



# Mansfield Heavy Vehicle Alternative Route Review

## Traffic Assessment Report

Client:

Mansfield Shire Council

Project No. 190225

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# TABLE OF CONTENTS

1	INTRODUCTION .....	5
1.1	Summary .....	5
2	BACKGROUND.....	7
2.1	2010 CPG Report.....	7
2.2	RRV Liaison .....	9
2.3	Technical references.....	9
2.4	Report structure .....	9
3	EXISTING CONDITIONS .....	10
3.1	Arterial road network .....	10
3.2	Traffic.....	10
3.3	Speed environment.....	12
3.4	Current Heavy Vehicle Routes.....	12
3.5	Crash history.....	13
4	TRAFFIC ANALYSIS.....	15
4.1	Heavy Vehicle Distribution.....	15
4.2	Design Principles.....	16
5	ULTIMATE ROUTE OPTIONS.....	17
5.1	Kidston Parade and Malcolm Street.....	17
5.2	Dead Horse Lane West and Withers Lane.....	18
5.3	Mount Battery Road and Greenvale Lane .....	19
5.4	Summary .....	19
6	INTERIM ROUTE OPTIONS .....	21
6.1	High Street West and Highett Street North .....	21
6.2	Dead Horse Lane/Whitfield Road/Chenery Street .....	22
6.3	Highett Street .....	22
6.4	Summary .....	23
7	DISCUSSION .....	25
7.1	Current Heavy Vehicle Demand .....	25
7.2	Route Selection.....	25
7.3	Planning for Long-term Solutions.....	26
7.4	Short Term Priority Works.....	26
	ATTACHMENT A – CRASH LOCATIONS.....	28
	ATTACHMENT B – SCHEDULE OF IMPROVEMENT WORKS.....	29

# 1 INTRODUCTION

In November 2010 CPG Australia prepared a planning study that investigated potential alternative heavy vehicle routes to bypass the Mansfield Central Activity Area (CAA). Since the preparation of that report, considerable improvement works have been undertaken along the various routes, including works identified in the CPG study. As such, Mansfield Shire Council (the Council) has requested the preparation of a report to update the previous study and to plan for future works to progress the incremental implementation of the strategy.

Trafficworks has been engaged by the Council to undertake the necessary investigations to update the 2010 CPG Planning Study.

The findings in this report are based on current traffic data from traffic surveys undertaken in November 2019, generally at the same locations as those used for the CPG report. It also takes into account verbal advice sought from Regional Roads Victoria – Benalla Region (RRV, formerly VicRoads) on any proposed future system upgrading works scheduled to be undertaken along the identified routes.

## 1.1 Summary

Current truck traffic volumes make it difficult to justify major investment in the provision of new external alternative routes to cater for north to/from west and north to/from 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.

Similarly, future use of the Mt Battery Road/Greenvale Lane route should ensure that:

- Spreading development does not inhibit future road widening options for Greenvale Lane.

All identified 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:

1. Seal widening and regulation of Malcolm Street from Kidston Parade to Highett Street to make the route suitable for the passage of large vehicles
2. Seal widening of Kidston Parade from Maroondah highway to Malcolm Street.

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 10 m x 10 m splay) or to encourage use of the route by catering for 60 km/h through-movements (requiring a 120 m x 120 m splay).

3. Upgrading of the school crossings in Highett Street for safety
4. 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
5. Construction of a shared path along Malcolm Street and footpaths along Kidston Parade for use by pedestrians and cyclists.

**VicRoads Works:**

1. Provision of a right turn lane in Maroondah Highway at the west approach to Kidston Parade to improve operational safety at the intersection
2. Seal widening along Maroondah Highway and Midland Highway to make the north to/from west route suitable for the passage of large vehicles
3. Intersection safety works at the High Street/Highett Street roundabout (suggest installation of raised pavement threshold treatments at all entries)
4. Intersection improvements including provision of turn lanes in Midland Highway at Dead Horse Lane to improve operational characteristics and safety at the intersection
5. Intersection improvements at Dead Horse Lane and Mansfield-Whitfield Road to improve safety and accessibility for large vehicles at the intersection.

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## 2 BACKGROUND

### 2.1 2010 CPG Report

The CPG study identified routes that could be developed over time to provide ultimate external bypass alternatives for heavy vehicle travel around Mansfield's residential and commercial areas. These routes represented the existing declared arterial road approaches to the town but interconnected remotely by Dead Horse Lane West and Withers Lane to the northwest and Mount Battery Road and Greenvale Lane to the northeast (refer to locality plan in Figure 1). The report nominated improvement works required for these routes to become fully operational and provided order-of-cost estimates for such works.

The report supported ongoing discussions by Mansfield Shire with RRV (VicRoads) on interim measures 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 CAA, whilst using High Street and Highett Street to execute the west to/from north traverse. The report suggested that Chenery Street was not suitable for use by B-Doubles and Higher Mass Limited vehicles. It recommended 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 itemised a series of prioritised improvement projects on the local and arterial road systems for consideration by the Council and RRV 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 comprised the following progressive interim 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 intersection
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 (completed).

#### **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.

The CPG investigation concluded that, due to the low levels of heavy vehicle demand at that time, and high infrastructure costs, the remote bypass options were unlikely to be developed in the short to medium term. The report 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 was the Kidston Parade / Malcolm Street route that forms the southern bypass link common to short and long-term strategies. The report recommended that upgrading projects along this route proceed in accordance with the highest priorities in the above suggested program of works.



