at:**

46 Wadhurst Drive, Boronia 3155, T 8805 3400

## Acknowledgements and Recognition

- Traffic data from classification counts conducted by VicRoads in September 2009 on the four arterial road entries to Mansfield Township;
- Results of VicRoads analysis of the above count data to determine origin and destination patterns for commercial vehicles;
- Transcripts of discussions by VicRoads staff with major transport operators in the Mansfield area;
- Crash data from the VicRoads database covering the most recent 5 year period (2005 – 2009);
- Map of currently approved B-Double routes around and through Mansfield;
- Results of supplementary traffic counts conducted by Mansfield Shire;
- Aerial photography provided by Mansfield Shire for site-specific treatment sketches.

Issue Date	Revision No	Author	Checked	Approved
29/06/2010	Preliminary Draft Report #1	Bob Citroën	Kevin Flynn Michael Ham	
22/07/2010	Draft Report #2	Bob Citroën	Peter Bourlotos	
27/08/2010	Draft Report #3	Bob Citroën	Michael Ham	
23/09/2010	Draft Report #4	Bob Citroën	Michael Ham	
02/11/2010	Final Report	Bob Citroën		Bob Citroën

© CPG Australia Pty Ltd

The information contained in this document is intended solely for the use of the client identified on the report cover for the purpose for which it has been prepared and no representation is made or is to be implied as being made to any third party. Other than for the exclusive use of our client, no part of this report may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying or otherwise, without the prior written permission of CPG Australia Pty Ltd.

## Table of Contents

<b>1. INTRODUCTION .....</b>	<b>1</b>
<b>1.1 Executive Summary.....</b>	<b>1</b>
<b>1.2 Background.....</b>	<b>3</b>
<b>1.3 Technical References .....</b>	<b>3</b>
<b>2. EXISTING CONDITIONS.....</b>	<b>4</b>
<b>2.1 Context.....</b>	<b>4</b>
<b>2.2 Arterial Road Network .....</b>	<b>5</b>
<b>2.3 Traffic.....</b>	<b>5</b>
<b>2.4 Speed Environment .....</b>	<b>6</b>
<b>2.5 Existing Heavy Vehicle Routes.....</b>	<b>6</b>
<b>2.6 Crash History .....</b>	<b>7</b>
<b>2.7 Industry Liaison .....</b>	<b>7</b>
2.7.1 Interviews.....	7
2.7.2 Summary of Feedback .....	10
<b>3. TRAFFIC CONSIDERATIONS .....</b>	<b>11</b>
<b>3.1 Heavy Vehicle Distribution.....</b>	<b>11</b>
3.1.1 B-Doubles.....	11
3.1.2 Semi trailers.....	11
<b>3.2 Design Principles.....</b>	<b>12</b>
<b>4. ULTIMATE ROUTE OPTIONS .....</b>	<b>14</b>
<b>4.1 Malcolm Street and Kidston Parade.....</b>	<b>14</b>
<b>4.2 Dead Horse Lane West and Withers Lane .....</b>	<b>15</b>
<b>4.3 Mount Battery Road and Greenvale Lane .....</b>	<b>15</b>
<b>4.4 Summary.....</b>	<b>16</b>
<b>5. INTERIM ROUTE OPTIONS.....</b>	<b>17</b>
<b>5.1 High Street West and Highett Street North.....</b>	<b>17</b>
<b>5.2 Dead Horse Lane/Whitfield Road/Chenery Street .....</b>	<b>18</b>
<b>5.3 Highett Street .....</b>	<b>18</b>
<b>5.4 Summary.....</b>	<b>19</b>
<b>6. ROUTE TREATMENTS.....</b>	<b>20</b>

<b>6.1 Malcolm Street and Kidston Parade Route.....</b>	<b>20</b>
6.1.1 Maroondah Highway at Kidston Parade .....	20
6.1.2 Kidston Parade .....	20
6.1.3 Malcolm Street at Kidston Parade .....	21
6.1.4 Malcolm Street .....	22
6.1.5 Malcolm Street at Highett Street .....	23
6.1.6 Malcolm Street at Chenery Street.....	23
6.1.7 Mount Buller Road/Malcolm Street at Highton Lane .....	23
<b>6.2 Withers Lane/Dead Horse Lane Route .....</b>	<b>24</b>
6.2.1 Midland Highway at Dead Horse Lane .....	24
6.2.2 Dead Horse Lane West .....	24
6.2.3 Withers Lane at Dead Horse Lane .....	25
6.2.4 Maroondah Highway at Withers Lane .....	26
<b>6.3 Mount Battery Road/Greenvale Lane Route .....</b>	<b>26</b>
6.3.1 Mansfield-Whitfield Road at Dead Horse Lane.....	26
6.3.2 Mansfield-Whitfield Road at Mount Battery Road.....	27
6.3.3 Mount Battery Road at Greenvale Lane .....	27
6.3.4 Greenvale Lane.....	27
6.3.5 Mount Buller Road at Greenvale Lane .....	28
<b>6.4 High Street West and Highett Street North Interim Route .....</b>	<b>28</b>
6.4.1 Maroondah and Midland Highways .....	28
6.4.2 Dead Horse Lane .....	28
6.4.3 Intersection Works .....	28
<b>6.5 Other Upgrades.....</b>	<b>28</b>
6.5.1 High Street South.....	28
6.5.2 Chenery Street .....	28
6.5.3 Chenery Street at High Street .....	28
<b>7. DISCUSSION.....</b>	<b>30</b>
7.1 Current Heavy Vehicle Demand.....	30
7.2 Route Selection.....	30
7.3 Planning for Long-term Solution .....	31
7.4 Short Term Priority Works .....	31
7.5 Road Declarations .....	32
 <b>APPENDIX A .....</b>	 <b>HEAVY VEHICLE ROUTES</b>
 <b>APPENDIX B .....</b>	 <b>IMPROVEMENT WORKS SCHEDULE</b>
 <b>APPENDIX C .....</b>	 <b>CRASH DATA</b>
 <b>APPENDIX D .....</b>	 <b>TRAFFIC COUNT DATA</b>

# 1. INTRODUCTION

## 1.1 Executive Summary

The study has identified routes that can be developed over time to provide ultimate external bypass alternatives for heavy vehicle travel around Mansfield's residential and commercial areas. These routes represent the existing declared arterial road network, but connected remotely by Dead Horse Lane West and Withers Lane to the northwest and Mount Battery Road and Greenvale Lane to the northeast. The report has nominated improvement works required for these routes to become fully operational and provides order-of-cost estimates for such works.

However, this investigation has concluded that, due to the current low levels of demand and high infrastructure costs, these remote bypass options are unlikely to be developed in the short to medium term. It is suggested that planning for these routes be confined to the acquisition of land at critical corners and the ultimate provision for widening of the Greenvale Lane reservation. The exception to this approach is the Kidston Parade/Malcolm Street route that is the southern bypass link common to short and long term strategies. It is recommended that upgrading projects along this route proceed with the highest priority in the suggested works program.

The report supports current discussions by Mansfield Shire with VicRoads to formalise a more rational network of heavy vehicle routes through the fringes of the town using Kidston Parade and Malcolm Street for the east-west bypass of the CBD whilst using High Street and Highett Street to execute the west-north traverse. However, the report suggests that Chenery Street is not suitable for use by B-Doubles and Higher Mass Limited vehicles. It recommends an extension of the Midland Highway route along Highett Street South as the most suitable interim link between the northern town entries and the southern east-west bypass route for heavy vehicles.

The report itemises a series of prioritised improvement projects on the arterial and local road systems for consideration by Council and VicRoads as treatments to cater for the safe and efficient passage of heavy vehicles (including B-Doubles and Higher Mass Limited trucks) through Mansfield to avoid the central business and retail area.

These comprise the following progressive route improvement works by the respective authorities:

### **Council Works:**

1. Intersection works at Malcolm Street and Kidston Parade to ensure long vehicles can safely perform turns at this location;
2. Seal widening of Kidston Parade and widening and regulation of Malcolm Street;
3. Upgrading of the school crossings in Highett Street;
4. Seal widening and drainage improvements along Dead Horse Lane East;
5. Construction of a shared path along Malcolm Street and footpaths along Kidston Parade;
6. Intersection works in Malcolm Street at Highett Street.

### **VicRoads Works:**

1. Provision of turn lanes in Maroondah Highway at Kidston Parade intersection;
2. Seal widening (shoulder sealing) along Maroondah Highway and Midland Highway;
3. Intersection improvements in Midland Highway at Dead Horse Lane;
4. Intersection improvements at Dead Horse Lane and Mansfield-Whitfield Road.



**Figure 1.1: Locality Plan of Mansfield**  
(Plan courtesy of Mansfield Shire Council)

## 1.2 Background

Mansfield Shire Council and VicRoads have identified roads that could be designated as preferred routes for heavy vehicles to use to avoid travel through the central business district (CBD) of Mansfield Township. CPG has been engaged to investigate the routes in greater detail, to identify planning issues and prepare conceptual designs.

Specifically, the consultancy task involves the following aspects:

- Review existing conditions along the potential routes including traffic data;
- Review results of VicRoads traffic data analysis and consultation with key transport operators;
- Review and develop proposals for heavy vehicle alternative routes, bearing in mind industry needs, community impacts of development of proposed routes, and likely funding constraints;
- Determine the capacity of existing infrastructure along proposed routes and identify any changes, improvements, upgrades necessary, including mitigation measures;
- Propose any short-term measures considered appropriate to address heavy vehicle issues in Mansfield;
- Prepare conceptual designs and cost estimates for key infrastructure upgrades required to implement the alternative routes, including recommended mitigation measures.

A locality plan of Mansfield is provided in Figure 1.1 for reference to road and street names used throughout this report.

## 1.3 Technical References

The technical references used in the preparation of this assessment are:

- The Austroads *Road Design Guide – Part 3, Geometric Design*;
- The Austroads *Road Design Guide – Part 4A, Unsignalised and Signalised Intersections*;
- *North East Infrastructure Design Manual* for Urban Road/Street Characteristics;
- Mansfield Shire Planning Scheme.

## 2. EXISTING CONDITIONS

### 2.1 Context

Mansfield continues to grow and develop as a tourist centre, with more than 60% of its income derived from tourism. There are distinct peaks in tourist activity that mirror the seasonal conditions:

- a) Winter - snow sports at Mount Buller and Mount Stirling;
- b) Summer - water activities on Lake Eildon and bush walking and touring in the high country.

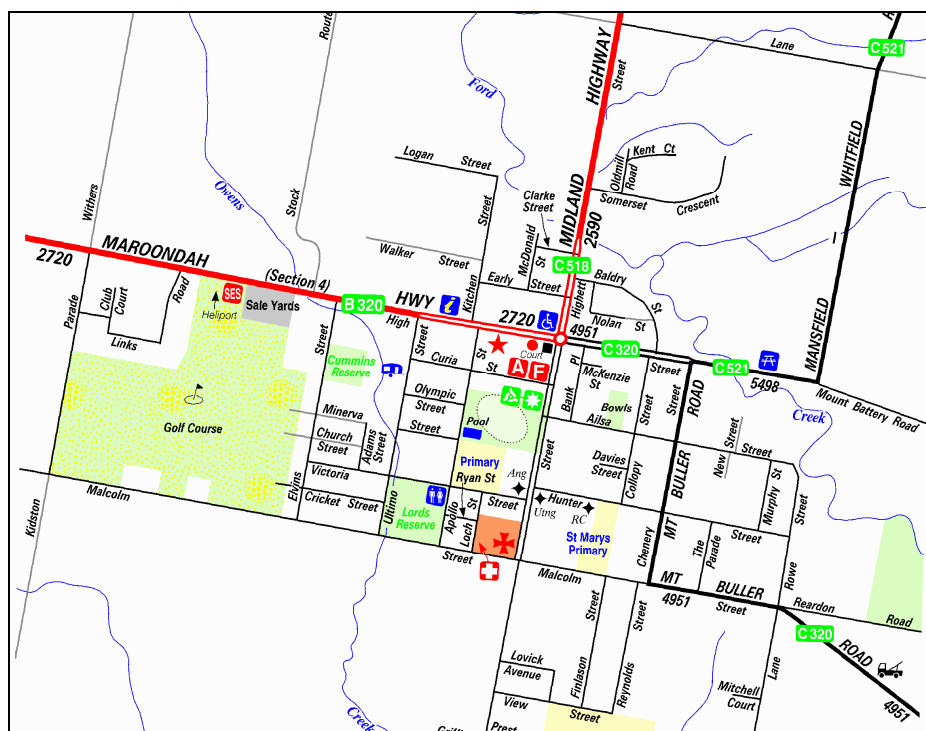
These seasonal peaks generate high visitor traffic volumes and, in particular, tourist buses comprise a significant proportion of the winter ski resort traffic. Logging generates significant heavy truck traffic activity, mainly in summer and depending upon logging programs.

The Mansfield Township CBD is centred on the intersection of two major highways, C518 Midland Highway (Highett Street) from the north and B320 Maroondah Highway (High Street) from the west with its extensions to the east, namely the C320 Mount Buller Road and beyond the C521 Mansfield-Whitfield Road (see arterial route locality plan in Figure 2.1).

Whilst these are the most direct routes through the township, heavy vehicles using these “through routes” are considered to be incompatible with local activity in the shopping centre and tourist traffic through the town. As a result heavy vehicles mix with local traffic on confined traffic lanes with angle parking, pedestrians and vehicles towing boats, caravans, horse floats, etc. This is seen to present ongoing safety and amenity issues for this busy and often congested commercial/tourism precinct.

