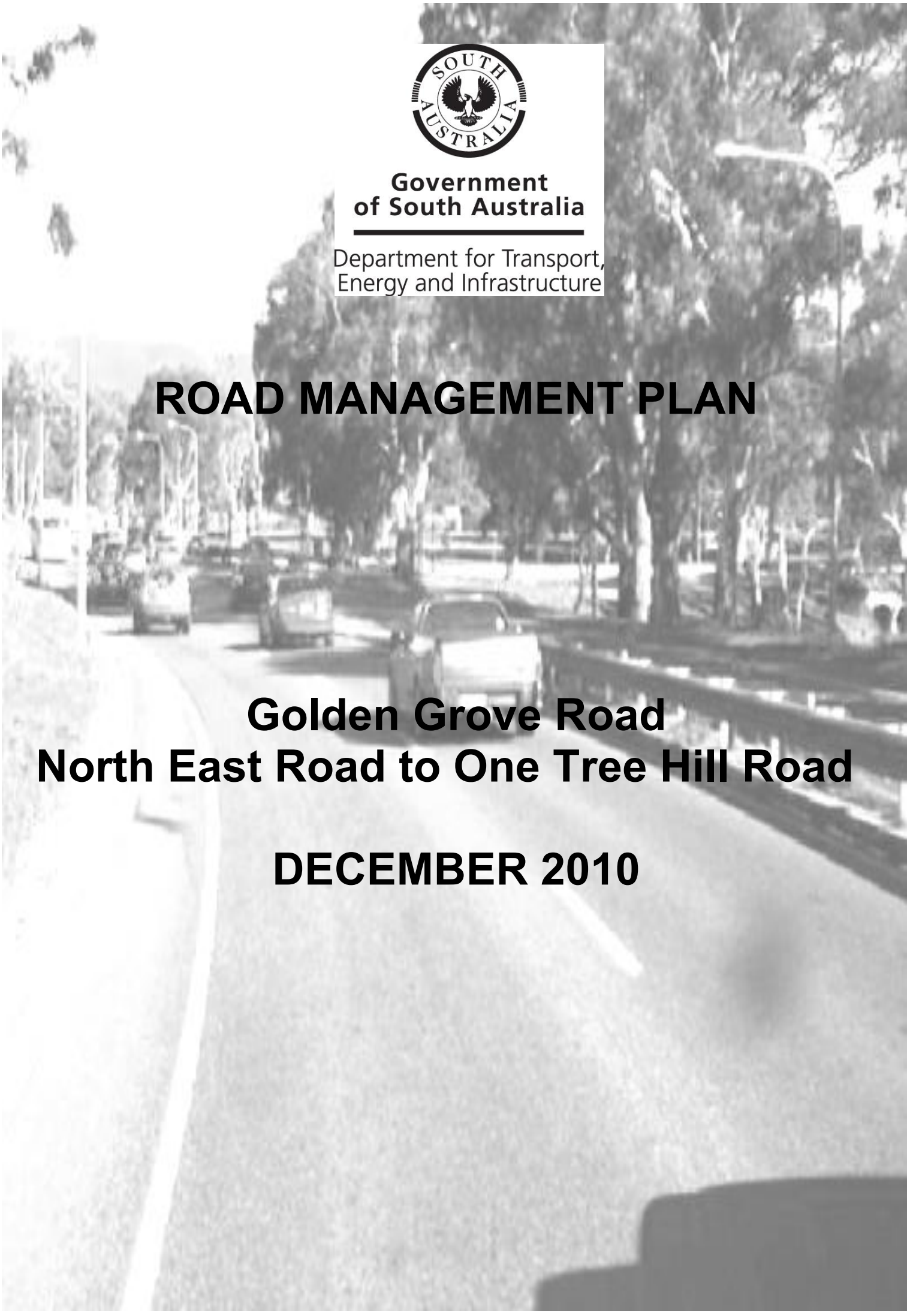

Government of South Australia

Department for Transport, Energy and Infrastructure

ROAD MANAGEMENT PLAN

Golden Grove Road
North East Road to One Tree Hill Road

DECEMBER 2010

Date	Revisions	Amended by
3-11-2005	Revisions table added.	C D'Agostini
3-11-2005	Bus map updated	C D'Agostini
4-11-2005	Concerns raised re trucks turning from Greenwith Road included.	C D'Agostini
3-7-2007	Transport SA changed to DTEI	C D'Agostini
3-7-2007	Speed limit between Grenfell Rd and Milne Road to be reduced to 60kph	C D'Agostini
3-7-2007	Priority for right turn ban treatment at Golden Grove Road – McPharlin Ave downgraded to "low".	C D'Agostini
3-7-2007	TTG Council's priority for sections of road needing kerbing, storm water drainage and footpaths included.	C D'Agostini
15-10-2010	Update RMP with current crash data and proposed treatments	C Taylor
28-01-2011	Formatting and concept drawing updates	R Kane

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GLOSSARY

AADT	Average Annual Daily Traffic – The number of axle pairs crossing at specific site per year and dividing this number by 365
DDA	Disability Discrimination Act
DTEI	Department for Transport, Energy and Infrastructure
Intersection	Place where two or more roads cross
Junction	Place where two or more roads meet
MARWP	Metropolitan Area Road Widening Plan
Pedestrian Refuge	An island in a carriageway set aside for the exclusive use of pedestrians
Right Angle Crash:	A crash occurring with vehicles turning right out of a side street
Right Turn Crash	A crash occurring with a vehicle turning right from the main road into a side street
RMP	Road Management Plan

1 OVERVIEW

This Road Management Plan (RMP) provides an update to the original plan prepared in 2006. The intent of this update is to review the progress of the implementation of the original recommendations of the plan, update the crash statistics to the most recent five year period, and make any modifications to the original recommendations having analysed the most recent data.

The RMP provides an overall view of the existing operational and safety issues and presents recommendations for traffic management improvements on the following sections of Golden Grove Road, Golden Grove:

- Section 1: Between One Tree Hill Road and The Grove Way
- Section 2: Between The Grove Way and Grenfell Road (west)
- Section 3: Between Grenfell Road (west) and North East Road

The Road Management Plan is not intended to address potential longer term major road improvement needs (eg road duplication) resulting from future residential and industrial development. Major road improvements that would significantly change the operation of the road corridor are highlighted where known, however extensive investigations of any major improvements are outside the scope of this document.

This document is focussed at identifying potential short term road improvement needs to improve safety and traffic operations of the existing road.

The process undertaken to identify existing traffic management issues included:-

- research of historical transport investigation records
- site auditing and observations
- analysis of recorded crash data and traffic flow statistics
- preliminary discussions with council officers and through information gained from the local community

By looking at a road on a route basis, traffic management improvements can be developed to take into account a range of factors including:-

- broader transport objectives
- role and function of the road
- needs of all modes of transport including, freight, buses, bicycles and pedestrians
- community needs and expectations
- ensuring that any treatments are consistent with longer term plans for the road or area where these are known
- appropriate standards and guidelines to ensure consistency and effectiveness of any proposed treatments

This RMP will form the basis for discussion and comment with the Tea Tree Gully Council and the community with a view to further development and eventual implementation of the

plan. Note that whilst the RMP proposes a number of recommended treatments, the proposals are presently not funded. Funding for any improvements will need to be considered against other state wide priorities in future financial years. This approach ensures that the funds available each year are allocated to the projects where the greatest benefit can be provided to the community as a whole.

2 EXISTING ROAD CONDITIONS

2.1 GENERAL DESCRIPTION

Golden Grove Road is located within the City of Tea Tree Gully. It is an urban arterial road, which provides access to Golden Grove

Golden Grove Road is a secondary arterial route for commuter traffic and freight movement. Golden Grove Road acts as a connector road to the route of Montague Road, McIntyre and Kings Road and North East Road. It predominantly services the residential areas of Ridgehaven, Redwood Park, Surrey Downs and Golden Grove. As a secondary freight route, it caters for the intra-urban movements and a low proportion of heavy freight vehicles generated particularly from brick manufacturers and garden product suppliers, who are located adjacent to it.