Figure 1: Mansfield Township Map (courtesy of Mansfield Sire Council)



## 2.2 RRV Liaison

Informal consultation with staff at the RRV Benalla Regional office in relation to this project has elicited the following responses:

*There are no upcoming works proposed for the Midland Highway / Dead Horse Lane intersection. Recent improvements undertaken at this location were developer-funded and are not expected to be augmented by RRV in the foreseeable future.*

*With respect to the intersection of Whitfield Road and Dead Horse Lane, improvements have been made in recent years which should have addressed the safety issues and the crash risks. At this stage there are no further treatments proposed at this site.*

*Similarly, it is understood that the High Street / Highett Street intersection operates safely and RRV do not have any records of fatal or serious injury crashes at this location. At this stage there are no further treatments proposed for this site.*

*RRV is generally aware of the strategic intent to have the bypass routes established and will work with Council as opportunities arise to incrementally upgrade these routes.*

## 2.3 Technical references

Technical references used in the preparation of this report include the following:

- Austroads *Guide to Road Design, Part 3 – Geometric Design 2016*
- Austroads *Guide to Road Design, Part 4 – Intersections and Crossings, General 2017*
- Austroads *Guide to Road Design, Part 4A – Unsignalised and Signalised Intersections 2017*
- Austroads *Guide to Traffic Management, Part 6: Intersections, Interchanges and Crossings 2017*
- VicRoads Supplement to Austroads *Guide to Road Design Part 4A*
- Department of Transport (DoT) *Open Data Portal* for casualty crash history on roads within Mansfield Township
- The *Mansfield Shire Planning Scheme*
- Local Government Infrastructure Design Association's *Infrastructure Design Manual (IDM)*, Version 5.20 released March 2019

## 2.4 Report structure

The remainder of this report follows the same structure as the 2010 CPG report but provides analysis based on updated data (whilst comparing it with those presented in the CPG report), acknowledges works undertaken over the past 10 years and draws fresh conclusions from the outcomes of the reassessments.



## 3 EXISTING CONDITIONS

### 3.1 Arterial road network

#### Maroondah Highway

The Maroondah Highway is part of the State's Arterial Road network (route B320) managed by RRV. It provides access to Mansfield and the high country from Melbourne. Known as High Street through Mansfield Township, it is a single 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 Highett Street.

#### Midland Highway

The Midland Highway is also part of the State's Arterial Road network (route C518) managed by RRV. It provides access to Mansfield from Benalla and central Victoria. It is a single two-lane two-way carriageway that converts to a two-lane dual carriageway with a wide median south of Ford Creek and takes the local name of Highett Street. The Midland Highway declaration terminates at High Street whilst the wide divided carriageway of Highett Street continues as a local road south of High Street to Malcolm Street, where it again 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 / Mount Stirling and Lake Eildon at Goughs Bay, Howqua and Jamieson. As the High Street extension of the 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 20m road reservation – then follows Malcolm Street out the eastern end of town.

#### Mansfield-Whitfield Road

Mansfield-Whitfield Road (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.

### 3.2 Traffic

Trafficworks arranged for the conduct of traffic counts at the four arterial road entries to Mansfield during November 2019, to update the counts undertaken by VicRoads in 2009. Summary results are provided in Table 1 and compared with those of the 2010 CPG report (shaded yellow). It can be seen from this Table that arterial road traffic volumes have increased significantly in the past 10 years, with Mount Buller Road showing the lowest increase at 21%, then Maroondah Highway with 35%, Midland Highway with 49% and Whitfield Road showing a 130% increase - likely the result of expanding development in the Dead Horse Lane industrial precinct. It is noted that the

proportion of commercial vehicles contained in these total volumes has generally increased, apart from the Maroondah Highway.

Table 1: Arterial Road Traffic Volumes (vpd)

Road	Location	Ave Daily Volumes		CPG	Commercials		CPG
		7 day	5 day	5 day	5 day ave	%	%
Maroondah Hwy	W of Kidston Parade	4,108	4,032	2,979	434	10.8%	12.4%
Mt Buller Rd	E of Greenvale La	4,071	4,004	3,297	522	13.0%	9.4%
Midland Hwy	N of Dead Horse La	1,799	1,923	1,294	302	15.7%	12.6%
Whitfield Rd	N of Dead Horse La	2,535	2,702	1,174	446	16.5%	8.6%

Mansfield Shire Council also renewed most of its local road traffic count information with surveys during November 2019. Results are provided in Table 2 and compared with values from the 2010 CPG report (shaded yellow). Previous Council counts on the Maroondah Highway and in Chenery Street were not updated. New counts along Malcolm Street were also not conducted.

The local road results showed a five-fold increase in traffic on Greenvale Lane, which followed replacement of the previously load-limited bridge over Ford Creek and sealing of the remaining route length to Mount Battery Road. They also show significant increases in traffic on Dead Horse Lane (48%) and Kidston Parade (31%). Total traffic on Highett Street has remained almost static, although directional flows were reversed to those quoted in the in the CPG study.

Table 2: Local road traffic count summary

Road	Location	Volumes	CPG	Peak Hour Volumes	
		vpd (7 day ave)	vpd (7 day ave)	vph AM	vph PM
Chenery Street	S of Hunter Street		3,940		
Dead Horse Lane	W of Whitfield Road	852	574	82	71
Greenvale Lane	N of Mt Buller Road	1,237	248	101	114
Highett St NB	S of Hunter Street	2,069	1,858	169	188
Highett St SB	S of Victoria Street	1,648	2,240	140	140
Kidston Parade	S of Maroondah Hwy	819	623	73	77
Malcolm Street	W of Finlayson Street		2,706		
Malcolm Street	At Elvins Street		988		
Maroondah Hwy	E of Kidston Parade		3,814		

A further breakdown of commercial vehicle types at the arterial road sites is provided in Table 3.

Table 3: Commercial Vehicle Types (vpd – weekday average volumes).

Road	Location	Small Trucks	Medium Trucks	Large Trucks						
				Semi-trailers				B-Doubles	Total	
				Austrroads Class	3	4 & 5	6	7	8	9
Maroondah Hwy	W of Kidston Parade	270	66	16	16	11	38		18	99
Mt Buller Rd	E of Greenvale Lane	354	59	30	25	7	30		14	106
Midland Hwy	N of Dead Horse Lane	183	32	8	20	7	23		29	87
Whitfield Rd	N of Dead Horse Lane	336	44	11	18	6	13		10	58

### 3.3 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 east of Highton Lane to the eastern town boundary
- Midland Highway from north of Dead Horse Lane to north of Cambridge Drive
- Whitfield Road from the township boundary sign to north of Dead Horse Lane
- Withers Lane north from Maroondah Highway (end of zone not signed)
- Mount Battery Road from east of Whitfield Road to east of Greenvale Lane
- Greenvale Lane from Mount Buller Road to Mount Battery Road.