Although heavy vehicles can use the approved B-Double route for east-west movements to the south of the CBD, it is currently not attractive, being narrow, rough and requiring vehicles to negotiate sharp turns. There are no such approved routes for heavy vehicles to cross town from the north and the north east. As a result, the majority of heavy vehicles travel through the busiest part of town en-route to cross-town destinations.

It is expected that traffic safety and amenity will be improved once alternative routes are provided which result in express type heavy vehicle facilities for bypassing the CBD wherever possible.



**Figure 2.1: Arterial Route Locality Plan**

(Plan provided courtesy of RACV/VicRoads Country Directory, Map 679)



## 2.2 Arterial Road Network

### Maroondah Highway

The Maroondah Highway is part of the State's Arterial Road network (route B320) managed by VicRoads. It provides access to Mansfield and the high country from Melbourne. Known as High Street through Mansfield Township it is a two-lane two-way carriageway for the majority of the length, converting to a two lane dual carriageway with a wide median from Ultimo Street to Hightt Street.

### Midland Highway

Midland Highway is also part of the State's Arterial Road network (route C518) managed by VicRoads. It provides access to Mansfield from Benalla and central Victoria. It is a two-lane two-way single carriageway that converts to a two lane dual carriageway with a wide median as it crosses Ford Creek and takes the local name of Hightt Street. The Midland Highway declaration terminates at High Street whilst the wide divided carriageway of Hightt Street continues as a local road south of High Street to Malcolm Street, where it converts to a two-lane two-way single carriageway.

### Mount Buller Road

Mount Buller Road is also part of the State Arterial Road network (route C320). It connects Mansfield with the popular tourist destinations of Mount Buller and Lake Eildon at Goughs Bay, Howqua and Jamieson. As the High Street extension of Maroondah Highway, it continues the wide divided carriageway through the primary retail centre of Mansfield. At the eastern end of the shopping centre Mount Buller Road turns south into Chenery Street – a two-lane two-way single carriageway in a confined 20m road reservation – then follows Malcolm Street out the eastern end of town.

### Mansfield-Whitfield Road

Mansfield-Whitfield Road is the fourth of the State Arterial Roads (route C521) radiating from Mansfield. It connects with Mount Buller Road at the High Street/Chenery Street intersection east of the shopping centre and provides the direct route from Mansfield to Wangaratta via Tolmie and Whitfield. It is a two-lane two-way single carriageway for its entire length.

All other roads under consideration in this study are local roads controlled by Mansfield Shire Council.

## 2.3 Traffic

VicRoads undertook traffic counts at the four "arterial entrances" to Mansfield in September 2009. A summary of results is shown in Figure 2.2. Count locations are illustrated in Figure A1 in Appendix A.

Road	Location	Total Volumes		CVs	
		7 day Ave	5 day Ave	5 day Ave	%
Maroondah Highway	W of Kidston Parade	3109vpd	2979vpd	370vpd	12.4%
Mount Buller Road	E of Greenvale Lane	3435vpd	3297vpd	310vpd	9.4%
Midland Highway	N of Dead Horse Lane	1235vpd	1294vpd	163vpd	12.6%
Mansfield-Whitfield Rd	N of Dead Horse Lane	1141vpd	1174vpd	102vpd	8.6%

**Figure 2.2: Recent VicRoads Arterial Road Traffic Count Results**

Traffic count data made available by Mansfield Shire Council and relevant to the road network included in this study are summarised in Figure 2.3.

Road	Location	Count Date	Volume	Peak Hour Volumes	
			7 day Ave	AM	PM
Chenery Street	S of Hunter Street	Sept 2006	3940vpd	363vph	421vph
Dead Horse Lane	W of Whitfield Road	Aug 2008	574vpd	620vph	81vph
Greenvale Lane	N of Mt Buller Road	Feb 2008	248vpd	20vph	28vph
Highbett Street southbound	S of Hunter Street	Oct 2006	1858vpd	158vph	265vph
Highbett Street northbound	S of Victoria Street	Oct 2006	2240vpd	238vph	279vph
Highbett Street	N of Lovick Avenue	Oct 2006	1890vpd	266vph	268vph
Kidston Parade	S of Maroondah Hwy	Oct 2008	623vpd	53vph	63vph
Malcolm Street	W of Finlayson Street	Aug 2006	2706vpd	319vph	307vph
Malcolm Street	At Elvins Street	Aug 2006	988vpd	96vph	120vph
Maroondah Highway	300m from Kidston Parade	Oct 2008	3814vpd	244vph	291vph
Mount Buller Road	E of Crosby Lane	Oct 2008	4060vpd	445vph	380vph

**Figure 2.3: Mansfield Shire Traffic Count Summary**

## 2.4 Speed Environment

Eighty kilometre per hour signed speed limits are in place along:

- Maroondah Highway from west of Kidston Parade to Ultimo Street;
- Mount Buller Road from west of Greenvale Lane to the eastern town boundary;
- Kidston Parade from Maroondah Highway to Malcolm Street;
- Malcolm Street from Kidston Parade to Elvins Street;
- Midland Highway from north of Dead Horse Lane to Cambridge Drive;
- Whitfield Road from town boundary to north of Dead Horse Lane;
- Withers Lane north from Maroondah Highway (end of zone not signed).

All other roads within the township are either signed at or are subject to the default 50 km/h urban speed limit.

## 2.5 Existing Heavy Vehicle Routes

It is desirable for heavy vehicle bypass routes and gazetted B-Double routes to coincide. The existing gazetted B-Double and Higher Mass Limited vehicle routes for Mansfield are shown in Figure A1 in Appendix A.

These currently approved routes include Kidston Parade and Malcolm Street (although not approved for higher mass limits), Dead Horse Lane, the western section of High Street (west of the saleyards at Elvins Street), Whitfield Road to Chenery Street and Highbett Street south from High Street to Malcolm Street.

However, Chenery Street, High Street east of Elvins Street and Highbett Street/Midland Highway north from High Street to Dead Horse Lane are presently excluded from this network. This creates a hiatus that prevents legal travel by B-Doubles and discourages travel by other heavy vehicles between the north approaches and the east or west entries to the town.

Mansfield Shire Council is currently working with VicRoads to achieve agreement on a more rational network of approved B-Double and Higher Mass Limited roads for Mansfield Township that provides

for all remote origin/destination movements across the town. Outcomes of these discussions are still pending but are expected to result in the network described in Figure A2 in Appendix A. This network is intended to include:

- Dead Horse Lane as an east-west link between Midland Highway and Whitfield Road;
- Full length of the Malcolm St / Kidston Pde link to Maroondah Hwy for east-west movements;
- High St west of Highett St and Highett St north of High St for north to/from west movements;
- Chenery St and Whitfield Rd for north to/from east movements.

## 2.6 Crash History

Over the past five years the VicRoads database has recorded the following six casualty crashes along the network being considered for heavy vehicle use (see details listed in Appendix C):

- Two cross traffic crashes (DCA 110), one at Maroondah Highway/Kidston Parade intersection and one at Highett Street/Malcolm Street intersection;
- One off-path crash (DCA 171) along Malcolm Street between Ultimo Street and Apollo Street;
- One pedestrian crash (DCA 108) in Highett Street at Early Street;
- One right rear crash (DCA 132) in High Street between Collopy Street and Bank Place;
- One leaving parking crash (DCA 142) in High Street west of Highett Street.

No pattern of crashes is evident and it can be concluded that the heavy vehicle routes currently operate relatively safely with no identified deficiencies that require addressing urgently through works.

## 2.7 Industry Liaison

VicRoads undertook phone interviews with 10 industry representatives to ascertain the quantum of heavy vehicle traffic generated by these industries, the routes used to travel through or around the township, comments about these routes and any alternatives, and general comments on truck traffic through Mansfield. These discussions are summarised below.

### 2.7.1 Interviews

#### **Mansfield Constructions** (quarry operation to southeast of town)

- Uses semi trailers and truck and dog trailer combinations to carry road materials.
- Produces up to 150,000t/annum crushed rock that equates to 15,000 total vehicle movements across town.
- Current travel routes:
  - Avoids High Street
  - Uses Chenery St to access Whitfield Rd (and Midland Hwy)
  - Uses Malcolm St and Kidston Parade to cross town in east-west direction
- Desirable upgrades:
  - Greenvale La and Mt Battery Rd route (including new bridge over Ford Ck)
  - Intersection of Malcolm St and Highett St (roundabout suggested)
  - Intersection of Dead Horse Lane with Whitfield Rd

#### **Shaw's** (livestock transport located to SE of town)

- Uses semi trailers and B-Doubles.
- Current travel routes:

- Uses Malcolm St and Highett St to access Midland Hwy
- Uses Malcolm St and Chenery St to access Whitfield Rd
- Uses Malcolm St, Highett St and High St to cross town east to west
- Desirable upgrades:
  - Intersection of High St/Chenery St/Whitfield Rd (for truck turns)
  - Intersection of Dead Horse Lane with Midland Hwy (remove cross slope)
  - Roughness and unsealed shoulders along Malcolm St
  - Intersection of Malcolm St with Kidston Parade (widen for truck turns)
  - Intersection Kidston Parade and Maroondah Hwy (turn lanes in highway)

**NF & CR Pigdon** (earthmoving contractors with pit west of town)

- Uses truck and dog trailer combinations and float.
- Produces up to 37,500t/annum from gravel pit that equates to 1,900 return trips across town.
- Current travel routes:
  - Uses High St and Highett St for access to Midland Highway
  - Uses High St to access Whitfield Rd and Chenery St to access Mount Buller Rd
- Desirable upgrades:
  - Intersection of Malcolm St and Highton La (roundabout suggested)
  - Roughness and unsealed shoulders along Malcolm St
  - Intersection of Kidston Parade and Maroondah Hwy (turn lanes in highway)
  - Intersection Mount Buller Rd and Greenvale La (turn lanes in Mount Buller Rd)
  - Withers La and Lakins La upgraded for access between Maroondah Highway and Midland Highway

**Mansfield Premix** (plant in Dead Horse La)

- Uses truck and dog trailer combinations and agitator trucks.
- Processes up to 16,000t/annum that equates to 1,600 total movements across town.
- Current travel routes:
  - Uses Chenery St and Whitfield Rd to access quarry to southeast of town
  - Uses Highett St and High St to access Maroondah Hwy to west

**Alpine Civil** (earthmoving contractors in Dead Horse La)

- Uses two-axle trucks, truck and dog trailer combinations and float.
- Average one return trip per day to/from quarry for garden supplies. Earthmoving requirements vary – can reach 10 trips per day
- Current travel routes:
  - Uses Highett St and Monkey Gully Rd to access quarry to SE
  - Uses Whitfield Rd and Chenery St for access to Mount Buller Rd
  - Would use Mt Battery Rd and Greenvale La if upgraded
  - Uses Highett St and High St to access Maroondah Hwy to W
  - Would use Dead Horse Lane & Withers Lane if upgraded
- Route disadvantages:
  - Malcolm St goes past hospital and schools (2 school crossings)
  - Kidston Parade passes retirement village with elderly crossing to golf course

**Mt Buller Freight** (depot in Dead Horse La)

- Uses two semi trailers and two B-Doubles
- One return trip per day for each vehicle – 90% to/from W (Melbourne).
- Current travel routes:
  - Uses Highett St and High St to access Maroondah Hwy to W
  - Would use Dead Horse Lane and Withers Lane if ford and bend were upgraded
- Desirable upgrades:
  - Intersection of High St and Chenery St (unsuitable for B-Doubles)

**FoxAg** (fertilizer distributor from Merton)

- Uses spreader trucks (bulk deliveries by contract)
- Current travel routes:
  - Uses Malcolm St and Kidston Parade to cross town in east-west direction
  - Uses High St and Highett St for access to midland Highway and Dead Horse La to access Mansfield-Whitfield Road

**Mansfield-Mt Buller Bus Lines** (charter trips Melbourne-Mount Buller)

- Familiar with cross town bus traffic, particularly during snow season.
- Total of 2,000 buses through gates at Mount Buller (data ex Alpine Resort Management)
  - 1/3<sup>rd</sup> 29 seater (or smaller) buses, 2/3<sup>rd</sup> 45-48 seater buses
  - Peak gate numbers = 89 buses on midseason Saturday
- Current travel routes:
  - 70% of Melbourne-Mount Buller traffic uses Malcolm St and Kidston Parade
  - 30% along High St (access ski hire outlets) and Chenery St
- Desirable upgrades:
  - Intersection of Malcolm St and Highett St (roundabout suggested)

**VicForests** (manages hardwood extraction from Mount Buller/Mt Stirling area)

- Contractors use semi trailer and B-Double timber jinkers
- Cartage depends on maturity of trees and weather conditions
  - 2007-08 season carted 30,000 - 45,000t = 1,000 – 1,500 total movements
- Current travel routes:
  - Use Malcolm St and Kidston Parade for east-west movements
  - Use Malcolm St and Highett St for movements east-north
  - Use Chenery St and Whitfield Rd from the east to access a storage dump in Dead Horse Lane
- Desirable upgrades:
  - Intersection of Malcolm St and Kidston Parade

**Victorian Farmers Federation** (on behalf of primary producers in area)

- Current travel routes:
  - Use Malcolm St and Highett St to access Midland Hwy
  - Use Malcolm St and Kidston Parade to cross town in east-west direction
- Desirable upgrades:

- Greenvale La and Mt Battery Rd route (including new bridge over Ford Ck)
- Intersection of Malcolm St and Chenery St
- Roughness and unsealed shoulders along Malcolm St

### **2.7.2 Summary of Feedback**

The following common themes arose out of the interviews:

- Current travel routes:
  - Highett St and High St used between Midland Hwy and Maroondah Hwy
  - Malcolm St and Kidston Parade used to cross town in east-west direction
  - Chenery St used for access between Mount Buller Road and Whitfield Road whilst Malcolm St and Highett St are used between Mount Buller Road and Midland Hwy

These routes are reflected in the proposed B-Double network being negotiated by Council with VicRoads

- Improvement projects identified by multiple respondents:
  - Rectify roughness and unsealed shoulders along Malcolm St
  - Intersection of Malcolm St and Kidston Parade (widening for truck turns)
  - Intersection of Malcolm St and Highett St (roundabout suggested)
  - Improve intersection High St, Whitfield Rd and Chenery St (unsuitable for B-Doubles)
  - Intersection Kidston Parade and Maroondah Hwy (add turn lanes in highway)
  - Intersection Mount Buller Rd and Crosbys La/Greenvale La (add turn lanes)
- Other identified improvement projects include:
  - Intersection of Dead Horse Lane with Midland Hwy (remove cross slope)
  - Intersection of Dead Horse Lane with Whitfield Rd (no specific issues noted)
  - Intersection Malcolm St and Highton La (roundabout)
  - Intersection of Malcolm St and Chenery St (no specific issues identified)
- Desirable new routes:
  - Greenvale La and Mt Battery Rd route (including new bridge over Ford Ck)
  - Dead Horse Lane and Withers Lane route (including new bridge over Ford Ck)

## 3. TRAFFIC CONSIDERATIONS

### 3.1 Heavy Vehicle Distribution

#### 3.1.1 B-Doubles

VicRoads undertook 5 day classification counts at the various arterial road entries to Mansfield in September 2009. An extract of the data yielded the total B-Double movement volumes summarised in Figure 3.1.1.