After a long period of population growth, the rate of development in the north-eastern areas of Surrey Downs and Golden Grove has slowed as the land suitable for development in the area diminishes. Therefore there is not expected to be any significant increases in traffic volumes into the future from that which exists now.

The two-lane section of Golden Grove Rd is of particular concern to the City of Tea Tree Gully due to problems associated with poor drainage, unsealed shoulders etc.

Whilst the need for long term duplication of this section of road is not clear at this time, the constraint in network efficiency is at the intersection of Golden Grove Road with The Grove Way where relatively long delays are being experienced.

For the purposes of the report, the road has been divided into three sections of similar cross section and road conditions, although the road through these sections varies as detailed in Section 2.3;

- Section 1: Between One Tree Hill Road and The Grove Way
- Section 2: Between Grove Way and Grenfell Road (west)
- Section 3: Between Grenfell Road (west) and North East Road

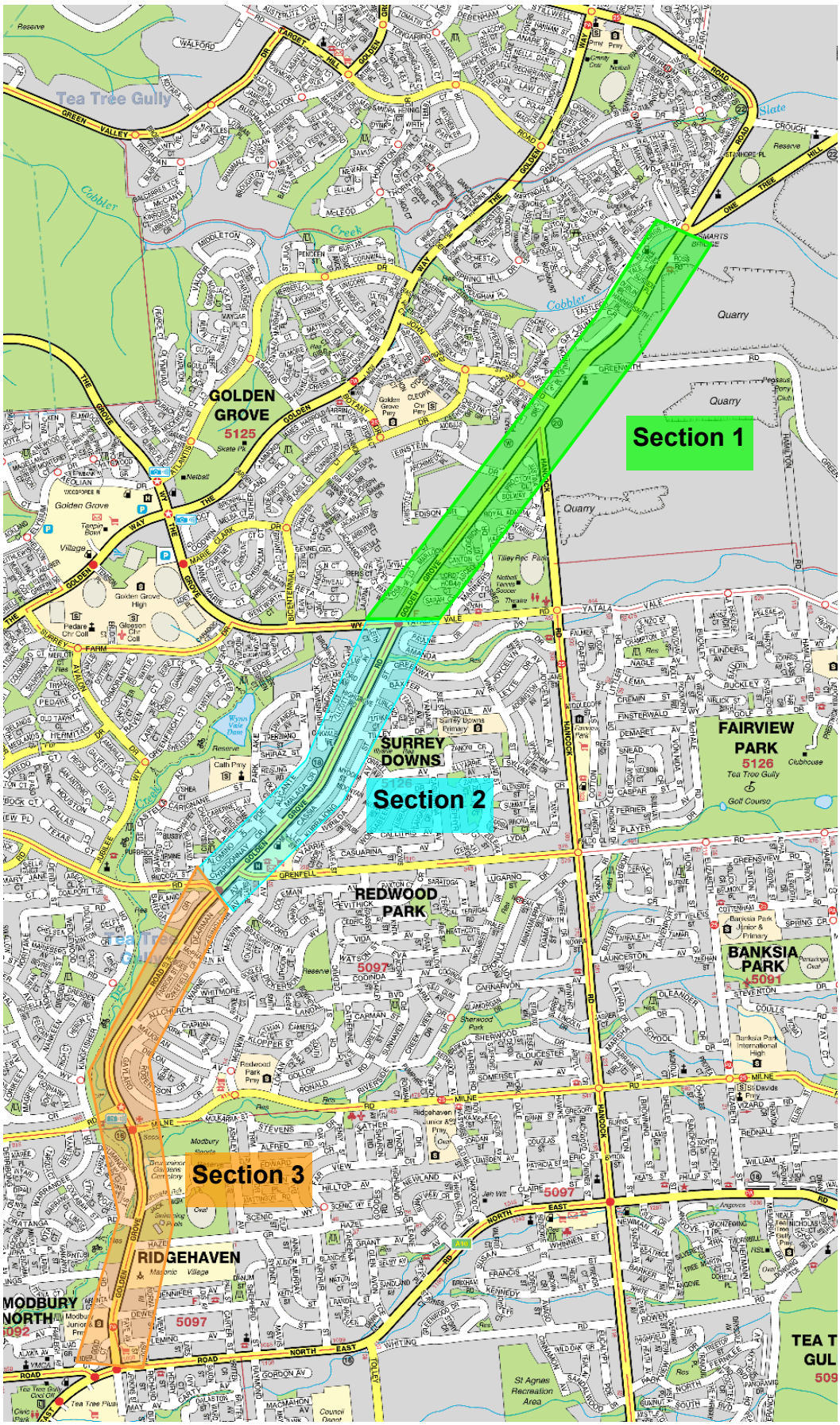

Figure 2.1: Length of study along Golden Grove Road from North East Road to One Tree Hill and referenced road sections

2.2 BEHAVIOUR OF TRAFFIC AND LAND USE

Golden Grove Road extends from North East Road through to One Tree Hill Road, passing through the suburbs of Ridgehaven, Surrey Downs and Golden Grove. DTEI is responsible for the care, control and maintenance of the section between North East Road and One Tree Hill Road. The remaining section to the north of One Tree Hill Road is the responsibility of Council.

Section 1 (One Tree Hill Road to The Grove Way)

This section is generally a narrow single lane in each direction with a narrow painted line separating the opposing traffic flows. No facilities are provided for cyclists. Some local widening is provided at side road junctions to facilitate right turn movements, with no direct access to properties being provided through this section.

Near the Hancock Road junction, large trees encroach on the sealed carriageway, limiting widening opportunities through this section of road if the vegetation is to be retained.

To the north of the Greenwith Road junction, the alignment of Golden Grove Road becomes more curvilinear, with some direct access to a service station to the south of the One Tree Hill Road junction.

Section 2 (The Grove Way to Grenfell Road (west))

To the north of the Grenfell Road intersection, Golden Grove Road merges to a single lane in each direction. Turning lanes are provided for access to the Golden Grove Shopping Centre. The section to Park Lake Drive was recently upgraded by the DTEI, working in conjunction with Tea Tree Gully Council to install a painted median scheme in line with that recommended in Section 4.1 of this RMP.

Beyond this, the road is generally a narrow single lane in each direction with a solid painted line separating the opposing traffic flows. No facilities are provided for cyclists.

No direct access is provided to any development through this section of Golden Grove Road.

Section 3 (Grenfell Road (west) to North East Road)

At the southern end, the road services some strip shopping and vehicle repair and servicing type businesses on the eastern side of the road, which provide off street parking within the site.

Located on the western side of the road is Modbury Primary School, which has access to Golden Grove Road via Gold Court. This generates a number of pedestrian and cyclist movements along this section of Golden Grove Road. The nearby signalised pedestrian facility on Golden Grove Road is used predominantly by the school community within the times of 8.30am and 3.15pm Monday to Friday.

A small number of residential allotments also have direct access to Golden Grove Road up to the Rawlings Road junction. Beyond this, the road is bordered by the Dry Creek reserve to the west and the Modbury Sports Complex and Drumminor Gardens Cemetery to the east.

The road is a two lane, two way road with a raised median containing some landscaping. Full time cycle lanes are provided along this section.

Between the Milne Road intersection and the Maughan Avenue junction, the northbound and southbound carriageways are constructed at different levels, requiring guard fence adjacent the southbound carriageway.

2.3 ROAD CROSS SECTION

Golden Grove Road is for the most part a two lane road with one lane in each direction. The general cross section varies from unsealed shoulders to bike lanes and painted medians.