Dead Horse Lane is signed at 60 km/h between Midland Highway and Whitfield Road. No speed limit signing is present on this road west of Midland Highway and it can be assumed that the default rural 100 km/h speed limit applies, although its unsealed surface and the presence of several bends are expected to result in ambient speeds well below the rural 100 km/h limit.

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

85 percentile speed values were also recorded at the arterial road survey stations in Table 1. These showed good compliance with the signed speed limits.

Table 4: Arterial Road Traffic Speeds

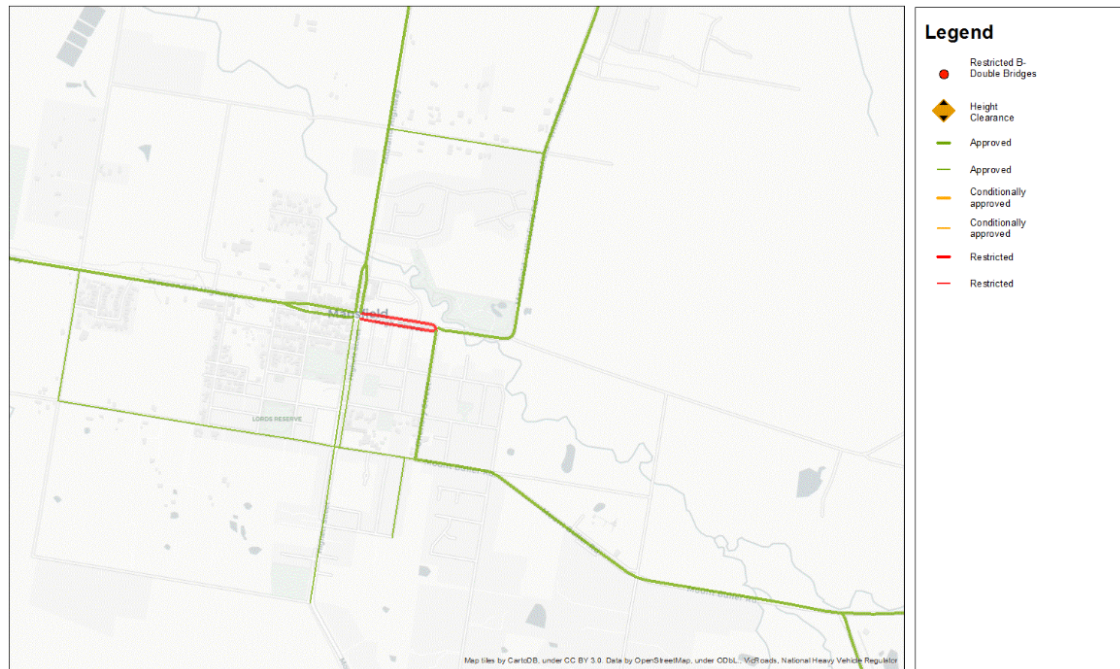
Road	Location	Speed Zoning	85% Speeds	
			EB/NB	WB/SB
Maroondah Hwy	W of Kidston Parade	80 km/h	76 km/h	83 km/h
Mt Buller Rd	E of Greenvale La	80 km/h	80 km/h	76 km/h
Midland Hwy	N of Dead Horse La	80 km/h	82 km/h	80 km/h
Whitfield Rd	N of Dead Horse La	80 km/h	79 km/h	79 km/h

### 3.4 Current 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 (HML) vehicle routes for Mansfield are shown in Figure 2. It is noted that Performance Based Standard (PBS) vehicles are restricted to only using the arterial road network through Mansfield, with Class 2A and 2B vehicles precluded from use of High Street between Highett Street and Chenery Street, covering the shopping centre and thereby creating a hiatus in this network, which is compensated for by use of the Dead Horse Lane and the Highett Street/Malcolm Street links.

Apart from the arterial road network, the currently approved B-Double and HML routes include Kidston Parade, Malcolm Street, Highett Street south from High Street and Dead Horse Lane. The gazettal specifically excludes the section of High Street between Highett Street and Chenery Street.

Figure 2: Victoria's gazetted B-Double and HML network at Mansfield.



### 3.5 Crash history

Over the past five years the DoT database has recorded the following fifteen casualty crashes along the HV network being considered for heavy vehicle use. These crashes are summarised as follows (see details listed in Attachment A):

- one pedestrian crash (DCA 103), northbound in Highett Street at High Street involving two pedestrians
- eight cross traffic crashes (DCA 110), three at Whitfield Road/Deadhorse Lane (including one fatal), three at High Street/Highett Street (one involving a bicycle), and one each at Malcolm Street/Kidston Parade (in the wet) and at Mount Buller Road/Greenvale Lane/Crosbys Lane intersections
- one left rear crash (DCA 116), northbound at Whitfield Road/Deadhorse Lane intersection
- two rear-end crashes (DCA 130), one eastbound on Maroondah Highway at Elvins Street and one northbound in Highett Street at High Street
- one emerging-from-driveway crash (DCA 147), on Malcolm Street, just west of Loch Street involving a bicycle
- two loss-of-control crashes (DCA 174 & 183) both westbound along Malcolm Street, one at Greenvale Lane and one at Highton Lane involving a motorcycle
- fourteen occurred during the day, one at night; 14 in clear conditions, one in the wet (raining)
- one crash resulted in fatal injuries, 12 in serious injuries and two in other (minor) injuries
- two crashes involved bicycles and one a motorcycle.

The above represents a 250% increase in crash numbers within the township compared with the six crashes in the 5-year period prior to the CPG report. Patterns evident in the above crashes are as follows:

- no crashes involving trucks (light, medium or heavy)
- 14/15 crashes during the day and 14/15 under dry conditions
- a cluster of four crashes in Whitfield Road, all involving vehicles emerging from Dead Horse Lane. It is recommended that crashes at this intersection be fully investigated by RRV with a view to the introduction of ameliorative treatments (suggest a raised pavement for the intersection be considered)
- a cluster of five crashes at the High Street/Highett Street roundabout featuring all four quadrants of the intersection and including three cross traffic (DCA 110) collisions. Again, the crashes at this intersection require further investigation by RRV with a view to the introduction of ameliorative treatments (suggest raised pavement threshold treatments be considered on all approaches).