Location	Direction	Mon 7/09/2009	Tues 8/09/2009	Wed 9/09/2009	Thur 10/09/2009	Fri 11/09/2009
Maroondah Hwy	EB (in)	5	4	5	6	6
	WB (out)	4	5	4	4	5
Mt Buller Rd	WB (in)	2	2	3	4	1
	EB (out)	2	2	3	3	0
Midland Hwy	SB (in)	3	4	2	5	2
	NB (out)	2	3	4	8	3
Whitfield Rd	SB (in)	0	1	0	0	0
	NB (out)	0	1	0	0	0
	Σ in	10	11	10	15	9
	Σ out	8	11	11	15	8
	Total	18	22	21	30	17

Figure 3.1.1: B-Double Movements

VicRoads performed an analysis of this data to estimate the routes of B-Double vehicle through-movements across the town on the three mid-week days. Despite gaining correlation with only a small number of axle configurations, the prevailing patterns, in order of frequency of use, appear to be:

1. Maroondah Highway to/from Mount Buller Road (7 matching movements)
2. Maroondah Highway to/from Midland Highway (5 matching movements)
3. Midland Hwy to/from Mount Buller Road (3 matching movements)
4. All movements to/from Whitfield Road (negligible demand)

#### 3.1.2 Semi trailers

A further extract of the above September count data yielded the semi trailer movements summarised in Figure 3.1.2.

Location	Direction	Mon 7/09/2009	Tues 8/09/2009	Wed 9/09/2009	Thur 10/09/2009	Fri 11/09/2009	Sat 12/09/2009	Sun 13/09/2009
Maroondah Hwy	EB (in)	19	19	19	20	28	15	5
	WB (out)	21	23	21	19	30	16	9
Mt Buller Rd	WB (in)	14	11	7	9	15	7	6
	EB (out)	13	12	8	12	16	6	6
Midland Hwy	SB (in)	7	14	14	13	13	3	2
	NB (out)	10	12	9	18	11	4	3
Whitfield Rd	SB (in)	2	2	2	8	3	3	1
	NB (out)	1	1	6	5	2	2	0
	Σ in	42	46	42	50	59	28	14
	Σ out	45	48	44	54	59	28	18
	Total	87	94	86	104	118	56	32

Figure 3.1.2: Semi Trailer Movements

A similar analysis was undertaken to establish semi trailer movements through Mansfield on the three mid-week days. Although total vehicle numbers were higher, axle patterns and vehicle timing correlations again produced a low number of matching movements. Similar patterns to the B-Double movements were evident with the movements in order of frequency being:

1. Maroondah Highway to/from Midland Highway (22 matching movements)
2. Maroondah Highway to/from Mount Buller Road (17 matching movements)
3. Midland Highway to/from Mount Buller Road (9 matching movements)
4. All movements to/from Whitfield Road (fewer than 3 movements for each combination)

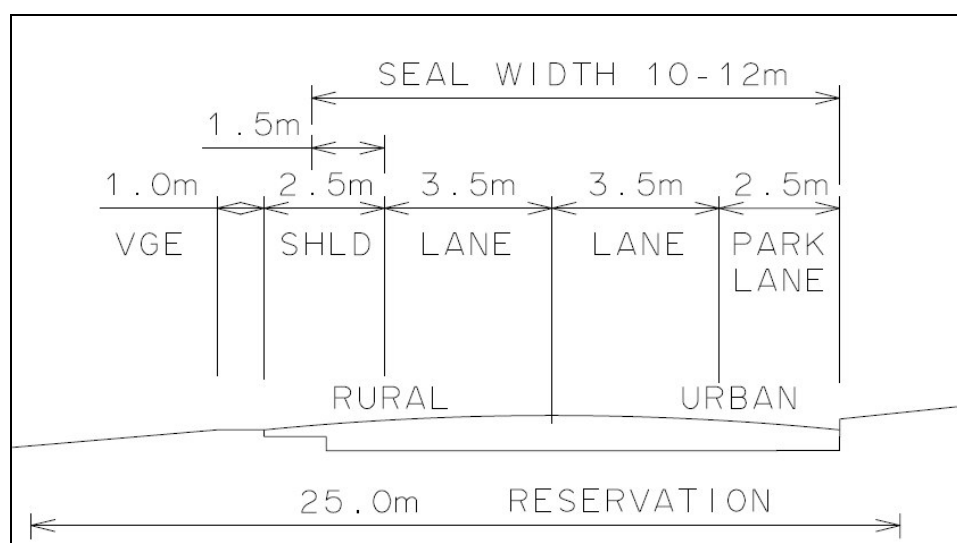
It should be remembered that this analysis is based on a cordon of count stations surrounding the town (as shown in Figure A1 in Appendix A) and does not take into account cross-town trips generated internally, for example by the businesses located along Dead Horse Lane or by the saleyards in High Street.

### 3.2 Design Principles

The aim of the study is to identify roads that could be designated as preferred alternative routes for heavy vehicles to use to avoid travelling through the central business area of Mansfield, which is primarily centred on that section of High Street between Highett Street and Chenery Street but also extends to a lesser degree west along High Street to Ultimo Street and north along Highett Street from High Street to Ford Creek. Recent retail development has also extended along Chenery Street.

The identified routes are intended to be progressively upgraded to cater for convenient travel by all standard design vehicles, particularly buses, semi trailers and B-Doubles. As such the basic design principles should include the minimum criteria outlined in the Austroads *Guide to Road Design – Part 3: Geometric Design* as follows and illustrated in Figure 3.2 below:

- Carriageway width of 7.0m (2 x 3.5m traffic lanes) desirably flanked by 1.5m sealed shoulders
- Turn radii of 15m to accommodate the Austroads template for 25m B-Double turn movements
- Intersection treatments (e.g. roundabouts) that allow for the passage of 25m B-Doubles
- Pavement and structure strengths that cater for tri-axle groups with gross mass of 22.5t
- Desirable minimum speed limit of 60 km/h in urban areas
- Clear zones of 3.0m from traffic lanes in urban areas (in 60 km/h or lower speed limits)



**Figure 3.2: Typical Design Cross Sections for HV Route**



---

These design parameters are consistent with the road characteristics nominated in Mansfield Shire's Infrastructure Design Manual Version 2.5 (Issued 2 November 2009) for:

- Urban Industrial Streets (refer Table 2 of the Manual) that specifies a 12.5m seal between barrier kerbs, including parking lanes on both sides, in a 25m reservation, or
- Rural Living Collector Roads (refer Table 6 of the Manual) that specifies a minimum seal width of 6.2m (or 7.0m for Group B Councils as defined in the Manual) within a 25m reservation and maximum traffic volumes of 6,000vpd.

## 4. ULTIMATE ROUTE OPTIONS

The project brief described a series of preferred alternative heavy vehicle route options that had been identified by Mansfield Shire and VicRoads. The three external routes are described in Sections 4.1 to 4.3 and illustrated in Figure 4.1 below. Broad constraints and upgrade requirements are discussed under each option.

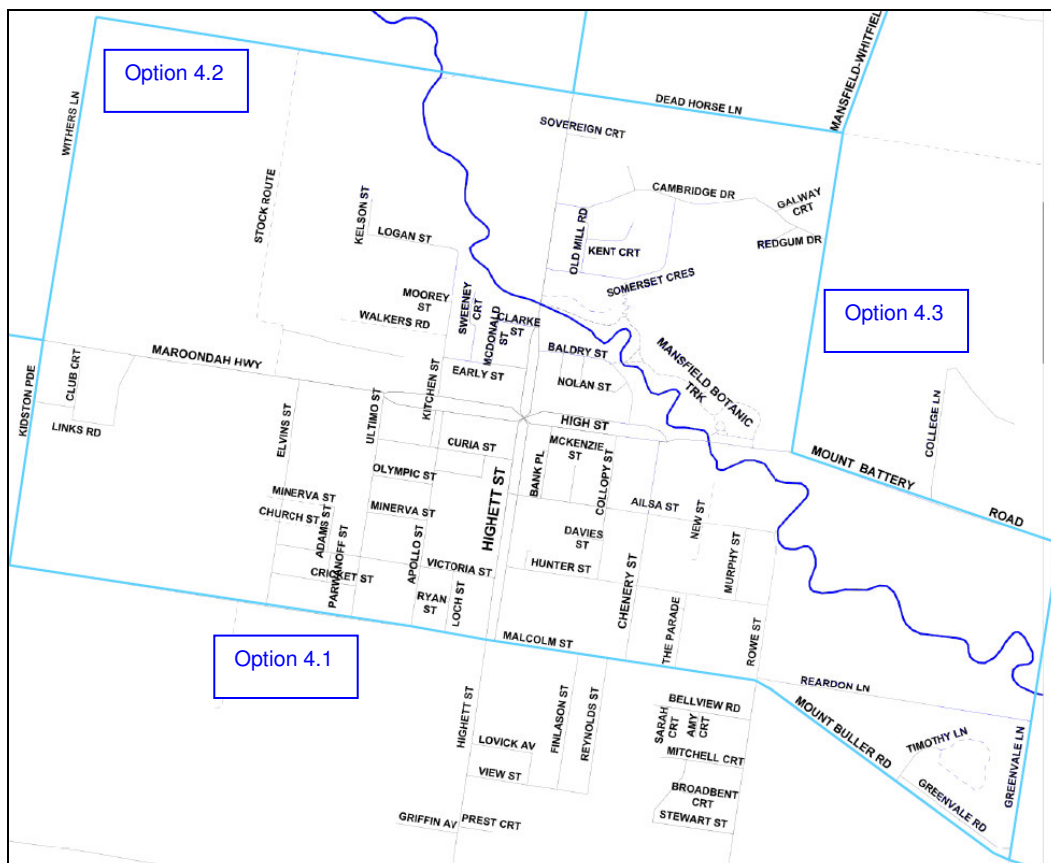


Figure 4.1: Ultimate Heavy Vehicle Route Options

### 4.1 Malcolm Street and Kidston Parade

Malcolm Street and Kidston Parade, between Maroondah Highway and Mount Buller Road, form the current frequently used east-west route that bypasses the CBD, particularly for winter traffic generated by the Mount Buller/Mount Stirling snow fields and for log and gravel cartage traffic.

It is currently a designated B-Double route (is the most frequently used bypass route in the VicRoads analysis – refer Section 3.1) and forms part of the proposed heavy vehicle cross-town link network. There are presently no alternatives to this route for an east-west bypass of the shopping centre.

Land-use issues potentially affecting the use of this route are:

- Hospital located at the NW corner of Malcolm Street and Highbett Street intersection;
- St Mary's Primary School (with school crossing) located on the route opposite Finlason Street;
- The flagged school crossing in front of St Mary's Primary School also serves the pedestrians walking to Mansfield Secondary College at the south end of Finlason Street;
- Retirement village being developed along the west side of Kidston Parade;
- Alzburg Resort located on NE corner of Malcolm Street and Highbett Street intersection.

Although currently functional for most vehicle movements, sections of the route do not comply with desirable design criteria for width and vehicle turns. Industry feedback has also highlighted the following deficiencies that would need to be addressed along the route:

- Installation of separate turn lanes (Type CHR and AUL treatments) in Maroondah Highway at Kidston Parade;
- Widening of the Kidston Parade/Malcolm Street intersection to facilitate turns. This work would require relocation of a HV power pole and may require acquisition of a splay from the golf club property on the NE corner of the intersection;
- Widening of the narrow seal in Kidston Parade from Maroondah Highway to Malcolm Street;
- Widening of the narrow seal in Malcolm Street from Kidston Parade to Highett Street and pavement regulation to reduce the current roughness for this length;
- Upgrading of the Malcolm Street/Highett Street intersection (several respondents suggested installation of a roundabout). This treatment is also important as a traffic calming measure in close proximity to the hospital (NW corner) and Alzburg Resort (NE corner).