2.3.1 Section 1

<u>One Tree Hill Road to The Grove Way</u>

- Typical 6.2m sealed carriageway
- No kerbing, unsealed shoulders
- No bicycle lanes
- Large trees close to the edge of sealed carriageway
- Some road junctions with various level of junction treatment

2.3.2 Section 2

<u>The Grove Way to Grenfell Road (east)</u>

- Typical 6.2m sealed carriageway
- No kerbing, unsealed shoulders (apart from recent works around Park Lake Drive)
- No bicycle lanes
- Large trees close to the edge of sealed carriageway
- Some road junctions with various level of junction treatment

2.3.3 Section 3

<u>Grenfell Road (east) to North East Road</u>

- Covers a distance of 2.6 km
- The road cross-section is 18.8m wide, which involves a divided section with two lanes in each direction, with the road crossing the Dry Creek watercourses

2.4 METROPOLITAN AREA ROAD WIDENING PLAN (MARWP)

The Metropolitan Adelaide Road Widening Plan (MARWP) Act was developed in 1972 as a means to control building works so that land would be available for the widening of existing and construction of future arterial roads with minimum disruption to abutting property, should this need arise in the future.

As outlined in the MARWP, locations of Golden Grove Road which may be affected, include:

- Between Greenwith Road and Hancock Road, where an extra 15m of widening may be required on the south-eastern side of Golden Grove Road (refer Figure 2.2)
- Between Hancock Road and The Grove Way/Yatala Vale Roads, where an extra 15m of widening may be required on the north-western side of Golden Grove Road (refer Figure 2.3)
- At the intersection of Golden Grove Road and The Grove Way, where an extra 15m of widening may be required on the south-eastern side of the intersection (refer Figure 2.4)
- South of the intersection with The Grove Way, where an extra 21m of widening may be required on the north-western side of Golden Grove Road (refer Figure 2.4)

It should be noted however, that there are no plans in the foreseeable future for works to be undertaken which are outside of the existing road reserve width.

Figure 2.2: Possible future road widening between Greenwith Road and Hancock Road

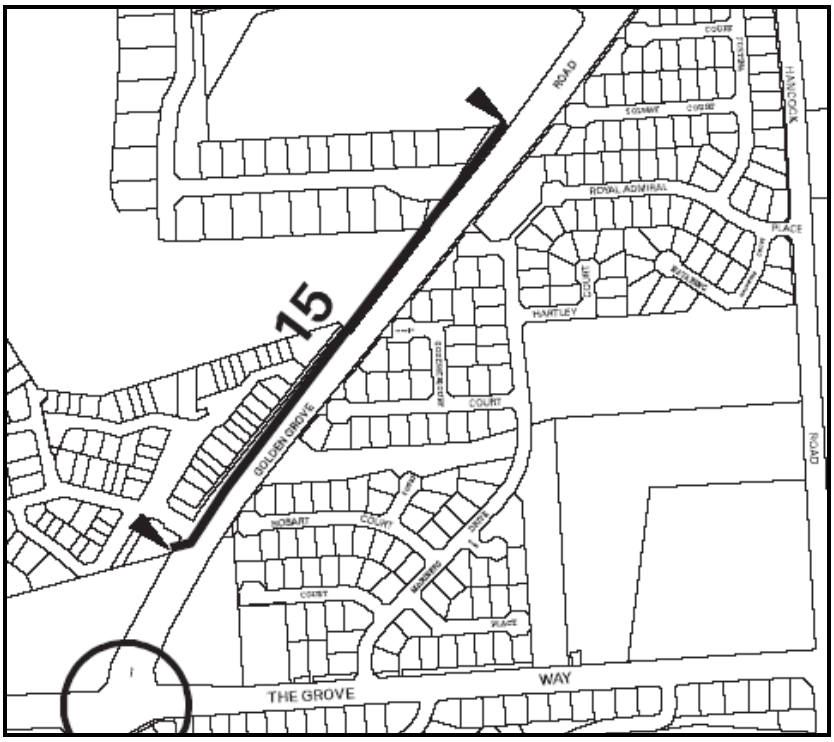

Figure 2.3: Possible future road widening between Hancock Road and The Grove Way

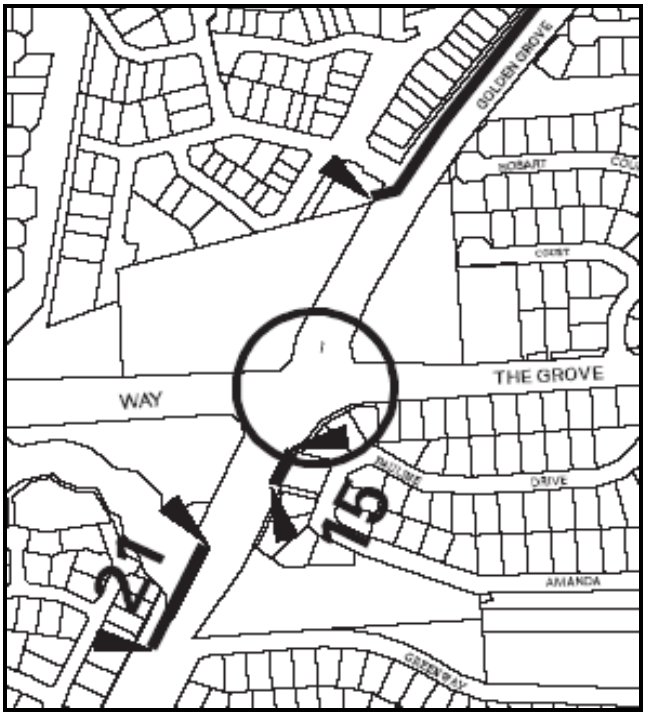

Figure 2.4: Possible future road widening at the intersection of Golden Grove Road and The Grove Way, and on Golden Grove Road south of this intersection

2.5 TRAFFIC VOLUMES AND COMMERCIAL QUANTITY

Figure 2.5 shows the Annual Average Daily Traffic (AADT) volumes, one-way peak hour traffic flows, and the commercial percentage of traffic for Golden Grove Road between One Tree Hill Road and North East Road.

This information has been sourced from traffic turning counts undertaken at the following intersections:

2009: Golden Grove Road / One Tree Hill Road / Kings Avenue Road
2008: Golden Grove Road / Hancock
2009: Golden Grove Rd / The Grove Way / Yatala Vale Rd
2010: Golden Grove Rd / Grenfell Rd
2009: Golden Grove Rd / Milne Rd
2009: Golden Grove Rd / North East Rd

It should be noted that a single clear lane of traffic has the capacity to cater for between 1200 to 1800 vehicles per hour, depending on the number and frequency of side roads and other factors which influence the smooth progression of traffic along a road. (Austroads, Guide to Traffic Management, Part 3: Traffic Studies and Analysis - section 5.2.1).

Section 1 and 2 of Golden Grove Road has a narrow pavement width and therefore the lowest capacity. Road widening to provide additional road width for turning traffic and stopping busses in these sections are therefore highly desirable.

Section 3 has sufficient road width to cater for the existing traffic flows and is able to cater for the anticipated future traffic growth.

It should be noted that the AADT has only grown by 2 to 5 % generally since the original RMP was prepared. The section of Golden Grove Road north of Hancock Road has shown a higher growth rate of 15%.