## 4 TRAFFIC ANALYSIS

### 4.1 Heavy Vehicle Distribution

The CPG report reviewed 5-day classification counts at the various arterial road entries to Mansfield and provided separate total volumes of semi-trailer (class 6 - 9) and B-Double (class 10 & 11) movements. These groupings have again been extracted from the 2019 survey data as summarised in Table 5. The 2019 volumes are compared with the CPG study values (shaded yellow).

Table 5: Large Truck Movements (vpd – 5-day average volumes).

Location	Direction	2019			CPG		
		Semi-trailers	B-Doubles	Total	Semi-trailers	B-Doubles	Total
Maroondah Hwy	EB (in)	173	39	212	105	26	131
	WB (out)	229	47	276	114	22	136
Mt Buller Rd	WB (in)	161	36	198	56	12	68
	EB (out)	304	33	337	61	10	71
Midland Hwy	SB (in)	162	70	235	61	16	77
	NB (out)	126	68	194	60	20	80
Whitfield Rd	SB (in)	26	5	153	60	1	61
	NB (out)	23	5	138	15	1	16
	Σ in	522	150	798	282	55	337
	Σ out	682	153	945	250	53	303
	Total	1204	303	1743	532	108	640

Apart from an inexplicable aberration on Whitfield Road, volumes of large trucks over the past 10 years have shown increases in the range 183% (Maroondah Highway two-way total) to 273% (Midland Highway two-way total), which exceeds growth in both total traffic volumes and general commercial vehicle traffic on these arterial road entry routes to Mansfield. These volumes now represent significant numbers of large trucks on the arterial entry routes with peaks of up to 40 vph.

In 2009 VicRoads performed an analysis of the data to estimate the routes of B-Double through-movements across the town. The prevailing patterns appeared to be as follows (noting low levels of correlation):

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)

Such an analysis was unable to be performed on the 2019 data and the amount of bypassable truck traffic (as opposed to trips with origins/destinations within the town) has not been established.

It is also noted that commercial vehicle content was not separately provided in the count data collected by Mansfield Shire Council.

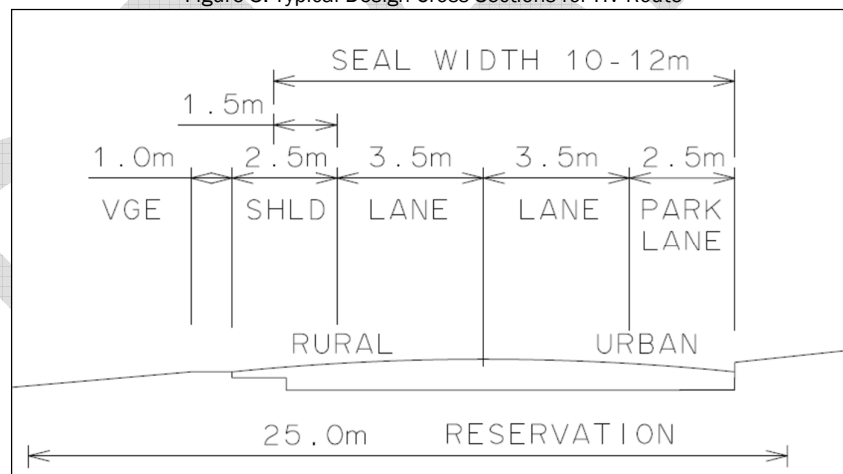
## 4.2 Design Principles

The aim of the 2010 CPG study was to identify roads that could be designated as preferred alternative routes for heavy vehicles 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 were 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 were founded on the minimum criteria outlined in the Austroads *Guide to Road Design – Part 3: Geometric Design* as follows and illustrated in Figure 3 below:

- Carriageway width of 7.0 m (2 x 3.5 m traffic lanes) desirably flanked by 1.5m sealed shoulders
- Turn radii of 15 m to accommodate the Austroads template for 25 m B-Double turn movements
- Intersection treatments (e.g. roundabouts) that allow for the passage of 25 m 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 3.0 m from traffic lanes in urban areas (in 60 km/h or lower speed limits).

Figure 3: Typical Design Cross Sections for HV Route



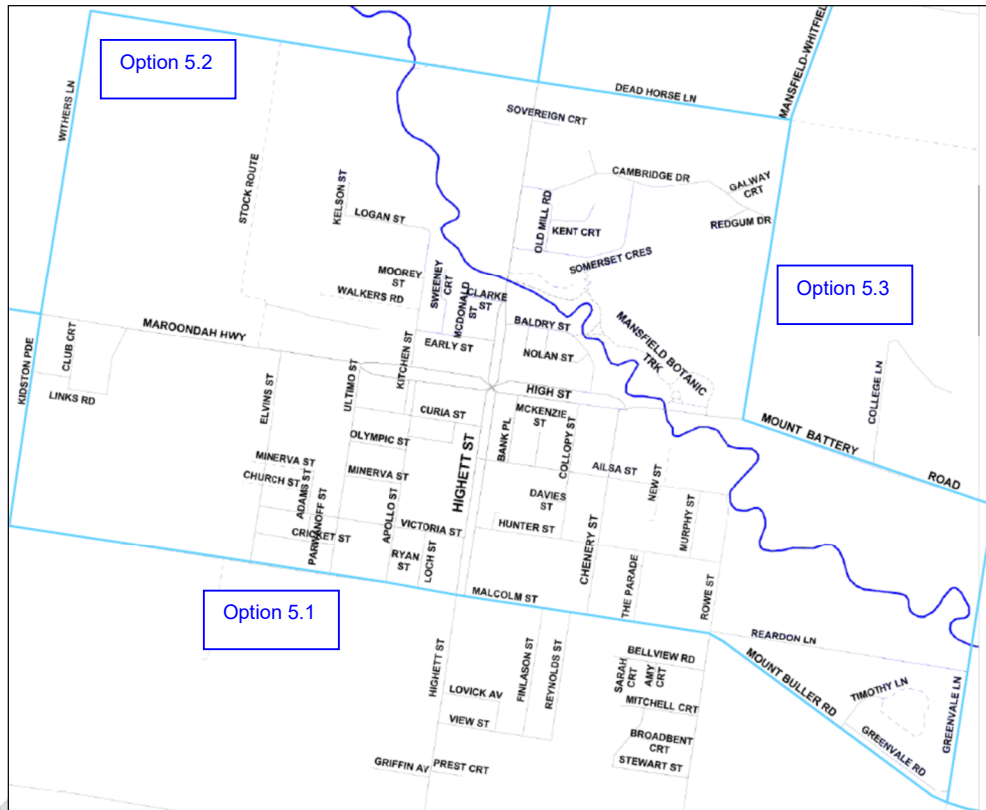
These design parameters are consistent with the road characteristics nominated in the Local Government Infrastructure Design Association's *Infrastructure Design Manual (IDM) Version 5.20* (released March 2019) for:

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

## 5 ULTIMATE ROUTE OPTIONS

The project brief for the CPG report described a series of preferred alternative heavy vehicle route options that had been identified by Mansfield Shire and VicRoads. The three external routes are illustrated in Figure 4 below and described in Sections 5.1 to 5.3. The current broad constraints, upgrade requirements and progress on their development are discussed under each option.

Figure 4: Ultimate Heavy Vehicle Route Options



### 5.1 Kidston Parade and Malcolm Street

Kidston Parade and Malcolm Street, between Maroondah Highway and Mount Buller Road, form the 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 and HML vehicle route (refer Section 3.4) and forms part of the proposed heavy vehicle cross-town link network. A potential alternative east-west route along High Street and Highett Street would still traverse the extended shopping strip along High Street east of Highett Street to Ultimo Street.

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

- Hospital located at the NW corner of Malcolm Street and Highett Street intersection
- St Mary's Primary School located on the route opposite Finlason Street



- The flagged school crossing in front of St Mary's Primary School, which 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 Highett Street intersection.

The potential alternative route via High Street and Highett Street also impacts all the above land uses except the retirement village in Kidston Parade, but in addition will cross the school crossings in Highett Street servicing Mansfield Primary School and the adjacent sporting facilities.

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

- installation of a separate eastbound right turn lane (Type CHR treatment) in Maroondah Highway at west approach to Kidston Parade
- widening of the Kidston Parade/Malcolm Street intersection to facilitate turns. This work would require relocation of a HV power pole and is likely to 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
- The desirability of constructed footpaths/shared paths to separate pedestrian and cycle traffic from vehicular traffic along both roads
- Eventual upgrading of the school crossing to pedestrian operated signals (POS)
- Lane widening/shoulder sealing for the extension of this route along Mount Buller Road and intersection improvements at Highton Lane.

It is noted that, since the CPG investigation, the intersection of Malcolm Street and Highett Street has been upgraded by the installation of a roundabout, introduced as a traffic safety treatment but also performing an important traffic calming function near the hospital (NW corner) and Alzburg Resort (NE corner).

## 5.2 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 and the industrial precincts of Dead Horse Lane East and Lakins Road further north. It is noted that this route is currently not gazetted for use by B-Doubles or HML vehicles.

Upgrading works will need to include:

- widening and strengthening of the 3.9 m wide seal along Dead Horse Lane West for the 400 m length from Midland Highway to Ford Creek
- construction and sealing of the remaining 2 km 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. The

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 a Type CHR right turn lane in Midland Highway at the east end of the route
- provision of a Type AUL left turn lane in Maroondah Highway at the west end of the route.

It is noted that the ford over Ford Creek has been replaced with a suitable bridge since the CGP report.

Potential truck movements along this route currently traverse the outer fringes of the shopping precinct by using Maroondah Highway (High Street) and Midland Highway (Highett Street North). Analysis in the CPG report indicated that, despite this route catering for the most frequent cross-town heavy vehicle movements, total bypassable vehicle numbers were very low, and it would be difficult to justify major capital investment in the required improvements along the outer route whilst a satisfactory internal alternative existed. Bypassable volumes could not be established from the recent survey results and it is contended that this route still represents a low upgrading priority.

### 5.3 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. The 60 m reservation width of Mount Battery Road offers ample scope for progressive improvement and the current sparse abutting development is unlikely to attract objections to its use by trucks. Works required to make this connection more viable include:

- intersection improvements at Whitfield Road to facilitate north to/from east turns by long vehicles
- widening and strengthening of Mount Battery Road from Whitfield Road to Greenvale Lane (850 m)
- intersection improvements at Mount Buller Road (provision of turn lanes)
- longer term provision for reserve widening of Greenvale Lane.

It is noted that replacement of the load-limited bridge over Ford Creek, upgrading of Greenvale Lane and installation of an altered intersection at Greenvale Lane and Mount Battery Road have all been implemented over the past 10 years and are likely the reason for the dramatic increase in traffic along this route shown in Table 2.

As for Option 5.2, an inability to demonstrate a high level of bypassable truck traffic demand and the relatively high cost of improvements, particularly at the intersections at each end of the route, is expected to result in a longer-term implementation time-frame.

### 5.4 Summary

In summary, it is suggested that the high costs associated with provision of the ultimate northwest and northeast bypass routes makes them a very long-term planning proposition. Order-of-cost estimates are provided for the improvement tasks along these ultimate alternative roads in the schedule in Appendix B and summarised in Table 5 below.

Immediate benefits can be gained from development of the southern route along Kidston Parade and Malcolm Street for all present and future east-west travel and improvement elements are itemised in Section 7.2.