## 4.2 Dead Horse Lane West and Withers Lane

These two low-standard gravel roads offer an opportunity for a future bypass of Mansfield for west to/from north/northeast trips between Maroondah Highway and Midland Highway or Whitfield Road. Although the section of Dead Horse Lane west of Midland Highway is currently gazetted for use by B-Doubles, the route is not suitable for use by these vehicles, containing a low level ford and several right angle bends that cannot accommodate long vehicles to the west of the highway.

Upgrading works will need to include:

- Construction of a bridge over Ford Creek;
- Widening and strengthening of the 3.9m wide seal along Dead Horse Lane for the 400m from Midland Highway to Ford Creek;
- Construction and sealing of the remaining 2km of the route;
- Improvement of the junction of Dead Horse Lane and Withers Lane to facilitate turns by long vehicles. This will require the acquisition of a splay from the SE corner property. This acquisition could be initiated at an earlier date by Council as part of an ultimate upgrading strategy but will require a decision on design speed to establish the scope of acquisition;
- Provision of turn lanes in the respective highways at both ends of the route – Type CHR in Midland Highway and Type AUL at Maroondah Highway.

Despite this route catering for the most frequent cross-town heavy vehicle movements, total vehicle numbers are very low (fewer than 30vpd) and it would be difficult to justify major investment in the required improvements whilst a satisfactory internal alternative exists along High Street and Highett Street (see Section 5.1). This is considered a very long term option requiring large capital investment and is considered to warrant the provision of an interim alternative option.

## 4.3 Mount Battery Road and Greenvale Lane

This option provides an ultimate northeast alternative route for north to/from east travel that avoids the densely developed and residential nature of Chenery Street (refer Section 5.2). The 60m reservation width of Mount Battery Road offers ample scope for improvement and the current sparse abutting development is unlikely to attract objections to its use by trucks. Works required to make this connection viable include:

- Intersection improvements at Whitfield Road to facilitate turns by long vehicles;
- Widening and strengthening of Mount Battery Road to Greenvale Lane (850m);

- Improvements to the Mount Battery Road/Greenvale Lane intersection;
- Construction and sealing of the northern part of Greenvale Lane (450m);
- Construction of a new bridge over Ford Creek;
- Seal widening for the southern part of Greenvale Lane (500m);
- Intersection improvements at Mount Buller Road (provision of turn lanes);

As for Option 4.2, the high cost of improvements is expected to result in a very long-term implementation time-frame.

However, Council should consider placing a Planning Acquisition Overlay (PAO) and perhaps a Development Plan Overlay (DPO) on land along Greenvale Lane to achieve building set-backs and allow for ultimate acquisition to widen the Greenvale Lane reservation.

## 4.4 Summary

In summary it is suggested that the high costs associated with provision of the ultimate northeast and northwest bypass routes makes them very long term planning propositions. Order-of-cost estimates are provided for the improvement tasks along these ultimate alternative routes in the schedule in Appendix B and summarised in Figure 4.4 below.

Route	Element	Costs (\$000)	
		Council	VicRoads
Malcolm Street/Kidston Parade	Maroondah Highway intersection		\$390
	Kidston Parade	\$1,039	
	Malcolm Street W of Chenery St	\$2,576.1	
	Malcolm Street E of Chenery St		\$643.5
	<b>Route Totals</b>	<b>\$3,615.1</b>	<b>\$1,033.5</b>
Dead Horse Lane/Withers Lane	2 x Highway intersections		\$780
	Dead Horse La W & Withers Lane	\$3,019.9	
	Dead Horse La E	\$156	
	<b>Route Totals</b>	<b>\$3,175.9</b>	<b>\$780</b>
Mount Battery Rd/Greenvale La	Whitfield Road		\$962
	Mt Battery Rd	\$585	
	Greenvale Lane	\$2,873	
	Mount Buller Road intersection		\$390
	<b>Route Totals</b>	<b>\$3,458</b>	<b>\$1,352</b>
<b>Totals</b>		<b>\$10,249</b>	<b>\$3,165.5</b>

**Figure 4.4: Estimated Costs for Ultimate Heavy Vehicle Route Options**

Immediate benefits can be gained from development of the southern route along Malcolm Street and Kidston Parade for all present and future east-west travel and improvement elements are discussed in detail in Section 6.1.

As an alternative to the ultimate outer northeast and northwest routes, to facilitate the passage of heavy vehicles around the Mansfield CBD during the short to medium term, it is recommended that improvements along several interim internal routes be considered. These are discussed in greater detail in Section 5.



## 5.2 Dead Horse Lane/Whitfield Road/Chenery Street

This is an existing bypass route of the CBD for traffic between Midland Highway and Mount Buller Road that also services the industries established along Dead Horse Lane. It also forms part of current and all future heavy vehicle routes by providing a direct link between the Midland Highway and Whitfield Road.

Although the Dead Horse Lane section is considered functional for the low level of external cross movements, current users have commented on operational issues associated with the intersections at each end of this link. Desirable improvements that were identified in the industry consultation and that should be considered early in any upgrading program are:

- Intersection improvements at Midland Highway to correct the steep grade (a particular issue for multi-deck stock crates) and install turn lanes;
- Intersection improvements at Whitfield Road to facilitate turns.

The Chenery Street section of this route contains several undesirable features. Chenery Street is located in a narrow (20m wide) road reservation that contains abutting residential development for much of its length and includes a school crossing near Hunter Street. Moreover, its intersection with High Street and Whitfield Road has an unconventional layout that is confusing and does not cater for turns by long vehicles such as B-Doubles. If this route is to be used, high priority should be given to the following:

- Intersection works at Chenery St/High St/Whitfield Rd (likely installation of a roundabout);
- Intersection works at Chenery St/Malcolm St (right turn lane for northbound movements);
- Potential for intersection works at Malcolm St and Highton Lane (noted in industry feedback).

## 5.3 Highett Street

Although not listed in the VicRoads brief as a route of interest, the use of Highett Street south of High Street as an interim solution for all connections between the Malcolm Street route and Midland Highway and Whitfield Road has emerged in the study as a viable alternative route to the Chenery Street link.

Highett Street has a divided cross section, identical to the section of Midland Highway north of High Street. It is currently an approved B-Double route and can cater for these vehicles without additional improvements. It is understood from industry feedback that it already performs a CBD bypass link function and carries occasional B-Double vehicles in this role.

Although it passes the sensitive hospital and Alzburg Resort establishments, these are currently exposed to the impacts of heavy vehicle travel along the Malcolm Street route and would experience a much lesser level of exposure from this type of traffic in Highett Street.

Flagged school crossings of both carriageways are located just north of Hunter Street but these are safer than their equivalent in Chenery Street by virtue of the single direction of traffic at each.

Intersection improvements have already been flagged as part of Option 4.1 for the intersection of Malcolm Street and Highett Street. Such an intersection treatment would facilitate use of Highett Street. It is consequently considered a superior route to Chenery Street as a connection from the north (Midland Highway) and northeast (Whitfield Road) approaches to the eastern (Mount Buller Road) approach.

Improvements along Highett Street South would comprise:

- Intersection works at Malcolm Street (already included in Option 4.1);
- Kerb outstands at the school crossings near Hunter Street.

## 5.4 Summary

In summary it is suggested that the immediate focus be on upgrading of the routes which currently have no ready alternatives as summarised in Figure 5.4 and including:

- Malcolm Street and Kidston Parade for all present and future east-west travel (it forms part of the ultimate alternative route network);
- Highett Street South as an interim link for north/northeast travel to/from east;
- Dead Horse Lane as a link from Midland Hwy to Whitfield Road and to serve current industries (it forms part of the ultimate alternative route network).

Other routes that can be progressively upgraded to replace the current inner interim routes are:

- Dead Horse Lane west from Midland Highway and Withers Lane for an outer north to/from west connection;
- Mount Battery Road and Greenvale Lane for an outer north to/from east connection.

Chenery Street is considered to suffer from a number of draw-backs that do not lend themselves to immediate or longer term remediation. These include:

- The narrow road reservation that prevents further cross sectional upgrades and curtails intersection improvements;
- Close abutting residential development and the spread of retail activity along the northern section of this road from the CBD;
- High cost of upgrading works at the intersection with High Street/Whitfield Road.

Route	Element	Costs (\$000)	
		Council	VicRoads
Malcolm St/Kidston Parade	As per ultimate strategy	\$3,615.1	\$1,033.5
High Street & Highett Street	High Street west of Highett Street		\$54.1
	Highett Street north of High Street		\$109.2
	<b>Route Total</b>		<b>\$163.3</b>
Dead Horse/Whitfield/Chenery	Dead Horse Lane	\$156	\$780
	Whitfield Road (+ Mt Battery Rd I/S)		\$572
	Chenery Street		\$975
	Malcolm Street (included above)		
	<b>Route Totals</b>	<b>\$156</b>	<b>\$2,327</b>
Highett Street south option	Dead Horse La (included above)		
	Highett Street North (included above)		
	Highett Street South	\$195	
	Malcolm Street (included above)		
	<b>Route Total</b>	<b>\$195</b>	

**Figure 5.4: Estimated Costs for Interim Heavy Vehicle Route Options**

As the projects in Figure 5.4 form optional elements and route alternatives, the total cost is dependent on which segments are adopted. A total cost has consequently not been provided.





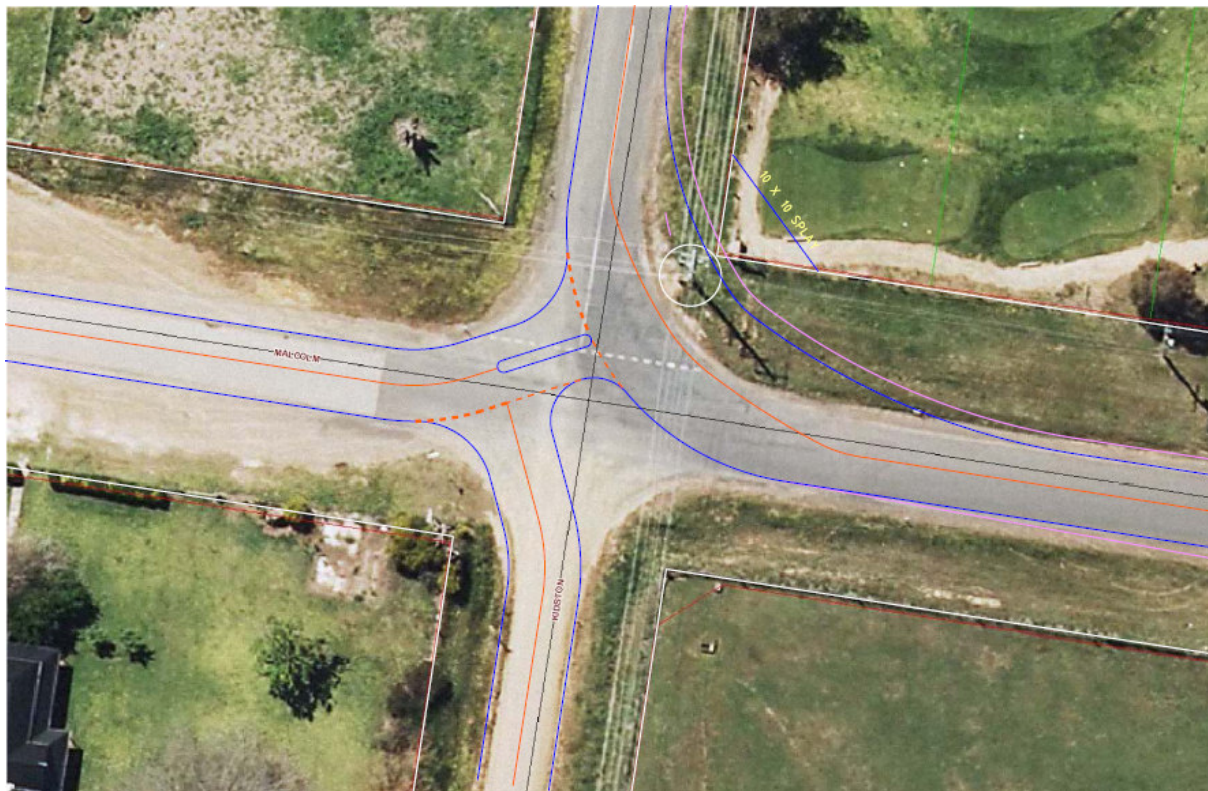
- Two 3.5m wide traffic lanes (bounded by 1.5m wide sealed shoulders where possible);
- Constructed footpaths in both road verges, along the frontages of the retirement village to the west and residential development to the east to cater for off-road pedestrian travel.

### 6.1.3 Malcolm Street at Kidston Parade

This cross intersection has its major traffic movements along the eastern and northern legs, with the south leg providing unsealed residential access to the south-western town fringe and the west leg being a minor rural collector road. Minor improvements have been considered but are difficult to achieve under present constraints imposed by services (power pole) and the reservation width.

An ultimate reorientation of priorities is indicated to align the layout along the majority traffic path, with the other two legs entering at the back of the curve connecting the east and north legs.

Such a layout change would necessitate the acquisition of a splay from the golf club property to the northeast and significant road works. The large high voltage power pole at the northeast corner (at 3.2m offset from present edge of seal) currently inhibits low-cost layout improvements and its relocation is a priority for any works at this site. The layout in Figure 6.1.3a indicates the minimum treatment required to cater for turns by heavy vehicles contained within the respective traffic lanes.



**Figure 6.1.3a: Proposed works at Malcolm Street/Kidston Parade intersection.**

It is further suggested that a PAO be applied for the ultimate acquisition of a larger splay from the golf club property to permit 60km/h vehicle speeds to be maintained through this bend, making it a more attractive travel option for a variety of heavy vehicles. The road centre line options have been plotted on the photo in Figure 6.1.3b. The worst case scenario of 180m radius with 3% superelevation that requires a 120m x 120m splay, has been used in the estimating spreadsheet in Appendix B.