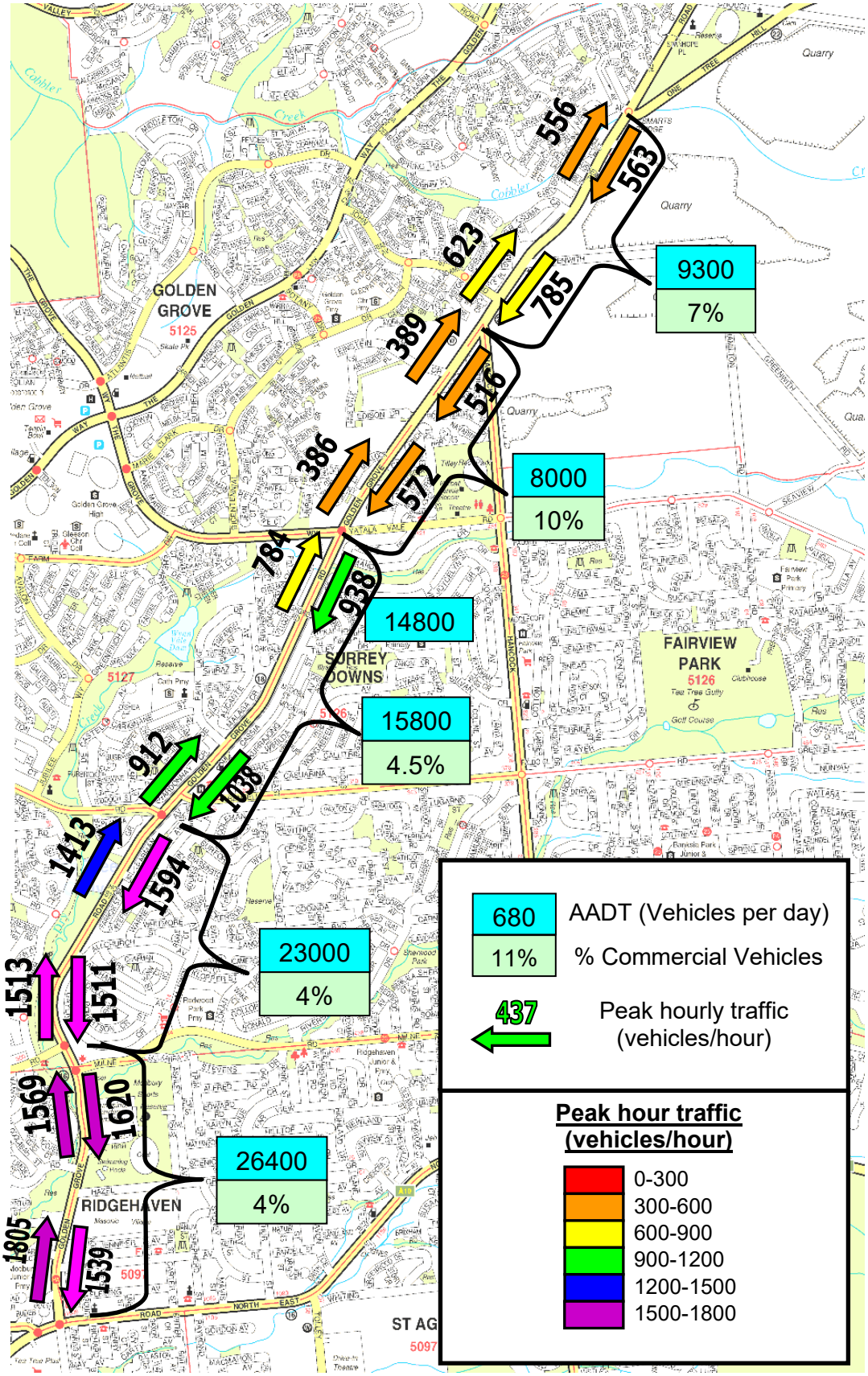

Figure 2.5: Annual Average Daily Traffic (AADT) volumes and one-way peak hour traffic flows for Golden Grove Road.

3 ROAD ROLE AND FUNCTION

Golden Grove Road is an important arterial road through the residential and commercial areas of Modbury and Golden Grove, and as such serves a number of key roles within the arterial road network.

3.1 FREIGHT ROUTE

Required to cater for significant freight movements generated by industrial and commercial areas, including Austral and PGH bricks, Garden Grove garden and landscaping suppliers, and the sand quarries.

3.2 PUBLIC TRANSPORT ROUTE

Services a number of bus routes including a transit link bus route connecting the north-eastern suburbs to and from the Adelaide CBD via the O-Bahn

3.3 CYCLE ROUTE

Provides for reasonably long inter-suburban connections and access to key cycle trip generators such as strip and local shopping, educational institutions and places of cultural and social activity (eg Tea Tree Plaza). From North East Road to just past Park Lake Drive there are bike lanes marked along Golden Grove Road. Although there are currently no bike lanes marked along Golden Grove Road north of this point there are other cyclist provisions within close proximity. Along the Golden Way, from Golden Grove Road to The Grove Way, there are marked bike lanes. West of Golden Grove Road, between The Grove Way and Grenfell Road, there currently exists a combination of off road sealed pathways and some secondary roads with bike lanes provided.

3.4 COMMUTER ROUTE

Provides an arterial link serving commuter traffic between the north-eastern suburbs (and beyond) to the Adelaide CBD. It also provides connectivity to residential, commercial and industrial areas to the north and west of Adelaide via strategic routes such as The Grove Way, McIntyre Road, Kings Road and Montague Road

4 FUNCTIONAL OUTCOMES

Functional outcomes are specific performance objectives to assist in the selection of system management components such as traffic signals, lanes, access control, roadside environment and pedestrian facilities. These outcomes provide guidance for the selection of road management techniques to achieve the broader network objectives, consistent with the roads specified role and function.

Routes will however, need to be assessed based on the opportunities and constraints of the area and some compromises may be required, particularly where the road serves a number of roles.

Functional outcomes have been used to develop an overall plan or vision of how the road should look and operate.

It should be noted that road safety is a key outcome in the selection of any road management techniques within this document.

The relevant target design/operational requirements are shown in Table 4.1.

Table 4.1: Functional Outcomes and Target design/optional requirements for Golden Grove Road

System management components	Functional outcomes	Target design / operational requirements
CAPACITY	• One clear operating lane will cater for traffic flows up to 1400 vph	As shown in Figure 2.5, the only section of Golden Grove Road which experiences traffic flows greater than 1400 vph is south of Grenfell Road (west), which currently has dual lanes in each direction. The remaining length has traffic flows under 1400 vph in each direction. • **One uninterrupted operating lane in each direction to cater for existing and expected traffic volumes in sections 1 and 2** • **Section 3 currently has two lanes to cater for higher traffic flows.**
LANES	• Provide at least one clear lane at all times • Provide lane widths to accommodate heavy vehicles and busses • Provide adequate kerb lane widths for freight vehicles or busses to pass a stationary bus at bus stops and parked cars in one lane roads • Provide adequate lane width where cyclists and traffic share the kerb lane or provide exclusive bike lanes	• **At least one wide uninterrupted traffic lane.** • **To ensure traffic flow is uninterrupted in sections 1 and 2 the provision of right turn storage lanes is desired where traffic turns right at intersections or to gain access to adjacent properties.** • **Indent all bus stops, particularly in the single lane sections (sections 1 and 2).** • **Provide bike lanes, or where this is not possible or practical, wider kerb lanes to accommodate cyclists**

Table 4.1: Functional Outcomes and Target design/optional requirements for Golden Grove Road (cont.)

TURNING TRAFFIC	• Where traffic turns right or U turns, separate turn lanes with appropriate deceleration tapers and storage lengths should be provided so that turning vehicles do not interfere with the smooth flow of traffic.	• **All U Turn manoeuvres should be banned at median openings except at locations where protected right turn lanes are provided as in Section 3.** • **See also "MEDIANS"**
MEDIANS	• Provide medians to store right turn vehicles including cyclists	• **Raised or flush median to provide storage lane for right turning vehicles where required**
TRAFFIC SIGNALS	• Coordinate during the peak to minimise stops and delays to buses, and commuters • Consider bus priority measures at key delay locations • Provide high level of right turn facilities for bus movements • Provide storage areas, and adequate detection and green time for cyclists at signalised intersections • Provide storage area for cyclists turning right • Favour major commuter peak flow • Cater for right turn demand into Golden Grove Road during peak times	• **Avoid the installation of additional traffic signals**
SPEED LIMITS	• Maintain speed limit at or above 60km/hr	• **Existing speed limits are appropriate for the existing level of adjacent development and design standards, therefore no changes are proposed.**
ACCESS - MIDBLOCK	• Provide reasonable spacing between driveways to enable bus stops to be installed • Minimise access points to reduce conflict points (Minimise direct property access) • Consider protected turn lanes where warranted	Given the limited road width it will be difficult to limit direct access to mid-block properties. • **Restrict midblock access to properties where necessary to ensure safe operation**

Table 4.1: Functional Outcomes and Target design/optional requirements for Golden Grove Road (cont.)