Table 5: Estimated Costs for Ultimate Heavy Vehicle Route Options

Route	Element	Costs (\$000)	
		Council	RRV
Kidston Pde / Malcolm St	Maroondah Highway intersection		\$585.0
	Kidston Parade upgrade	\$1,562.9	
	Kidston Pde / Malcolm St intersection	\$585.0	
	Malcolm Street W of Chenery St	\$2,045.5	
	Malcolm Street E of Chenery St		\$965.3
	<b>Route Totals</b>	<b>\$4,193.4</b>	<b>\$1,550.3</b>
Dead Horse La / Withers La	2 x Highway intersections		\$1,170.0
	Dead Horse La W & Withers Lane	\$1,604.9	
	Dead Horse La E	\$234.0	
	Whitfield Rd intersection		\$585.0
	<b>Route Totals</b>	<b>\$1,838.9</b>	<b>\$1,755.0</b>
Mt Battery Rd / Greenvale La	Whitfield Rd upgrade		\$273.0
	Whitfield Rd intersection		\$585.0
	Mount Battery Rd upgrade	\$810.0	
	Mount Buller Road intersection		\$585.0
	<b>Route Totals</b>	<b>\$810.0</b>	<b>\$1,443.0</b>
<b>Totals</b>		<b>\$6,842.3</b>	<b>\$4,748.3</b>

As an alternative to full development of the ultimate outer northeast and northwest routes, whilst facilitating the passage of heavy vehicles around the Mansfield CAA during the short to medium term, several improvement options are discussed in Section 6.

## 6 INTERIM ROUTE OPTIONS

The CPG study also discussed several interim options to facilitate heavy vehicle movements around the CAA until such time as the ultimate external routes are fully developed. These internal route improvements are described in Sections 6.1 to 6.3 and illustrated in Figure 5 below. Broad constraints and upgrade requirements are discussed under each option and are contained in the schedule in Attachment B, with costs summarised in Table 6.

Figure 5: Interim Heavy Vehicle Route Options



### 6.1 High Street West and Highett Street North

The Maroondah Highway (or High Street) western entrance to Mansfield is currently a permitted B-Double and HML vehicle route to Highett Street and north along Highett Street to provide a connection to Midland Highway. The 2010 VicRoads analysis in Section 3.1 indicated this to be the most frequent movement by semi-trailers (noting low total numbers).

There are currently no viable alternative routes for heavy vehicles to travel around Mansfield between the west and north approaches. Ultimately, development of the Withers Lane and Dead Horse Lane West route (see Section 5.2) would offer an alternative route. However, significant road upgrading requirements are expected to make this alternative a long-term proposition, which will result in a continued reliance on the use of the High St/Highett St link as an interim route for the foreseeable future.

The existing roundabout at the intersection of the two highways caters for turns by large vehicles. However, the crash history identified in Section 3.5 should be addressed to ensure safe operation of this interim route into the future. In addition, completion of seal widening and/or shoulder sealing along the untreated 1 km length of Maroondah Highway from Kidston Parade to Ultimo Street and the 350m of Midland Highway north of Cambridge Drive should be undertaken at an early stage.

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

This is an existing bypass route of the CAA for traffic between Midland Highway and Mount Buller Road that also services the industrial precinct along Dead Horse Lane. The Dead Horse Lane connection between the Midland Highway and Whitfield Road also forms an integral link for the current and all future heavy vehicle routes.

Although the Dead Horse Lane section is considered functional for the relatively low level of external cross movements, there are operational issues associated with the intersections at each end of this link. Desirable improvements that were identified in the industry consultation during the CPG study 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 and to improve safety
- ultimate increase in pavement width along Dead Horse Lane, consistent with the Industrial Street designation in the IDM.

The cross-section of Chenery Street has been upgraded in recent years and now includes a roundabout treatment at the High Street/Whitfield Road intersection, thereby facilitating its use by heavy vehicles. However, it should be noted that 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. It is not considered desirable for this route to continue to function as part of a heavy vehicle route in the longer term. Meanwhile, high priority should be given to the following works:

- potential for intersection works at Malcolm St and Highton Lane (noted in previous industry feedback)
- upgrade the school crossing to pedestrian operated signals (POS).

## 6.3 Highett Street

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 and HML vehicle route and can cater for these vehicles without additional road improvements.

Although it passes the hospital and Alzburg Resort, these sensitive establishments are also exposed to the impacts of heavy vehicle travel along the Malcolm Street route. The roundabout constructed at the intersection of Malcolm Street and Highett Street provides for improved safety at the intersection and acts as a traffic calming treatment along the Malcolm Street route.

Flagged school crossings of both Highett Street carriageways are located just north of Hunter Street. These are considered safer than their equivalent in Chenery Street by virtue of the single direction of traffic at each, but they could be improved by reducing the cross-walk distance through a narrowing of the wide carriageway with kerb outstands and their eventual upgrading to (POS).

The only improvements identified along Highett Street South would comprise:

- Kerb outstand and ultimate POS installations at the two school crossings near Hunter Street.

## 6.4 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 Table 5 and including:

- Kidston Parade and Malcolm Street 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). This work should include intersection upgrades at both ends of the link.

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

- Mount Battery Road for an outer north to/from east connection, including the provision for turns in Mount Buller Road and Whitfield Road
- Dead Horse Lane west from Midland Highway and Withers Lane for an outer north to/from west connection.

Chenery Street is considered to have a number of drawbacks that do not lend themselves to its inclusion as a longer term HV route. 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 CAA.

Table 6: Estimated Costs for Interim Heavy Vehicle Route Options

Route	Element	Costs (\$000)	
		Council	RRV
Kidston Parade / Malcolm St	As per ultimate strategy	<b>\$4,193.4</b>	<b>\$1,550.3</b>
High Street & Highett Street	High Street, Kidston Pde to Ultimo St		\$81.1
	High St/Highett St roundabout		\$260.0
	Midland Hwy north of Ford Creek		\$163.8
	<b>Route Total</b>		<b>\$504.9</b>
Midland/Dead Horse/Whitfield	Midland Hwy at Dead Horse Lane		\$585.0
	Dead Horse Lane upgrade	\$234.0	
	Whitfield Road at Dead Horse Lane		\$585.0
	Chenery St POS		\$292.5
	<b>Route Totals</b>	<b>\$234.0</b>	<b>\$1,462.5</b>
Highett Street south option	Dead Horse La (included above)		
	Midland Highway (included above)		
	Highett Street South 2 x POS	\$438.7	
	Malcolm Street (included above)		
	<b>Route Total</b>	<b>\$438.7</b>	

As the projects in Table 6 form optional elements and route alternatives, the total cost is dependent on which segments are adopted. A total cost has consequently not been provided.

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## 7 DISCUSSION

### 7.1 Current Heavy Vehicle Demand

It is evident from analysis of the count data in Section 3.2 that numbers of large trucks have increased on all arterial road entries to Mansfield. However, bypassable through movements by these vehicles were not able to be established, while regarded as low in the VicRoads analysis for the CPG report.