**Figure 6.1.3b: Curve Options for Malcolm Street/Kidston Parade intersection.**

### **6.1.4 Malcolm Street**

Many of the respondents to the VicRoads consultation mentioned the narrow (6.2m seal) and rough surface along the section of Malcolm Street from Kidston Parade to Highett Street. Widening and regulation of this 1.4km length of road is a high priority as it is the only viable east-west heavy vehicle alternative route around the CBD. Works should aim to provide:

- Two 3.5m wide traffic lanes (bounded by 1.5m wide sealed shoulders where possible);
- An off-road shared path along the northern reserve boundary, east from Elvins Street at the minimum, for safe pedestrian and cyclist access to the schools;
- Depending on growth in heavy vehicle traffic, it may also become necessary in the medium term to upgrade the school crossing at St Mary's Primary School to provide active control (permanent Zebra crossing or pedestrian operated signals).

### **6.1.5 Malcolm Street at Highett Street**

This complex cross intersection occurs at the change in cross section in Highett Street from a divided road with a wide central median (north leg) to a two-lane two-way cross section (south leg). Although it has undergone recent layout improvements, several respondents to the VicRoads interviews still commented on the poor operational characteristics of this site. It has been the subject of a cross traffic crash in the last five years.

A roundabout treatment (as illustrated in Figure 6.1.5) is considered to offer the best means of addressing the difficult mix of layout elements. Such a treatment is expected to involve a deviation of the northern legs (with resultant loss of some central parking) and represent a project with significant development costs. A roundabout would have the additional benefit of introducing a slow point along the long straight alignment of Malcolm Street at a sensitive location abutting the hospital and Alzburg Resort.

An alternative treatment that could be considered in detailed design is the extension of the duplication through the intersection and introduction of the merge south of Malcolm Street.



**Figure 6.1.5: Proposed works at Malcolm Street/Highett Street intersection**

### **6.1.6 Malcolm Street at Chenery Street**

This intersection also received mention during the VicRoads consultation. If the Highett Street interim route is adopted and in-principle agreement is given to the ultimate Mount Battery Road/Greenvale Lane external bypass route, this intersection could be provided with a splitter island and kerb outstands in the north leg to downgrade it as a heavy vehicle route.

### **6.1.7 Mount Buller Road/Malcolm Street at Highton Lane**

This intersection received mention by several respondents to the VicRoads consultation. It has marginal sight distance characteristics from the south (Highton Lane) leg and exhibits an undesirable five leg layout but has no crash history to warrant high priority consideration of upgrading works.

## 6.2 Withers Lane/Dead Horse Lane Route

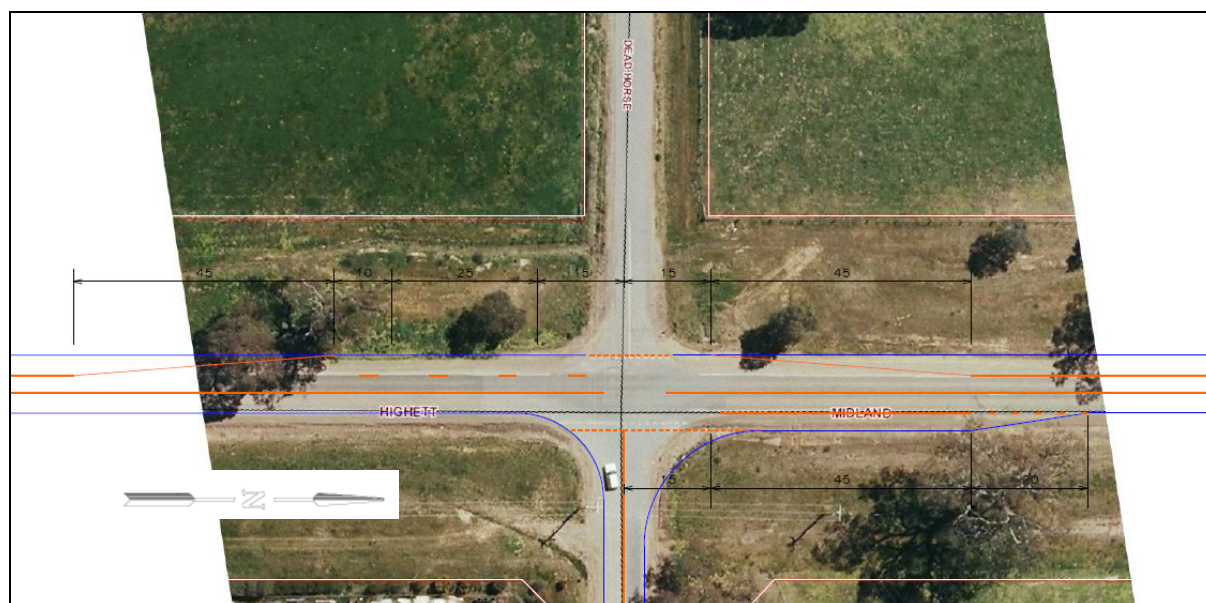
### 6.2.1 Midland Highway at Dead Horse Lane

This intersection is envisaged to undergo staged upgrading, initially to satisfy the interim route proposals outlined in Section 5.1, and ultimately to cater for right turn movements into Dead Horse Lane west as part of the Dead Horse Lane/Withers Lane route proposals.

There are only short sections of sealed shoulder along the highway approaches to this intersection. They do not comply with the Austroads criteria for a Type BAR treatment and do not permit heavy vehicle turns to be confined within the relevant traffic lanes (i.e. they require these vehicles to swing wide into the opposing traffic lanes). There is also a grade issue in the east approach that is of concern to livestock transporters.

As this intersection on an arterial road forms an integral part of both the existing and proposed heavy vehicle alternative routes, initial upgrading of this site is recommended to incorporate the following elements to facilitate turns by heavy vehicles as part of the program to establish the interim route network as illustrated in Figure 6.2.1:

- Introduce a passing lane that satisfies the Type BAR dimensions for an 80km/h design speed;
- Widen the intersection to permit turns without crossing the centre line;
- Ameliorate the cross-slope issue by reducing the down-grade in the east approach.



**Figure 6.2.1: Proposed interim works at Midland Highway/Dead Horse Lane intersection.**

As noted above, the northbound Type BAR interim treatment should be augmented with a southbound Type CHR treatment in the Midland Highway northern leg at the time that the ultimate Dead Horse Lane/Withers Lane route is opened to heavy vehicle traffic.

### 6.2.2 Dead Horse Lane West

This section of road consists of a 400m length of narrow (3.9m wide) seal between Midland Highway and the low level crossing of Ford Creek, with the remaining 1km to Withers lane comprising a 4m wide gravel formation (apart from the 100m of seal along the frontage of No 115). The pavement along the entire length of this road requires strengthening and sealing to provide 2 x 3.5m traffic lanes and a new bridge over Ford Creek for it to be suitable as a heavy vehicle alternative route.

Any medium term proposal to replace the current low-level crossing of Ford Creek with a bridge should include alignment and structure design parameters that cater for future use of the route by heavy vehicles including B-Doubles.

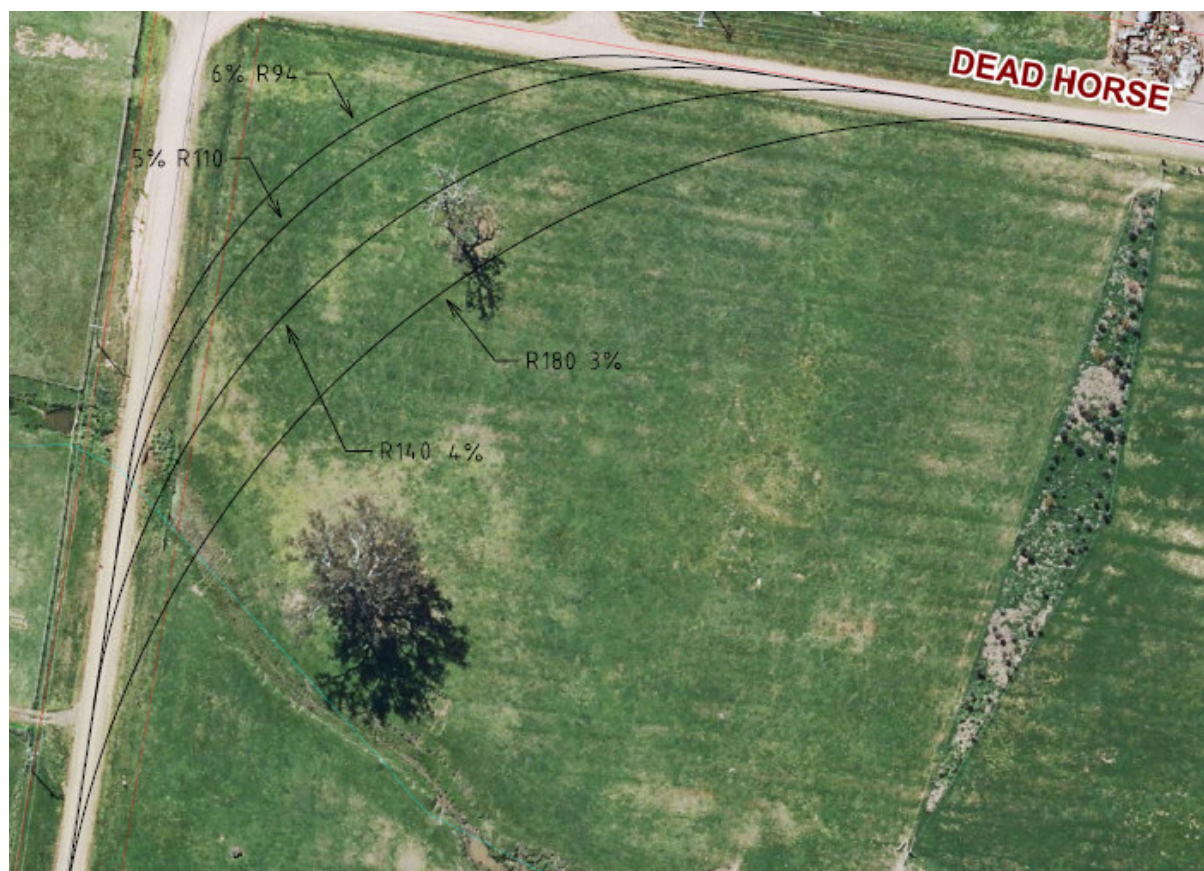
### 6.2.3 Withers Lane at Dead Horse Lane

As part of an ultimate Dead Horse Lane/Withers Lane route, this T junction would need to cater for major east to/from south movements by heavy vehicles. Such a priority change would necessitate the acquisition of a splay from the property on the southeast and significant road works. In addition, a reorientation of priorities would indicate that the current northern leg should form an altered T junction at the back of the curve connecting the east and south legs. The layout in Figure 6.2.3a indicates the minimum treatment required to cater for turns by heavy vehicles contained within the respective traffic lanes necessitating the acquisition of a 10m x 10m splay from the property to the southeast.



**Figure 6.2.3a: Minimum Splay at Withers Lane/Dead Horse Lane intersection**

This minimum treatment effectively represents a stop condition and is not considered conducive to attracting heavy vehicles onto the route. It is suggested that Council should initiate the acquisition of a splay (or place a PAO over land that may need to be acquired in the future) from the property at the southeast corner of the intersection of these roads to implement future layout improvements. It is suggested that the minimum 10m x 10m splay dimensions should be enlarged to 150m x 150m to maintain 60km/h travel along the route through a 180m radius curve at 3% superelevation. Road centre line alignments for this option are illustrated in Figure 6.2.3b over the page and the worst-case splay is used in the estimating spreadsheet in Appendix B.



**Figure 6.2.3b: Curve Options for Withers Lane/Dead Horse Lane intersection**

### **6.2.4 Maroondah Highway at Withers Lane**

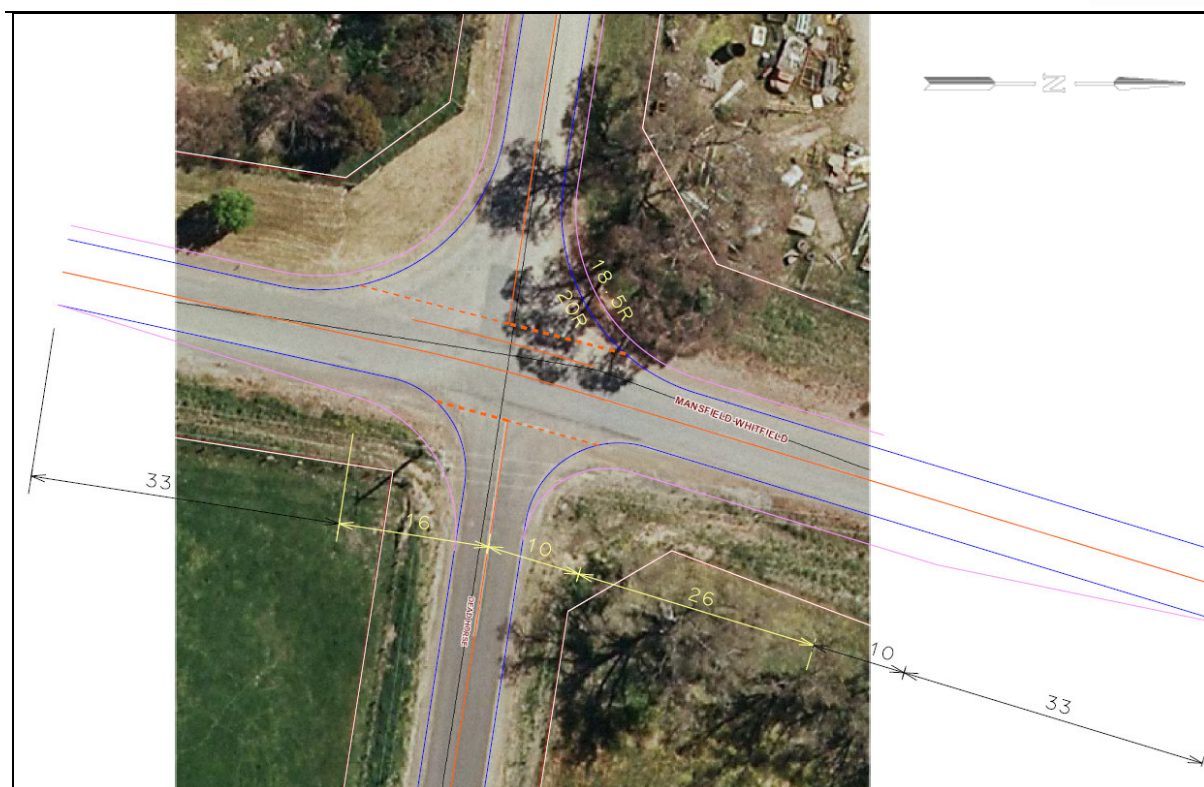
As noted in Section 6.1.1, future development of the Dead Horse Lane/Withers Lane bypass route will also need to be accompanied by the installation of a Type AUL treatment in Maroondah Highway that caters for eastbound left turn movement into Withers Lane.