TRAFFIC MANAGEMENT AT INTERSECTIONS	• Provide adequate bus turning circles into side roads • Major intersections and junctions should have active control • Minimise conflict points	• **Provide active control (eg traffic signals, roundabouts) at major intersections where rationalisation of access / movements is not possible** • **Investigate various sites for active control**
LANDSCAPING AND ROADSIDE FURNITURE	• Eliminate roadside hazards • Eliminate overhanging vegetation • Provide bus shelters, seating and timetables at all bus stops • Eliminate roadside furniture, except bus shelters, within 8m of approach to bus pole • Ensure adequate sight distance between exiting traffic and cyclists	• **Trim vegetation and remove trees where necessary for road safety**
PEDESTRIANS	• Minimise crossing distances • All facilities to be DDA compliant • Raised medians at crossing points • Reduce traffic speeds if possible • Ensure visibility at crossing points • Provide appropriate clear width and heights on walkways and footpaths • Good road lighting	• **Provide raised medians / kerb protuberances / walk throughs at busy pedestrian crossing points** • **Upgrade road lighting in busy pedestrian locations** • **Provide appropriately designed footpaths (council responsibility)** • **All pedestrian footpaths, ramps, cut outs etc. to be DDA compliant**
BUSES	• Ensure suitable width travelling lane • Co-locate bus stops and pedestrian crossing facilities • Bus stops on exit side of traffic signals • Indent bus bays where buses interfere with flow of following buses	• **Provide appropriate width travelling lanes for buses** • **Indent all bus bays in sections 1 and 2 (see also "CAPACITY", "LANES", "MEDIANS")**

5 LONG TERM VISION

5.1 SECTIONS 1 AND 2

A vision of how Golden Grove Road should look and operate has been developed based on the above “functional outcomes analysis”. The traffic management recommendations in this report aim at realising as much as possible this vision and they therefore target the higher safety and operational requirements.

However there may be constraints requiring some compromises from the vision ideals, such as the need to retain as much of the existing landscaping and roadside vegetation, limitations in available road reserve and the need to maintain a reasonable level of access to adjacent property.

These preferred general cross sections are intended to meet the target design and operational requirements listed in table 1 above.

The preferred traffic management treatment at side road junctions is shown in Figure 5.1; while Figure 5.2 shows the preferred general mid-block cross section (where limited direct access to adjacent properties exists).

Both cross sections include indented bus bays, separate bike lanes or lane widths appropriate for bike use, and un-interrupted through travelling lanes.

5.2 SECTION 3

As Section 3 currently has two travelling lanes in each direction, on-road bicycle lanes, and a raised median with turning facilities and adequate lighting there are no significant changes proposed for this section of road.