Mount Buller Road showed the highest level of use with an average of 106 Large trucks per day (or a peak of 11 per hour). Maroondah Highway and Midland Highway recorded similar volumes (99 vpd and 87 vpd respectively) with the Midland Highway having the largest component of B-Doubles at 29 vpd or 3 vph in the peak. Although numbers are still modest, this represents a three-fold increase in total truck volumes on the arterial road entries over the past 10 years, compared to a 45% increase in overall vehicle volumes.

The allocation of higher priorities to the recommended works will require establishment of through versus bypassable truck movements, which in turn will rely on the conduct of an origin and destination study for the township.

### 7.2 Route Selection

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

- Progressive upgrading of the Kidston Parade / Malcolm Street route to facilitate the predominant east-west cross-town movements clear of the CAA. This should include:
  - Intersection works in Maroondah Highway at the west approach to Kidston Parade
  - Seal widening and footpath construction along Kidston Parade
  - Intersection works (including land acquisition) at Kidston Parade/Malcolm Street
  - Seal widening, pavement regulation and shared path construction along Malcolm Street.
- Adoption of the High Street West and Highett Street North route to provide an interim route for the west-north movements. The route improvements should include:
  - Seal widening along Midland Highway from Cambridge Drive to Dead Horse Lane
  - Seal widening along Maroondah Highway from Ultimo Street to Kidston Parade
  - Safety improvements at the High Street/Highett Street roundabout.
- 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 and ultimately POS.

### 7.3 Planning for Long-term Solutions

Current truck traffic volumes make it difficult to justify major investment in the provision of new external alternative routes to cater for north to/from west and north to/from 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.

Similarly, future use of the Mt Battery Road/Greenvale Lane route should ensure that:

- Spreading development does not inhibit future road widening options for Greenvale Lane.

### 7.4 Short Term Priority Works

All identified 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:

6. Seal widening and regulation of Malcolm Street from Kidston Parade to Highett Street to make the route suitable for the passage of large vehicles
7. Seal widening of Kidston Parade from Maroondah highway to Malcolm Street.  
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 10 m x 10 m splay) or to encourage use of the route by catering for 60 km/h through-movements (requiring a 120 m x 120 m splay).
8. Upgrading of the school crossings in Highett Street for safety
9. 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
10. Construction of a shared path along Malcolm Street and footpaths along Kidston Parade for use by pedestrians and cyclists.

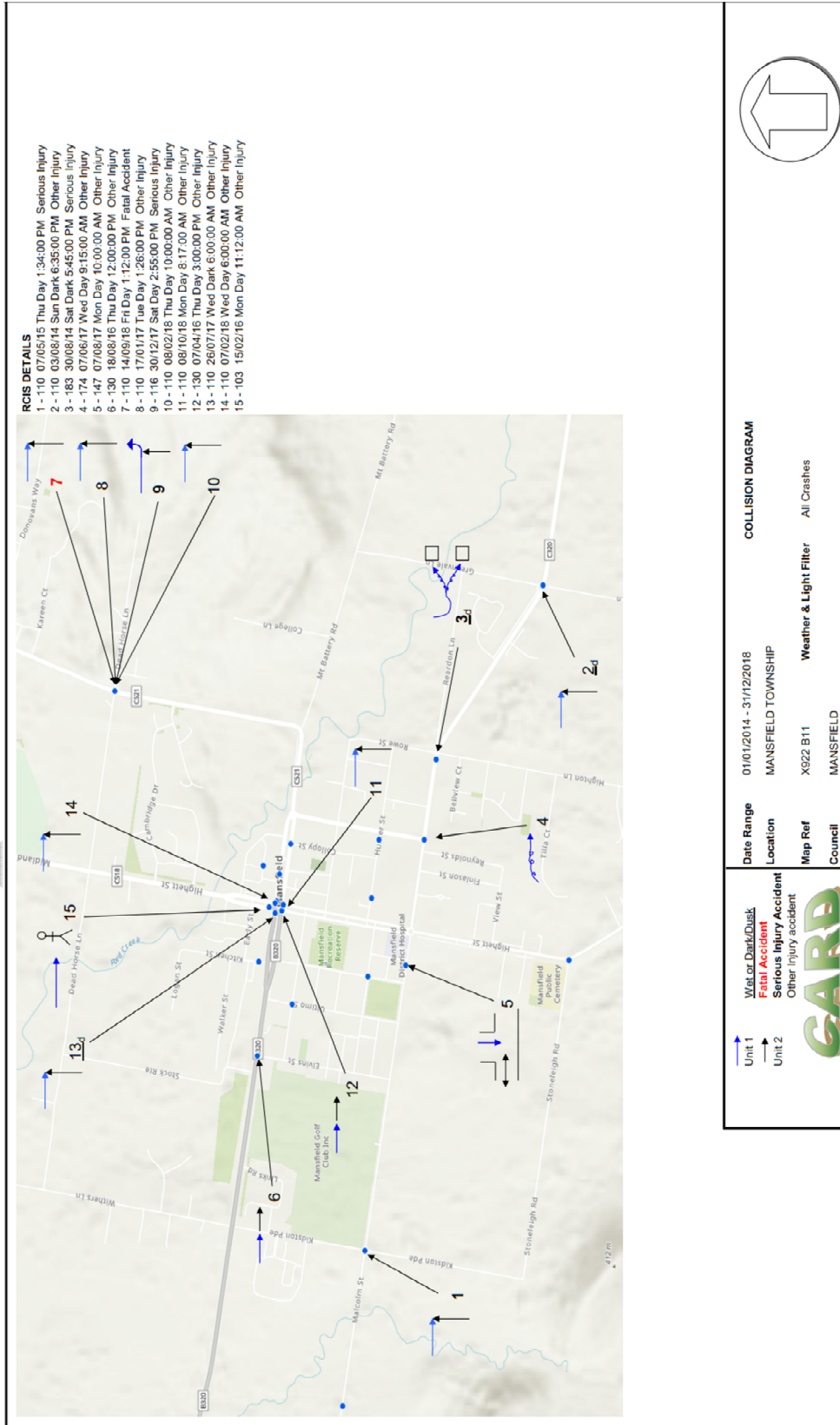
#### VicRoads Works:

6. Provision of a right turn lane in Maroondah Highway at the west approach to Kidston Parade to improve operational safety at the intersection
7. Seal widening along Maroondah Highway and Midland Highway to make the north to/from west route suitable for the passage of large vehicles
8. Intersection safety works at the High Street/Highett Street roundabout (suggest installation of raised pavement threshold treatments at all entries)

9. Intersection improvements including provision of turn lanes in Midland Highway at Dead Horse Lane to improve operational characteristics and safety at the intersection
10. Intersection improvements at Dead Horse Lane and Mansfield-Whitfield Road to improve safety and accessibility for large vehicles at the intersection.