## **6.3 Mount Battery Road/Greenvale Lane Route**

### **6.3.1 Mansfield-Whitfield Road at Dead Horse Lane**

No turn lanes are currently provided at this intersection, which forms an integral part of the existing B-Double route, the proposed interim heavy vehicle route and the ultimate heavy vehicle alternative route. Upgrading works, as illustrated in Figure 6.3.1, should aim to:

- Provide a passing lane that satisfies the Type BAR dimensions for an 80km/h design speed;
- Widen the intersection so that B-Doubles can make turns without crossing the centre line.



**Figure 6.3.1: Proposed works at Mansfield-Whitfield Road/Dead Horse Lane intersection.**

### **6.3.2 Mansfield-Whitfield Road at Mount Battery Road**

Development of the Mount Battery Road/Greenvale Lane bypass route will need to include major layout modification at this intersection to cater for north to/from east movements by heavy vehicles. Depending on vehicle numbers, it may be adequate to retain the current T junction layout, appropriately augmented by turn lanes.

Route upgrading works will need to include widening and strengthening of the 750m length of Mount Battery Road from Whitfield Road to Greenvale Lane.

### **6.3.3 Mount Battery Road at Greenvale Lane**

As part of a future Mount Battery Road/Greenvale Lane route, this T junction would need to cater for the major west to/from south flows and may require altering the priority to bring the eastern leg in as a T junction on the back of a curved connection between the west and south legs.

### **6.3.4 Greenvale Lane**

Residential development east from the township may impact on the viability of this route to cater for heavy commercial traffic in a 20m reservation. It is suggested that building setbacks or other planning measures (PAO and DPO) be implemented along the route to allow for future reserve widening if required.

Eventual route upgrading works will include widening, strengthening and sealing of the full 1km length of this road from Mount Battery Road to Mount Buller Road.

It is also suggested that any proposal to replace the current aging timber bridge over Ford Creek (which is presently subject to a 6t load limit) should include alignment and structure design parameters that cater for future use by B-Doubles.

### **6.3.5 Mount Buller Road at Greenvale Lane**

Development of the Mount Battery Road/Greenvale Lane bypass route would need to include a westbound Type BAR passing lane in Mount Buller Road for an 80km/h design speed. Intersection widening would also be required to facilitate the north to east exit movement from Greenvale Lane.

## **6.4 High Street West and Highett Street North Interim Route**

### **6.4.1 Maroondah and Midland Highways**

The two-lane two-way section of Maroondah Highway west of Ultimo Street currently has a seal width of about 6.4m bounded by gravel shoulders whilst the Midland Highway north of Ford Creek has a seal width of 6.0m bounded by sealed shoulders for parts of the length. Both of these sections of road are considered to require seal widening, as a minimum to add sealed shoulders but preferably to provide 2 x 3.5m traffic lanes, consistent with their arterial road status and to satisfactorily carry heavy vehicles.

### **6.4.2 Dead Horse Lane**

A key component of this proposed interim heavy vehicle route and the ultimate heavy vehicle alternative routes is the Dead Horse Lane link between Midland Highway and Mansfield-Whitfield Road. The current seal width of this section of Dead Horse Lane varies between 6.4m and 6.7m. To provide the expected level of service for B-Double and other heavy vehicles along this route, the seal width requires widening to 7.0m (with sealed shoulders if possible) for the 800m of the road. This may also include upgrading a number of commercial entrances and addressing drainage issues along the route.

### **6.4.3 Intersection Works**

Works that are required to facilitate the passage of heavy vehicles at each end of the length of Dead Horse Lane between Midland Highway and Whitfield Road have already been identified in Sections 6.2.1 and 6.3.1.

## **6.5 Other Upgrades**

### **6.5.1 Highett Street South**

Allowing this local road to be used by heavy vehicles as an interim connection between Midland Highway and the Malcolm Street/Kidston Parade route should be accompanied by the installation of kerb outstands at the school crossings north of Hunter Street to improve the conspicuity of the crossings beyond the approaching parking lanes and to act as a road narrowing for traffic calming purposes.

### **6.5.2 Chenery Street**

As noted in Section 5.2, this route has a number of deficiencies that are difficult to address. The recommended strategy involves adoption of the Highett Street South route instead of this route. However, if this route is to be designated as a preferred heavy vehicle route the school crossing north of Hunter Street should be upgraded with kerb outstands to increase its conspicuity and operational safety.

### **6.5.3 Chenery Street at High Street**

As for item 6.5.2, if the Highett Street option is rejected, this intersection would require modification to make it suitable for B-Double turns to/from Mansfield-Whitfield Road. An indicative roundabout layout is illustrated in Figure 6.5.3 over the page for consideration.





**Figure 6.5.3: Potential Roundabout Layout for High Street/Chenery Street intersection.**

## 7. DISCUSSION

### 7.1 Current Heavy Vehicle Demand

It is evident from the industry liaison in Section 2.7 and analysis of the count data in Section 3.1.1 that numbers of through movements by B-Double vehicles are currently very low with total movements on all arterial entries to Mansfield averaging at 22vpd over the 5 week days of the survey (11 inward and 11 outward movements). Maroondah Highway showed the highest level of use with a consistent passage of 10 B-Doubles per day (or a peak of 1 per hour). The most frequent B-Double through movements were west to/from east with 7 matching movements over the mid-week three days. The second highest demand is for the north to/from west movements with 6 matches established in the same three days.

A similar pattern is evident from the semi trailer movements extracted from the count data in Section 3.1.2, albeit at a higher order of magnitude by a factor of 4 to 5. Again the Maroondah Highway approach recorded the highest overall volumes with a 5 day average of 44vpd (or a peak of 5vph). The tracked through-movements showed a reverse order for the top two routes, with the north to/from west presenting the highest demand with 24 movements (including 2 related to Whitfield Road) over the mid-week three days, followed by the west to/from east route with 17 matching movements over the three days.

There was an apparent low demand for north to/from east movements with only 3 B-Doubles and 9 semi trailers recorded travelling this route over the three days of the count (or 4vpd).

### 7.2 Route Selection

From the discussion of route elements in Section 6 and the above assessment of current need, it is suggested that a viable strategy for catering for heavy vehicle traffic cross-town movements should involve the following:

- Progressive upgrading of the Malcolm Street/Kidston Parade route to facilitate the predominant east-west cross-town movements clear of the CBD. This should include:
  - Intersection works in Maroondah Highway at Kidston Parade
  - Seal widening and footpath construction along Kidston Parade
  - Intersection works (including land acquisition at Kidston Parade/Malcolm Street)
  - Seal widening, regulation and shared path construction along Malcolm Street
  - Medium term intersection works at Malcolm Street/Highett Street
- Adoption of the High Street West and Highett Street North route to provide an interim route for the west-north movements, which are of comparable importance to the east-west movements. This would not require any intersection works but should be accompanied by:
  - Seal widening along Midland Highway from Ford Creek to Dead Horse Lane
  - Seal widening along Maroondah Highway from Ultimo Street to Kidston Parade
- Improvement of the current Dead Horse Lane link between Midland Highway and Mansfield-Whitfield Road to better cater for heavy vehicles by:
  - Seal widening and drainage improvements along this length of Dead Horse Lane
  - Intersection improvements at Midland Highway
  - Intersection improvements at Mansfield-Whitfield Road
- Use of Highett Street south from High Street to Malcolm Street as an interim north/northeast-east cross-town link for heavy vehicles. This route is expected to only require:

- Upgrading of the existing school crossings with kerb extensions

### 7.3 Planning for Long-term Solution

Current traffic volumes make it difficult to justify major investment in the provision of new external alternative routes to cater for north-west and north-east truck movements clear of the town centre. However, planning should occur along the Dead Horse Lane /Withers Lane route by:

- Placing a PAO and ultimately proceeding with the acquisition of a splay from the corner of the Withers Lane/Dead Horse Lane intersection;
- Ensuring that any future upgrading of the Ford Creek crossing caters for B-Double vehicles.

Similarly, future works on Greenvale Lane should ensure that:

- Any replacement structure at Ford Creek caters for B-Double vehicles
- Spreading development does not inhibit future road widening options.

### 7.4 Short Term Priority Works

All short term works should be implemented in accordance with the strategy outlined in Section 7.2 with a suggested order of priority as follows:

#### Council Works:

7. Intersection works at Malcolm Street and Kidston Parade to ensure long vehicles can safely perform turns at this location. A decision will need to be made by Council whether to provide for a minimum treatment (requiring a 10m x 10m splay) or to encourage use of the route by catering for 60km/h through-movements (requiring a 120m x 120m splay);
8. Seal widening and regulation of Malcolm Street from Kidston Parade to Highett Street to make the route suitable for the passage of large vehicles;
9. Seal widening of Kidston Parade from Maroondah highway to Malcolm Street;
10. Upgrading of the school crossings in Highett Street for safety;
11. Seal widening and drainage improvements along Dead Horse Lane between Midland Highway and Mansfield-Whitfield Road to improve this link for the passage of large vehicles;
12. Construction of a shared path along Malcolm Street and footpaths along Kidston Parade for use by pedestrians and cyclists;
13. Intersection works (suggested installation of a roundabout) in Malcolm Street at Highett Street to improve safety and introduce traffic calming along the east-west route.

#### VicRoads Works:

5. Provision of turn lanes in Maroondah Highway at Kidston Parade to improve operational safety at the intersection;
6. Seal widening along Maroondah Highway and Midland Highway to make the north to/from west route suitable for the passage of large vehicles;
7. Intersection improvements and provision of turn lanes in Midland Highway at Dead Horse Lane to improve safety at the intersection;
8. Intersection improvements at Dead Horse Lane and Mansfield-Whitfield Road to improve safety and accessibility for large vehicles at the intersection.