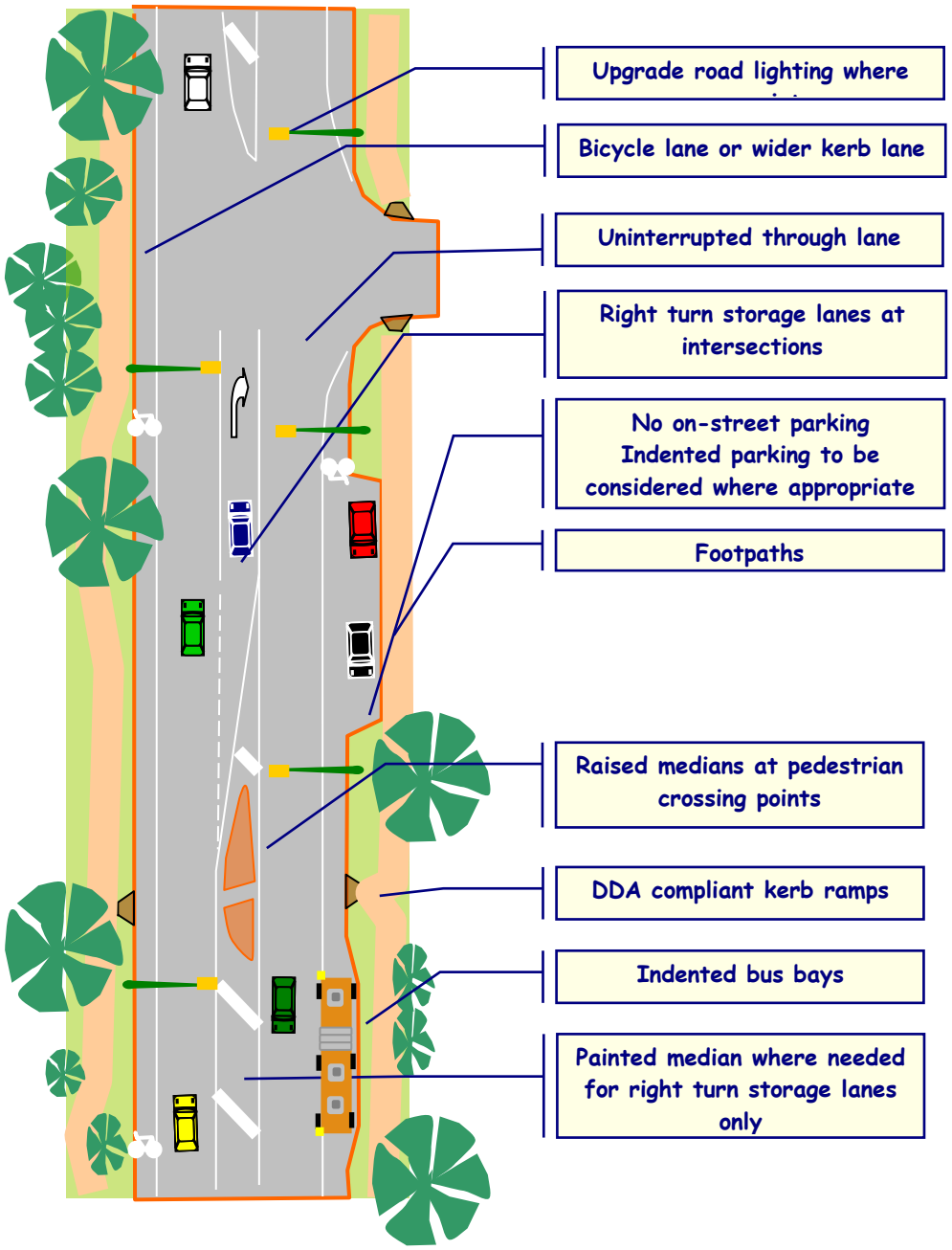

Figure 5.1: Typical Cross section of Golden Grove Road at side road junctions

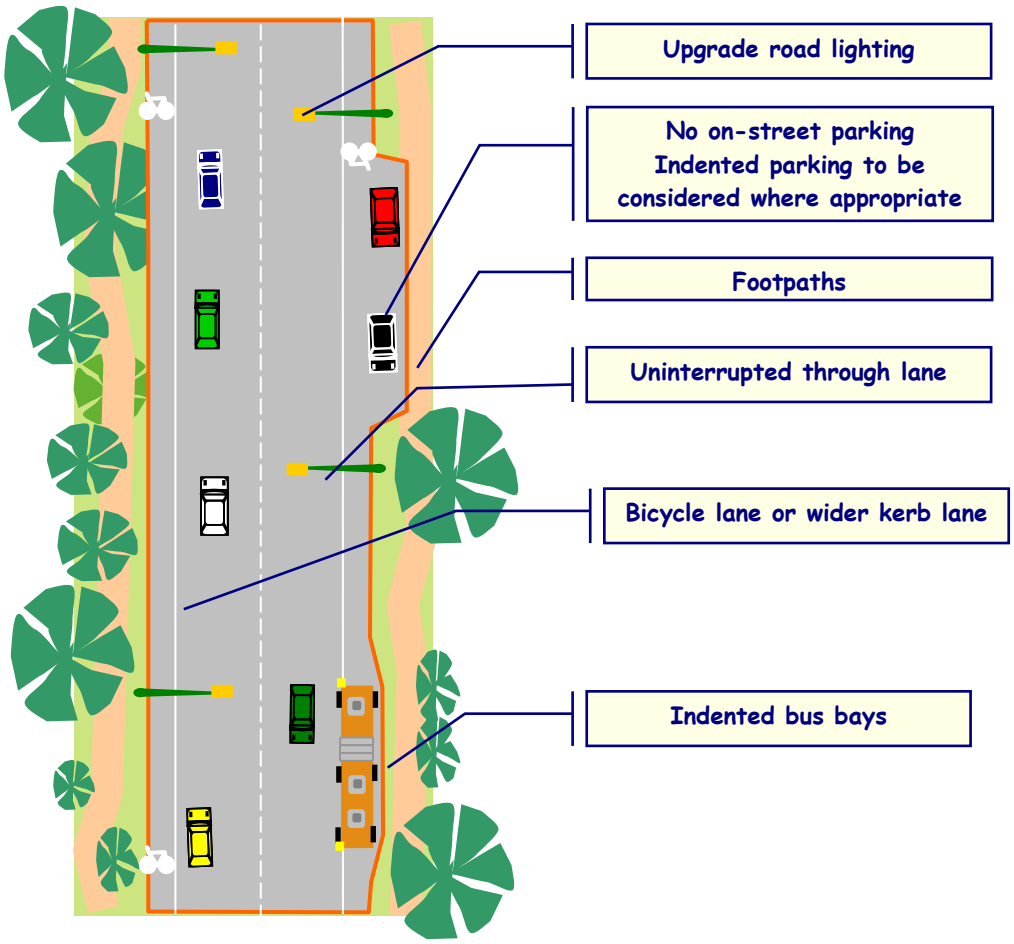

Figure 5.2: Typical Mid-block Cross-section for Sections 1 and 2

6 ROAD SAFETY

The community expects a safe and secure transport system. The South Australian Government has set out clear directions for Transport Safety including: -

- Reducing the number of crashes and/or incidents and their human impact
- Providing the community with a safer and more secure transport system
- Having specific regard for the safety and security of vulnerable road users

Crash data has been studied for the five-year period of 2005 to 2009 inclusive. Site investigations have also been undertaken to assess safety issues at the individual locations.

6.1 INTERSECTION CRASH DATA

Table 6.1- Intersection Crash Data

Sect.	Mid-Block Section	Crash Type	PDO $3000+	Casualty	Total
1	One Tree Hill Road/ Kings Avenue	Hit Fixed Object	3	-	3
		Rear End	1	1	2
		Left Rd – Out Of Control	1	-	1
		Total	**5**	**1**	**6**
1	Ross Road	Hit Pedestrian	-	**1**	**1**
		Total	**-**	**1**	**1**
1	Satsuma Crescent	Right Angle	1	-	1
		Total	**1**		**1**
1	Greenwith Road	Rear End	-	-	
		Right Turn	-	**1**	1
		Total	**-**	**1**	**1**
1	John Road	Right Angle	2	1	3
		Hit Fixed Object	2	2	4
		Total	**4**	**3**	**7**
1	Hancock Road	Right Angle	2	-	2
		Hit Fixed Object	1	-	1
		Total	**3**	**-**	**3**
1	Einstein Drive	Right Angle	-	2	2
		Rear End	-	1	1
		Right Turn	-	1	1
		Head On	-	1	1
		Total	**-**	**5**	**5**
1	Kunzea Way	Right Angle	-	1	1
		Total	**-**	**1**	**1**
1	The Grove Way / Yatala Vale Road	Right Turn	5	1	6
		Rear End	1	4	5
		Right Angle	-	2	2
		Head On	1	-	1
		Hit Fixed Object	2	-	2
		Side Swipe	1	-	1
		Total	**11**	**8**	**17**
2	High Grove Road	Rear End	1	-	1
		Total	**1**	**-**	**1**
2	Park Lake Drive	Rear End	1	-	1
		Total	**1**	**-**	**1**
2	Grenfell road (East)	Right Angle	3	-	3
		Rear End	4	1	5
		Right Turn	2	4	6
		Hit Fixed Object	1	-	1
		Side Swipe	-	1	1
		Total	**10**	**6**	**16**
3	Grenfell Road (West)	Right Turn	6	8	14
		Rear End	6	3	9
		Hit Fixed Object	4	1	5
		Side Swipe	1	-	1
		Total	**17**	**12**	**29**

Table 6.1 - Intersection Crash Data (cont.)

Sect.	Mid-Block Section	Crash Type	PDO $3000+	Casualty	Total
3	McPharlin Avenue	Right Angle	1	5	6
		Rear End	-	1	1
		Roll Over	1	-	1
		Side Swipe	-	1	1
		Total	**2**	**7**	**9**
3	Maughan Avenue	Right Angle	-	1	1
		Rear End	1	-	1
		Side Swipe	-	1	1
		Total	**1**	**2**	**3**
3	Milne Road (West)	Right Turn	9	5	14
		Rear End	11	3	14
		Right Angle	6	4	10
		Hit Fixed Object	2	-	2
		Side Swipe	1	-	1
		Other			
		Total	**29**	**12**	**41**
3	Milne Road (East)	Right Turn	9	6	15
		Rear End	4	-	4
		Right Angle	4	1	5
		Hit Fixed Object	2	-	2
		Head On	1	-	1
		Total	**20**	**7**	**27**
3	Jack High Lane	Rear End	1	-	1
		Total	**1**		**1**
3	Oratanga Road	Rear End	1	-	1
		Right Angle	1	1	2
		Hit Fixed Object	1	-	1
		Total	**3**	**1**	**4**
3	Hazel Grove	Rear End	3	1	4
		Right Angle	2	2	4
		Right Turn	-	1	1
		Total	**5**	**4**	**9**
3	Rawlings Road	Right Angle	1	-	1
		Hit fixed Object	-	1	1
		Side swipe	1	-	1
		Rear End	-	1	1
		Total	**2**	**2**	**4**
3	Dewer Avenue	Right Angle	2	2	4
		Rear End	-	1	1
		Total	**2**	**3**	**5**
3	Gold Court	Rear End	1	-	1
		Total	**1**	**-**	**1**
3	North East Road	Rear End	19	2	21
		Side Swipe	2	-	2
		Right Angle	3	1	4
		Hit Fixed Object	6	-	6
		Right Turn	1	-	1
		Total	**31**	**3**	**34**

6.2 MID-BLOCK CRASH DATA

Table 6.2- Mid-Block Crash Data

Sect.	Intersection	Crash Type	PDO $3000+	Casualty	Total
1	Kings Avenue/One Tree Hill Road – Ross Road				
		Total			**0**
1	Ross Road-Satsuma Crescent				
		Total			**0**
1	Satsuma Crescent-Greenwith Road	Hit Fixed Object	1	1	2
		Total	**1**	**1**	**2**
1	Greenwith Road-John Road	Hit Pedestrian	-	1	1
		Total	**-**	**1**	**1**
1	John Road – Hancock Road	Hit Fixed Object	1	-	1
		Total	**1**	**-**	**1**
1	Hancock Road – Einstein Drive	Head on	-	1	1
		Total		**1**	**1**
1	Einstein Drive – Kunzea Way				
		Total			
1	Kunzea Way – The Grove Way/Yatala Vale Road	Rear End	-	1	1
		Side Swipe	-	1	1
		Total	**-**	**2**	**2**
2	The Grove Way/Yatala Vale Road – Highgrove Road	Rear End	4	2	6
		Hit Fixed Object	3	-	3
		Side Swipe	1	1	2
		Total	**8**	**3**	**11**
2	Highgrove Road – Park Lake Drive				
		Total			
2	Park Lake Drive-Grenfell Road (East)	Right Angle	5	2	7
		Side Swipe	1	-	1
		Rear End	1	1	2
		Total	**7**	**3**	**10**
2	Grenfell Road (East) – Grenfell Road (West)	Rear End	1	-	1
		Hit Pedestrian	-	1	1
		Total	**1**	**1**	**2**
3	Grenfell Road (west) – McPharlin Avenue	Hit Parked Vehicle	1	-	1
		Hit Fixed Object	-	1	1
		Total	1	**1**	2
3	McPharlin Avenue – Maughan Avenue	Hit Fixed Object	1	-	1
		Total	1	-	**1**
3	Maughan Avenue – Milne Road (west)	Rear End	1	1	2
		Head On	-	1	1
		Side Swipe	1	-	1
		Total	2	**2**	**4**

Table 6.2 – Mid-Block Crash Data (cont.)