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# ATTACHMENT A – CRASH LOCATIONS



COLLISION DIAGRAM			
Date Range	01/01/2014 - 31/12/2018		
Location	MANSFIELD TOWNSHIP		
Map Ref	X922 B11	Weather & Light Filter	All Crashes
Council	MANSFIELD		

## ATTACHMENT B – SCHEDULE OF IMPROVEMENT WORKS

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### Mansfield Heavy Vehicle Bypass Route Options

<b>Route: Kidston Parade / Malcolm Street</b>										
Route:	Kidston Parade / Malcolm Street									
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	820vpd	50km/h	current bypass route current B-Double route	abutting retirement village abutting residences	widen traffic lanes seal shoulders construct footpaths along both sides provide R turn lane in highway upgrade Malcolm St intersection include: acquisition of splay off corner shift HV power pole	102,000 40,800 54,400 450,000 450,000 540,000 15,000
Malcolm St	Kidston Pde to Highett St	1,450	6.6m seal	gravel	NK	50km/h	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	217,500 87,000 1,015,000 29,000
Malcolm St	Highett St to Chenery St	420	7.0m seal	2 x 3m sealed parking	>2,700vpd est	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 to POS	450,000 225,000
Malcolm St	Chenery St to Greenvale La	1,950	6.6m seal	2.0m sealed	>4,000vpd	50/80km/h E of Highton La	declared arterial road 30m wide road reserve current B-Double route	abutting residences	widen traffic lanes upgrade Highton La intersection	292,500 450,000
									<b>Kidston Pde/Malcolm St Total Costs (includes 30% contingency)</b>	<b>5,743,660</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	4,000vpd	80km/h	highway 60m wide road reserve current B-Double route		seal shoulders	62,400
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	Safety works at roundabout	200,000
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	1,900vpd	80km/h	highway current B-Double route 60m wide road reserve	residential estate to east	widen traffic lanes seal shoulders (50% of length)	105,000 21,000
									<b>High St/Highett St Total Costs (includes 30% contingency)</b>	<b>504,920</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 L turn lane in highway upgrade Dead Horse La junction acquire splay off SE corner	300,000 450,000 450,000 49,500
Dead Horse La	Withers La to Ford Creek	1,050	4.0m gravel	nil	<100vpd est	NS (adopt 100km/h)	minimal development		construct & seal 1.05km new road	315,000
Dead Horse La	Ford Creek to Midland Hwy	400	3.9m seal	nil	<100vpd est	NS (adopt 100km/h)	no development		widen & strengthen 400m seal provide R turn lane at highway	120,000 450,000
									<b>Withers La/Dead Horse La Total Costs (includes 30% contingency)</b>	<b>2,774,850</b>

Mansfield Heavy Vehicle Bypass Route Options (part 2)

Route: Whitfield Road / Chenery Street											
Road	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	2,700vpd	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	150,000 60,000 450,000	\$858,000
High St	Mt Battery Rd to Chenery St	400	6.9m seal	gravel	2,700vpd	80/50 at Ford Creek	declared arterial route minimal development current B-Double route	abutting picnic area	upgrade Mt Battery Rd intersection	450,000	\$585,000
Chenery St	High St to Malcolm St	680	7.0m traffic lanes	2 x 3.5m parking lanes	NK	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 school crossing to POS	225,000	\$292,500
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	POS at school crossing upgrade Highton La intersection	225,000 450,000	\$877,500
<b>Whitfield Rd/Chenery St Total Costs (includes 30% contingency)</b>										<b>2,613,000</b>	\$2,613,000
Route: Whitfield Road/Mt Battery Road/Greenvale Lane											
Road	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	2,700vpd	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	150,000 60,000 450,000 450,000	\$1,443,000
Mt Battery Rd	Whitfield Rd to Greenvale La	750	5.6m seal	gravel	NK	80km/h	minimal development wide 60m reservation	some abutting residences	widen & strengthen 0.75km road upgrade Greenvale La intersection	225,000 450,000	\$877,500
Greenvale La	Mt Battery Rd to Ford Creek	680	6.2m seal	gravel	1,200vpd	80km/h	no development	narrow 20m reservation	provide for ultimate reserve widening	0	\$0
Greenvale La	Ford Creek to Mt Buller Rd	740	5.0-6.2m seal	gravel	1,200vpd	80km/h	minimal development	narrow 20m reservation	widen & strengthen 740m road turn lanes at Mt Buller Rd intersection	222,000 450,000	\$873,600
<b>Mt Battery Rd/Greenvale La Total Costs (includes 30% contingency)</b>										<b>3,194,100</b>	\$3,194,100
Route: Dead Horse Lane / Highett Street											
Road	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	850vpd	60km/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	180,000 450,000 450,000	\$1,404,000
Midland Hwy	Dead Horse La to Ford Creek	700	6.0m seal	gravel	1,900vpd	50/80km/h	highway proposed B-Double route 60m wide road reserve	residential estate to E	widen traffic lanes seal shoulders	105,000 42,000	\$191,100
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	3,600vpd	50km/h	current B-Double route divided road	abutting Council offices abutting rec reserve school crossings abutting hospital abutting Alzgurg Resort	safety works at High St roundabout kerb outstands & POS at school crossings x 2	200,000 225,000	\$552,500
<b>Dead Horse La/Highett St Total Costs (includes 30% contingency)</b>										<b>2,147,600</b>	\$2,147,600

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