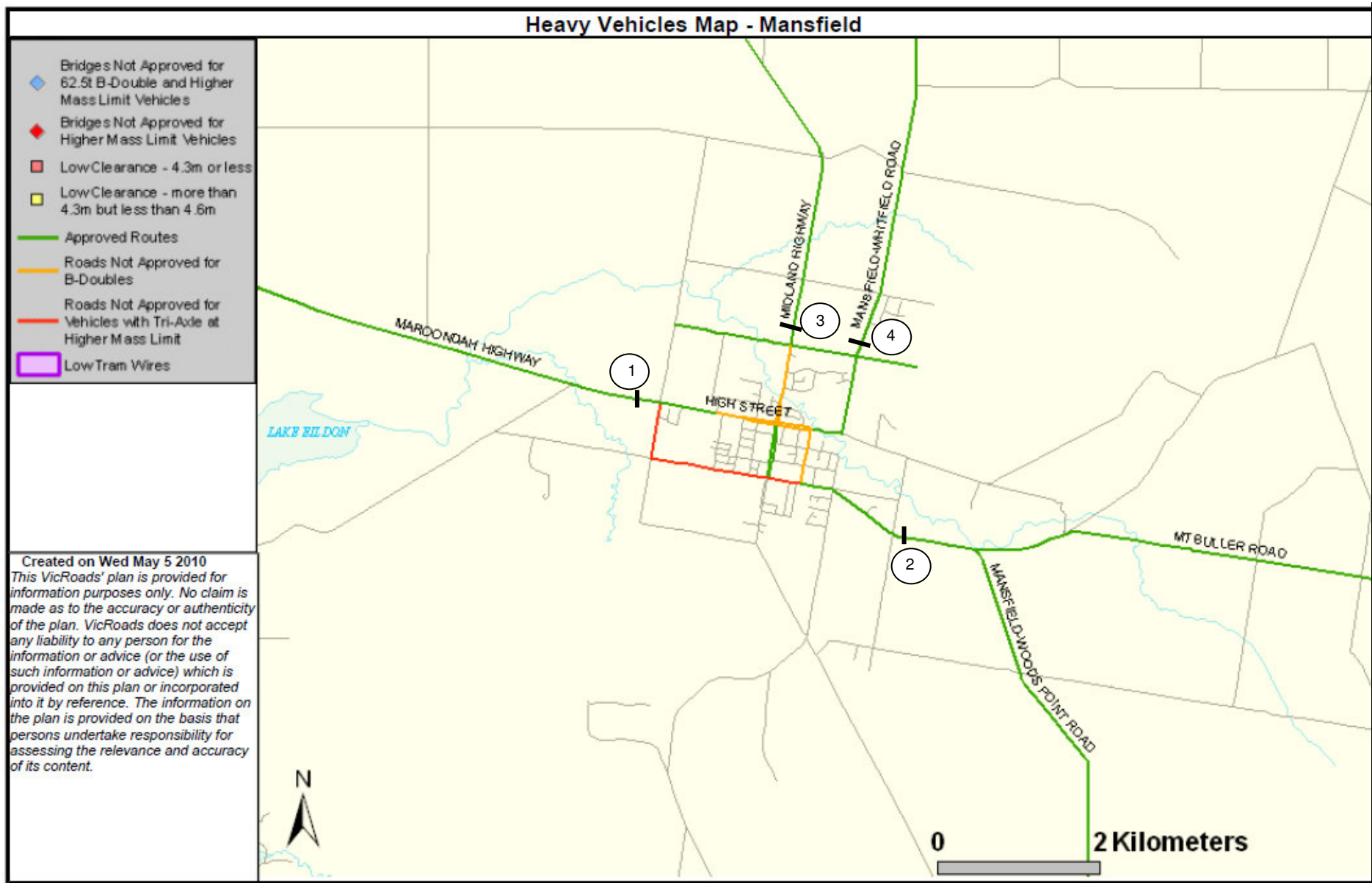
---

## 7.5 Road Declarations

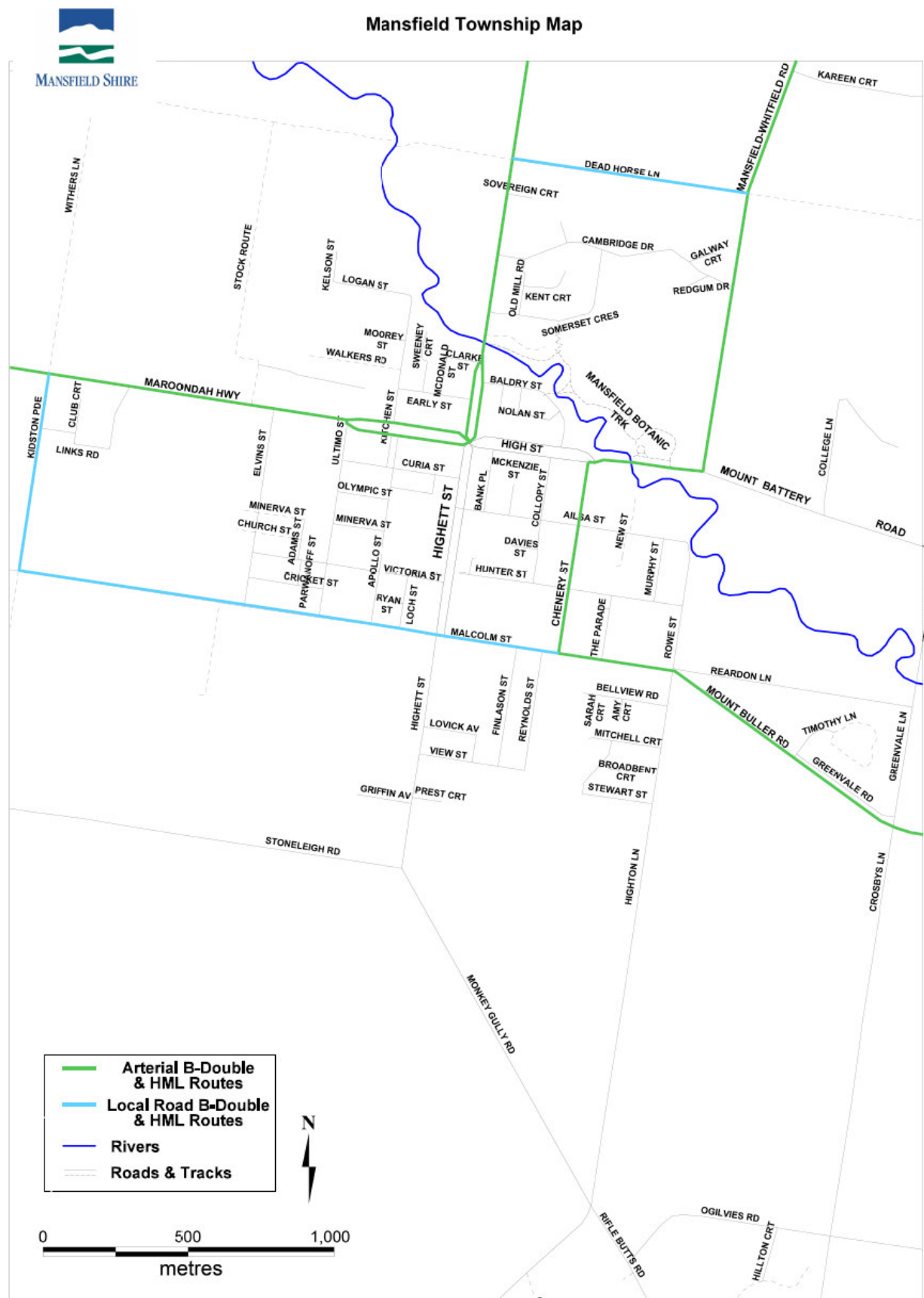
In the event that the strategy for using Highett Street as an interim preferred heavy vehicle alternative route is adopted, and intersection works result in a downgrading of Chenery Street as an arterial road, it is suggested that the matter of declared arterial road status of these two roads be reviewed. A change of “ownership” for these roads between Council and VicRoads, with Council relinquishing responsibility for Highett Street and portion of Malcolm Street in exchange for Chenery Street, may be appropriate and should be discussed by the respective road authorities.

## **APPENDIX A**

### **HEAVY VEHICLE ROUTES**



**Figure A1: Existing Approved Mansfield B-Double Routes** (also showing VicRoads traffic counting stations)



**Figure A2: Proposed Mansfield B-Double & Higher Mass Limits Routes**  
(Plan courtesy of Mansfield Shire Council)

## **APPENDIX B**

### **IMPROVEMENT WORKS SCHEDULE**



**Mansfield Heavy Vehicle Bypass Route Options**

<b>Route: Kidston Parade/Malcolm Street</b>										
Road	Section	Length (m)	Pavement Width	Shoulders	Traffic	Speed Zone	Advantages	Sensitivities	Works Required	TEC \$
Kidston Pde	Maroondah Hwy to Malcolm St	680	6.4m seal	gravel	623vpd	80km/h	current bypass route current B-Double route	abutting retirement village abutting residences	widen traffic lanes seal shoulders construct footpaths along both sides provide turn lanes in highway upgrade Malcolm St intersection include: acquire splay off corner shift HV power pole	68,000 27,200 34,000 300,000 300,000 360,000 10,000
Malcolm St	Kidston Pde to Highett St	1,450	6.6m seal	gravel	990vpd	80/50 at Elvins St	current bypass route 30m wide road reserve low density development current B-Double route	abutting hospital abutting rec reserve abutting residences	widen traffic lanes seal shoulders reduce roughness (asphalt overlay) construct shared path along north side upgrade Highett St intersection	145,000 58,000 710,500 18,125 600,000
Malcolm St	Highett St to Chenery St	420	7.0m seal	2 x 3m sealed parking	2,700vpd	50km/h 40km/h TBSZ	current bypass route 30m wide road reserve current B-Double route	abutting Alzburg Resort abutting St Mary's PS Sec College down Finlayson St school crossing	upgrade Chenery St intersection upgrade school crossing	300,000 150,000
Malcolm St	Chenery St to Greenvale La	1,950	6.6m seal	2.0m sealed	4,060vpd	50/80 E of Highton La	declared arterial road 30m wide road reserve current B-Double route	abutting residences	widen traffic lanes upgrade Highton La intersection	195,000 300,000
									<b>Kidston Pde/Malcolm St Total Costs (includes 30% contingency)</b>	<b>4,648,573</b>
<b>Route: High Street/ Highett Street</b>										
Road	Section	Length	Pavement Width	Shoulders	Traffic	Speed Zone	Advantages	Sensitivities	Works Required	TEC \$
High St	Kidston Pde to Ultimo St	1,040	6.4m seal	gravel	3,800vpd	80km/h	highway 60m wide road reserve current B-Double route		seal shoulders	41,600
High St	Ultimo St to Highett St	400	divided road	sealed parking lanes	>5,000vpd est	50km/h	highway divided road proposed B-Double route	abutting shops fringe of commercial centre	Nil	
Highett St	High St to Ford Creek	300	divided road	sealed parking lanes	>5,000vpd est	50km/h	highway divided road proposed B-Double route	abutting shops fringe of commercial centre	Nil	
Midland Hwy	Ford Creek to Dead Horse La	700	6.0m seal	gravel	1,200vpd	80km/h	highway proposed B-Double route 60m wide road reserve	residential estate to east	widen traffic lanes seal shoulders (50% of length)	70,000 14,000
									<b>High St/Highett St Total Costs (includes 30% contingency)</b>	<b>163,280</b>
<b>Route: Withers Lane/Dead Horse Lane</b>										
Road	Section	Length	Pavement Width	Shoulders	Traffic	Speed Zone	Advantages	Sensitivities	Works Required	TEC \$
Withers La	Highway to Dead Horse La	1,000	4.0-5.5m gravel	nil	<200vpd est	80km/h	minimal development		construct & seal 1km new road provide turn lanes in highway upgrade Dead Horse La junction acquire splay off SE corner	200,000 300,000 300,000 33,000
Dead Horse La	Withers La to Ford Creek	1,050	4.0m gravel	nil	<100vpd est	NS (assume 80km/h)	minimal development		construct & seal 1.05km new road construct bridge over Ford Creek	210,000 1,500,000
Dead Horse La	Ford Creek to Midland Hwy	400	3.9m seal	nil	<100vpd est	NS (assume 80km/h)	no development		widen & strengthen 400m seal provide turn lanes at highway	80,000 300,000
									<b>Withers La/Dead Horse La Total Costs (includes 30% contingency)</b>	<b>3,799,900</b>

**Schedule of improvement works Part 1**

<b>Route: Whitfield Road/Chenery Street</b>										
Route	Section	Length	Pavement Width	Shoulders	Traffic	Speed Zone	Advantages	Sensitivities	Works Required	TEC \$
Whitfield Rd	Dead Horse La to Mt Battery Rd	1,000	6.2m seal	gravel	1,140vpd	80km/h	declared arterial route houses set well back current B-Double route	residential estate to west	widen traffic lanes seal shoulders upgrade Dead Horse La intersection	100,000 40,000 300,000
High St	Mt Battery Rd to Chenery St	400	6.9m seal	gravel	1,140vpd	80/50 at Ford Creek	declared arterial route minimal development current B-Double route	abutting picnic area	upgrade Mt Battery Rd intersection	300,000
Chenery St	High St to Malcolm St	680	7.0m traffic lanes	2 x 3.5m parking lanes	3,940vpd	50km/h	declared arterial route current B-Double route	abutting residences and commercial establishments fringe of commercial centre school crossing narrow 20m road reserve	upgrade High/Chenery intersection upgrade school crossing	600,000 150,000
Malcolm St	Chenery St to Greenvale La	1,950	6.6m seal	2.0m sealed	4,060vpd	50/80 E of Highton La	declared arterial road 30m wide road reserve current B-Double route	abutting residences	widen traffic lanes upgrade Chenery/Malcolm intersection upgrade Highton La intersection	195,000 300,000 300,000
									<b>Whitfield Rd/Chenery St Total Costs (includes 30% contingency)</b>	<b>2,970,500</b>
<b>Route: Whitfield Road/Mt Battery Road/Greenvale Lane</b>										
Route	Section	Length	Pavement Width	Shoulders	Traffic	Speed Zone	Advantages	Sensitivities	Works Required	TEC \$
Whitfield Rd	Dead Horse La to Mt Battery Rd	1,000	6.2m seal	gravel	1,140vpd	80km/h	declared arterial route houses set well back current B-Double route	residential estate to west	widen traffic lanes seal shoulders upgrade Dead Horse La intersection upgrade Mt Battery Rd intersection	100,000 40,000 300,000 300,000
Mt Battery Rd	Whitfield Rd to Greenvale La	750	5.6m seal	gravel	<200vpd est	NS (adopt 80km/h)	minimal development wide 60m reservation	some abutting residences	widen & strengthen 0.75km road upgrade Greenvale La intersection	150,000 300,000
Greenvale La	Mt Battery Rd to Ford Creek	680	4.5m gravel	nil	250vpd	NS (adopt 80km/h)	no development	narrow 20m reservation	construct & seal 680m new road construct bridge over Ford Creek provide for ultimate reserve wideing	136,000 1,500,000 204,000
Greenvale La	Ford Creek to Mt Buller Rd	740	5.0-6.2m seal	gravel	250vpd	NS (adopt 80km/h)	minimal development	narrow 20m reservation	widen & strengthen 740m road turn lanes at Mt Buller Rd intersection provide for ultimate reserve wideing	148,000 300,000 222,000
									<b>Mt Battery Rd/Greenvale La Total Costs (includes 30% contingency)</b>	<b>4,810,000</b>
<b>Route: Dead Horse Lane/Highett Street</b>										
Route	Section	Length	Pavement Width	Shoulders	Traffic	Speed Zone	Advantages	Sensitivities	Works Required	TEC \$
Dead Horse La	Whitfield Rd to Midland Hwy	1,200	6.7m seal	gravel	574vpd	70km/h	abutting industry to N current B-Double route	some residences to S	widen seal upgrade intersection at Whitfield Rd upgrade intersection at Midland Hwy	120,000 300,000 300,000
Midland Hwy	Dead Horse La to Ford Creek	700	6.0m seal	gravel	1,200vpd	80km/h	highway proposed B-Double route 60m wide road reserve	residential estate to E	widen traffic lanes seal shoulders	70,000 28,000
Highett St	Ford Creek to High St	300	divided road	sealed parking lanes	>5,000vpd est	50km/h	highway divided road proposed B-Double route	abutting shops fringe of commercial centre	Nil	
Highett St	High St to Malcolm St	660	divided road	sealed parking lanes	4,100vpd	50km/h	current B-Double route divided road	abutting Council offices abutting rec reserve school crossing abutting hospital abutting Alzurg Resort	upgrade Malcolm St intersection upgrade school crossings x 2	600,000 150,000
									<b>Dead Horse La/Highett St Total Costs (includes 30% contingency)</b>	<b>2,038,400</b>