Sect.	Intersection	Crash Type	PDO $3000+	Casualty	Total
3	Milne Road (west) – Milne Road (east)	Rear End		1	1
		Head on			
		Total		**1**	**1**
3	Milne Rd (east) – Jack High Lane	Rear End	1	-	1
		Roll Over	-	1	1
		Side Swipe	1	-	1
		Total	**2**	1	3
3	Oratanga Road – Hazel Grove				
		Total			**0**
3	Hazel Grove - Rawlings Road	Rear End	1	-	1
		Right Angle	1	-	1
		Total	2	**-**	**2**
3	Rawlings Road – Dewer Avenue				
		Total			**0**
3	Dewer Avenue – Gold Court	Rear End	1	1	2
		Total	**1**	**1**	**2**
3	Gold Court – North East Road	Rear End	5	2	7
		Right Angle	1	2	3
		Hit fixed Object	1	-	1
		Total	**7**	**4**	**11**

Investigations of the crash statistics for the mid-block sections show that whilst the crash numbers are significantly lower than those for the intersection locations, those that are comparatively high (3 sites around 10 crashes in five years, Table 6.2), are located in the near vicinity of the shopping precincts. It would appear that these crashes are associated with the turning manoeuvres of motorists into and out of the shopping or commercial areas. These crashes could be alleviated with the inclusion of right turn storage lanes and left turn deceleration lanes into the shopping precincts, minimising the number of entrances into these sites (hence reducing confusion with respect to where vehicles may be turning) and having these entrances as far away as practically possible from intersections.

6.3 SPEED ENVIRONMENT

The speed limit along Section 1 of Golden Grove Road was reduced from an 80km/hr zone to a 60km/hr zone in late 2000. The change of speed limit was deemed necessary to maintain consistency with the other sections of Golden Grove Road.

The current speed limits along Golden Grove Road are shown in Figure 6.1.

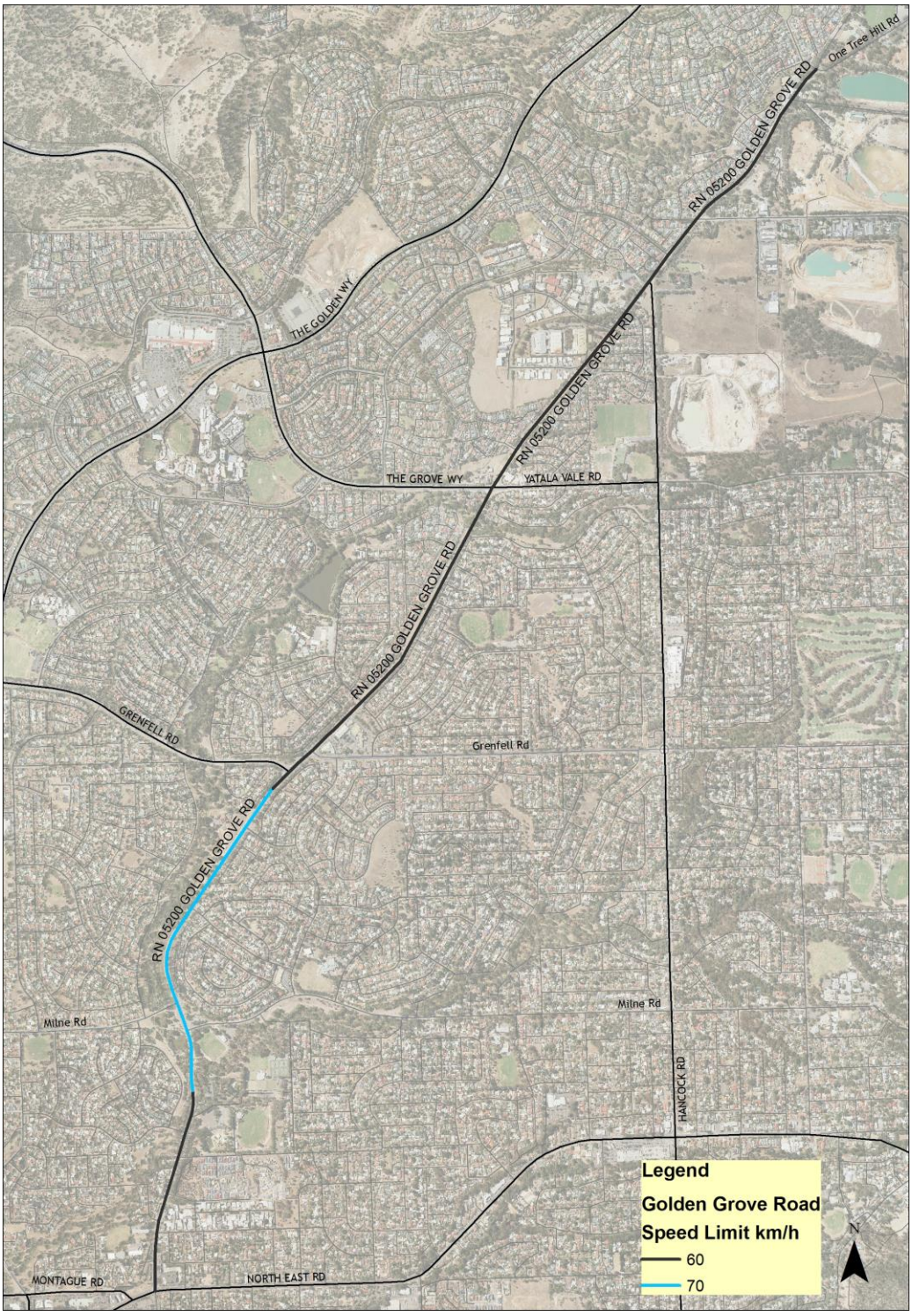

Figure 6.1: Current Speed Zones

6.4 ROADSIDE HAZARDS

At present, there are roadside hazards located along Golden Grove Road. A number of these are in the form of natural hazards and include substantial sized trees within the shoulder area of the road and associated overhanging low branches. Other hazards include roadside obstacles (stobie poles, drainage structures etc) and unprotected roadside drop offs.

Whilst no specific recommendations are made for this RMP regarding roadside hazards, DTEI will carry out an assessment of risks associated with these hazards and recommend treatments as part of any upgrade works.

6.5 PEDESTRIANS

The provision of properly designed, safe, and DDA compliant walking facilities along Golden Grove Road is primarily the responsibility of Tea Tree Gully Council.

The footpath design and function should target: -

- Clear width and height requirements
- DDA compliant gradients and cross fall
- DDA compliant kerb ramps and tactile indicators
- Access to public transport

DTEI is primarily responsible for providing safe pedestrian facilities across the arterial roads (eg pedestrian actuated crossings, pedestrian refuges and median walk throughs). Several treatments to improve safety for pedestrians have been recommended in this report, including:

- The installation of a raised pedestrian refuge on Golden Grove Road just south of the junction of Park Lake Drive **completed**
- The installation of a pedestrian median walkthrough in the raised median on Golden Grove Road immediately north of Grenfell Road (east) **completed**
- Upgrading of existing median walkthroughs in the raised median within Section 3 of Golden Grove Road.