**Schedule of improvement works Part 2**

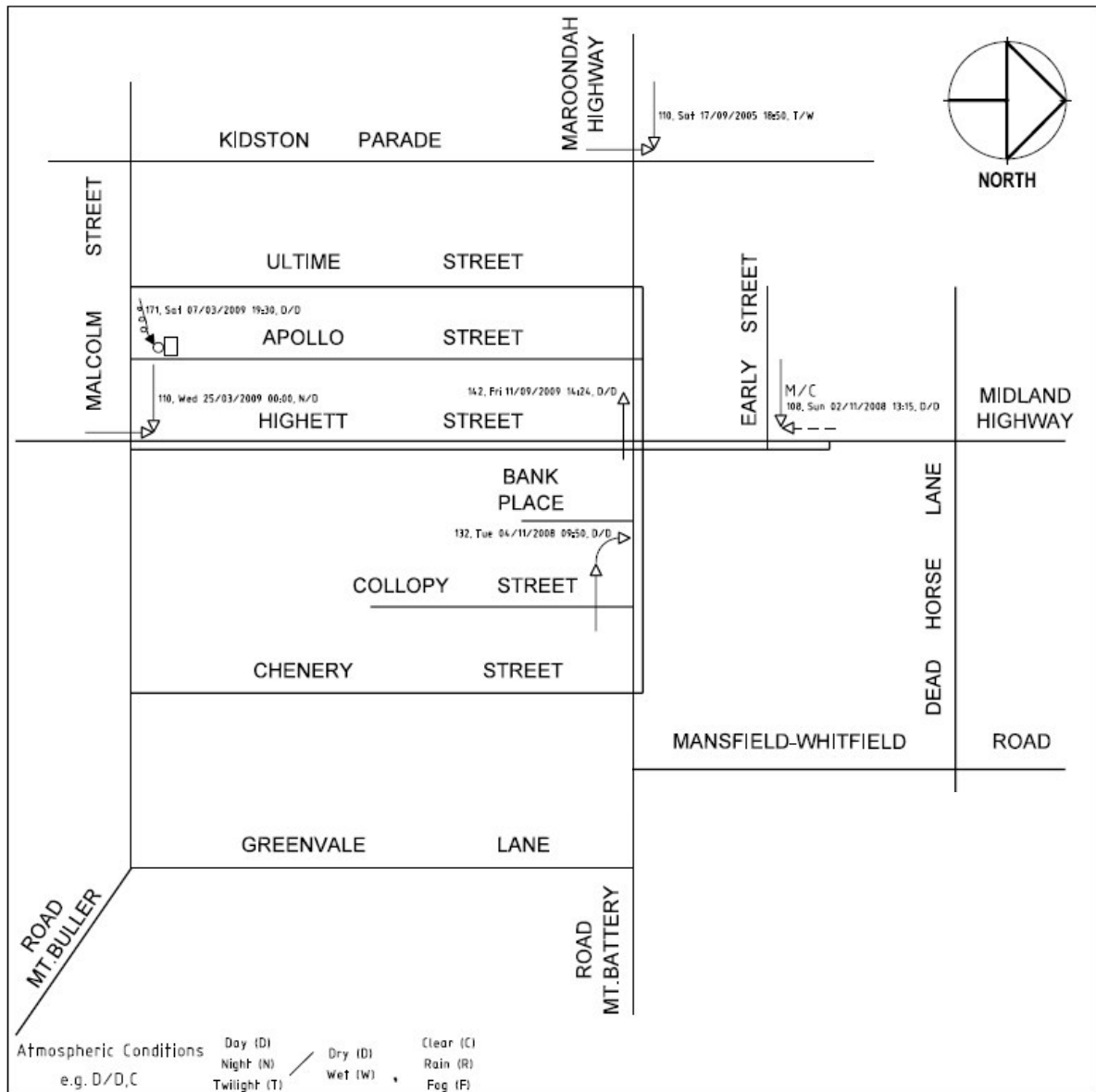
## **APPENDIX C**

### **CRASH DATA**

# CPG Australia Pty Ltd



<b>Project:</b> Mansfield Township		<b>Date:</b> 11/06/10
<b>Client:</b> VicRoads - North East Region	<b>Job No:</b> B00265	<b>Sheet No:</b> 1 of 1
<b>Subject:</b> Collision Diagram		<b>By:</b> P.Dehn



Atmospheric Conditions Day (D) Night (N) Twilight (T) Dry (D) Wet (W) Clear (C) Rain (R) Fog (F)  
e.g. D/D,C

L E G E N D	Symbol	Description	Symbol	Description	S U M M A R Y	Year	Accident Severity			Total
							Fatal	SI	OI	
	←→→→	Vehicle Backing	←	Side Swipe						
	←	Vehicle Moving	←	Out of Control						
	←---	Pedestrian	→	Fatal Accident	M	2005	-	-	1	1
	←	Tram	→	Serious Injury	M	2006	-	-	-	-
	▭	Stationary Vehicle	→	Other Injury	A	2007	-	-	-	-
	▭ P	Parked Vehicle	M/C	Motor Cycle	R	2008	-	-	2	2
	▭	Fixed Object	T	Rigid Truck/Bus	Y	2009	-	1	2	3
	⊗	Bicycle	A	Articulated Truck		Total	-	1	5	6

Collision Diagram Rev B

### Road Crash Statistics: Victoria Accident Details

Location is LGA(s): MANSFIELD; Query: Casualty accidents; Sites: On Maroondah Hwy (184.382 km) between Kitchen Street and Midland Hwy / Midland Highway Inbound Cwy / Mount Buller Road, On Maroondah Hwy (184.372 km) between Kitchen Street and Midland Hwy / Midland Highway Inbound Cwy / Mount Buller Road, On Malcolm Street (2.765 km) between Elvins Street and Ultimo Street, On Mount Buller Road Inbound Cwy (0.167 km) between Bank Place and Collopy Street, Intersection of Maroondah Hwy and Kidston Parade, Intersection of Midland Highway Inbound Cwy and Early Street, Intersection of Highett Street and Malcolm Street; Date range is 01/01/2005 to 31/12/2999; Sorted by location.

**ACCIDENT COUNT: 1**

Accident No	42005033666	Light	Dusk/dawn	DCA/Accident	110 Cross traffic(intersections only)	Location	Maroondah Hwy&	
Date/Time	17/9/2005 Sat 18:50	Road	Wet	Sub DCA		(Road Names)	Kidston Parade	
Severity	Other Injury	Atmosphere	Clear	Sub DCA Code				
Traffic Control	Stop sign	Total Vehicles	Total Veh=2	<b>PERSON INJURY DETAILS</b>				
Map Refs	VCD ED7 679 M4	Killed	0	Vehicle,DIR.(+DCA arrow)	Road User	Age	Sex	Injury Level
Road Number	2720	Serious Injury	0	Car, N(2)	Passenger		F	Injured, needed treatment
KM from Start	182.972 Km , Mansfield	Other Injury	1		Driver	46	M	Not injured
Speed Zone	80 km/hr	Not Injury	4		Passenger		F	Not injured
Urbanisation	Other City/Town				Passenger		F	Not injured
				Car, E(1)	Driver	65	M	Not injured

**ACCIDENT COUNT: 2**

Accident No	T20080040473	Light	Day	DCA/Accident	108 Ped struck walking to/from or	Location	Midland Highway Inbound Cwy&	
Date/Time	2/11/2008 Sun 13:15	Road	Dry	Sub DCA	boarding/alighting vehicle	(Road Names)	Early Street	
Severity	Other Injury	Atmosphere	Clear	Sub DCA Code	Pedestrian emerged from behind car etc			
Traffic Control	Giveaway sign	Total Vehicles	Total Veh=2	<b>PERSON INJURY DETAILS</b>				
Map Refs	VCD ED7 679 P4	Killed	0	Vehicle,DIR.(+DCA arrow)	Road User	Age	Sex	Injury Level
Road Number	2590	Serious Injury	0	Motor cycle, E(1)	Motor cyclist	57	F	Not injured
KM from Start	451.491 Km , Mansfield	Other Injury	1	Stn. wagon, S(8)	Driver	36	M	Not injured
Speed Zone	50 km/hr	Not Injury	2		Pedestrian		F	Injured, needed treatment
Urbanisation	Other City/Town							

**ACCIDENT COUNT: 3**

Accident No	T20080040692	Light	Day	DCA/Accident	132 Right rear	Location	On Mount Buller Road Inbound C	
Date/Time	4/11/2008 Tue 09:50	Road	Dry	Sub DCA	Mid block	(Road Names)	btw Bank Place	
Severity	Other Injury	Atmosphere	Clear	Sub DCA Code	N02		& Collopy Street	
Traffic Control	Giveaway sign	Total Vehicles	Total Veh=2	<b>PERSON INJURY DETAILS</b>				
Map Refs	VCD ED7 679 P4	Killed	0	Vehicle,DIR.(+DCA arrow)	Road User	Age	Sex	Injury Level
Road Number	4951	Serious Injury	0	Car, S(2)	Passenger	23	F	Injured, needed treatment
KM from Start	0.167 Km , Mansfield	Other Injury	1		Driver	33	F	Not injured
Speed Zone	40 km/hr	Not Injury	2		Driver	54	F	Not injured
Urbanisation	Other City/Town			Car, S(1)				

**Road Crash Statistics: Victoria Accident Detail**

Location is LGA(s): MANSFIELD; Query: Casualty accidents; Sites: On Maroondah Hwy (184.382 km) between Kitchen Street and Midland Hwy / Midland Highway Inbound Cwy / Mount Buller Road, On Maroondah Hwy (184.372 km) between Kitchen Street and Midland Hwy / Midland Highway Inbound Cwy / Mount Buller Road, On Malcolm Street (2.765 km) between Elvins Street and Ultimo Street, On Mount Buller Road Inbound Cwy (0.167 km) between Bank Place and Collopy Street, Intersection of Maroondah Hwy and Kidston Parade, Intersection of Midland Highway Inbound Cwy and Early Street, Intersection of Highett Street and Malcolm Street; Date range is 01/01/2005 to 31/12/2999; Sorted by location.

**ACCIDENT COUNT: 4**

<b>Accident No</b>	T20090010762	<b>Light</b>	Unknown	<b>DCA/Accident</b>	110 Cross traffic(intersections only)	<b>Location</b>	Highett Street&	
<b>Date/Time</b>	25/3/2009 Wed 00:00	<b>Road</b>	Dry	<b>Sub DCA</b>	Not Required	<b>(Road Names)</b>	Malcolm Street	
<b>Severity</b>	Other Injury	<b>Atmosphere</b>	Clear	<b>Sub DCA Code</b>	NRQ			
<b>Traffic Control</b>	Stop sign	<b>Total Vehicles</b>	Total Veh=2	<b>PERSON INJURY DETAILS</b>				
<b>Map Refs</b>	VCD ED7 679 P6	<b>Killed</b>	0	<b>Vehicle,DIR.(+DCA arrow)</b>	<b>Road User</b>	<b>Age</b>	<b>Sex</b>	<b>Injury Level</b>
<b>Road Number</b>	153222	<b>Serious Injury</b>	0	Car, N(2)	Driver	26	F	Injured, needed treatment
<b>KM from Start</b>	0.817 Km , Mansfield	<b>Other Injury</b>	1	Car, E(1)	Driver	55	F	Not injured
<b>Speed Zone</b>	50 km/hr	<b>Not Injury</b>	1					
<b>Urbanisation</b>	Other City/Town							

ROAD CRASH INFORMATION SYSTEM

Location Formatted Report

Page 1

25/05/2010

Route=MALCOLM STREET (1904-3842) Severity=All Casualty Date=01/01/2005 to 31/12/2009 ABS=ABS to receive accident

LGA	Map KM	Location	Severity K/SI/Inj Road User/Age/Sex/Injury	Date Time	Day DCA	Traf. Control Sub DCAs	Light Road	Veh Units/ Dir. Object Hit	Accident No MF/Image
MANSFIELD	67906 3058	On MALCOLM STREET (54mE) btw ULTIMO STREET and APOLLO STREET	Serious injury 0/1/0 Dri/44/F/2	07/03/2009 19:30	Sat 171	No control Q04 V01	Day Dry	E * Station W/Emban	T20090008281 0/0
MANSFIELD	679P4 184381	On MAROONDAH HIGHWAY (R) (64mSW) btw MIDLAND HIGHWAY and APOLLO STREET	Other injury a 0/0/1 Dri/53/F/4 Dri/52/F/3	11/09/2009 14:24	Fri 142	No control R01	Day Dry	E * Station Wagon W Station Wagon	T20090035292 0/0

Number of Accidents: 2

Note : \* Indicates vehicle # 1 as per DCA chart

NB: Any complex intersections included in this report may not have had all accidents included.