6.6 CYCLISTS

Both the “Bikedirect” network and the City of Tea Tree Gully’s “Local Area Bicycle Plan - 2006” have identified Golden Grove Road as strategically important in the bicycle network, providing for inter- and intra-regional bicycle travel, whilst also connecting recreational features and points of interest. A description of current cycling facilities along Golden Grove Road is provided in section 3 of this report.

Whilst Section 3 of Golden Grove Road has marked bike lanes, there are a limited number of formalised cycling facilities in sections 1 and 2, and narrow pavement widths in sections, creating significant hazards for cyclists.

The widening of the narrow cross section of Sections 1 and 2 of Golden Grove Road, incorporating marked bike lanes, has therefore been recommended in this report.

6.7 PUBLIC TRANSPORT

A number of bus routes use Golden Grove Road. In order to provide an uninterrupted traffic lane, bus stops should be indented.

Figure 6.2: Bus routes present on Golden Grove Road - 2010

6.8 STRUCTURES (BRIDGES AND CULVERTS)

A number of structures currently exist along Golden Grove Road including:

Smarts Bridge (PN 0026) – 40m southeast of One Tree Hill Road

The culvert was designed in 1914. The last routine inspection showed the structure has an overall rating of fair condition. The structure was inspected in September 2007, and reconstruction assessment in 2018.

Minor Watercourse Crossing (PN 0741) – 10m northeast of Hancock Road

The culvert was designed in 1937. The last routine inspection showed the structure has an overall rating of good condition. The structure was inspected in January 2006, and reconstruction assessment in 2017.

Watercourse Crossing (PN 1569) – 160m southwest of Yatala Vale Road

The culvert was designed in 1949. The last routine inspection showed the structure has an overall rating of good condition. The structure inspected in 2009, and reconstruction assessment in 2029.

Northern Bridge over Dry Creek (PN 5381) – 110m south of Milne Road

The bridge was designed in 1984. The last routine inspection showed the structure has an overall rating of very good condition. The structure was inspected in 2009, and reconstruction assessment in 2064.

Southern Bridge over Dry Creek (PN 5382) – 250m north of Hazel Grove

The bridge was designed in 1984. The last routine inspection showed the structure has an overall rating of very good condition. The structure was inspected in 2009, and reconstruction assessment in 2064.

7 TRAFFIC ISSUES AND RECOMMENDATIONS

7.1 INTERSECTION ISSUES AND RECOMMENDATIONS

7.1.1 Golden Grove Road / One Tree Hill Road

This intersection is controlled by an existing roundabout (installed 2002). During the period 2005-2009, there were a total of 6 crashes at this intersection, with one of these crashes resulting in personal injury.

Given the low casualty crash rate, this location would not meet the criteria for Black Spot funding.

Analysis of the crash data indicates that of these crashes, 3 were hit fixed object type crashes involving a left turning vehicle from the south losing control (2 in wet weather) and hitting road side objects. Interestingly, in all three of these crashes, the drivers were all under the age of 20. The crash resulting in injury was a rear end type crash on the southern approach.

A site inspection was undertaken which considered the data identified in the crash analysis. The recommended treatments at this location include undertaking an analysis of the existing skid resistance of the current road pavement, especially on the southern approach, and taking appropriate remedial action as required (e.g. asphalt overlay).

To warn motorists to the presence of the roundabout, especially those on the northern approach, consideration should be given to improving the existing signs.

Figure 7.1: Golden Grove Road / One Tree Hill Road Intersection

7.1.2 Golden Grove Road / Satsuma Crescent

This junction had one recorded right angle crash in the period 2005 - 2009. Although there are a low number of recorded crashes at this junction, on site inspections have highlighted a number of issues that pose a safety concern.

The junction was originally constructed to include and auxiliary right turn lane to enable through vehicles to pass any stationary vehicle on Golden Grove Road waiting to turn right into Satsuma Crescent, as shown in Figure 7.2.

For continuity in the road layout for drivers, it is considered appropriate to upgrade the junction to include a protected right turn lane as per the recommended treatment in this RMP (refer Figure 5.1) However given the low number of recorded crashes at this junction, such a treatment would be considered a low priority at this time.

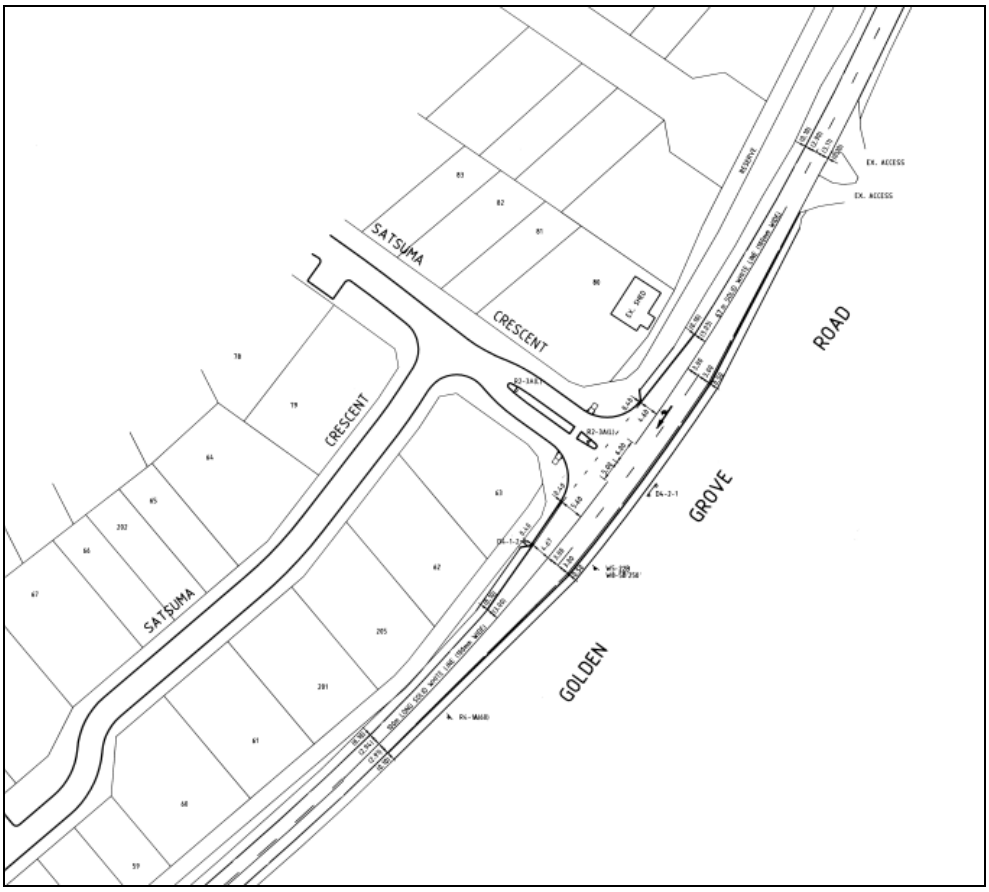

Figure 7.2: Current plan for Golden Grove Road / Satsuma Crescent Intersection

7.1.3 Golden Grove Road / Greenwith Road

There was one recorded right turn crash resulting in injury in the period 2005 – 2009 at this junction.

Golden Grove Road is within a slight cutting on the northern leg of this junction, with no provision for northbound vehicles to pass a vehicle waiting to turn right into Greenwith Road.

Sight distance for both vehicles approaching the junction from the north, and those vehicles in Greenwith Road looking to the north, is limited due to the embankments around the junction.

For continuity in the road layout for drivers, it is considered appropriate to upgrade the junction to include a protected right turn lane as per the recommended treatment in this RMP (refer Figure 5.1). However given the low number of recorded crashes at this junction, such a treatment would be considered a low priority.

In addition to this, the embankment on the north eastern side of the junction could be removed to improve site distance to and from the northern approach.

In the shorter term, consideration will be given to installing improved delineation for the Greenwith Road leg, including separation of the lanes on Greenwith Road with safety bars in the centre of the road and investigate the need for a STOP sign on this leg.

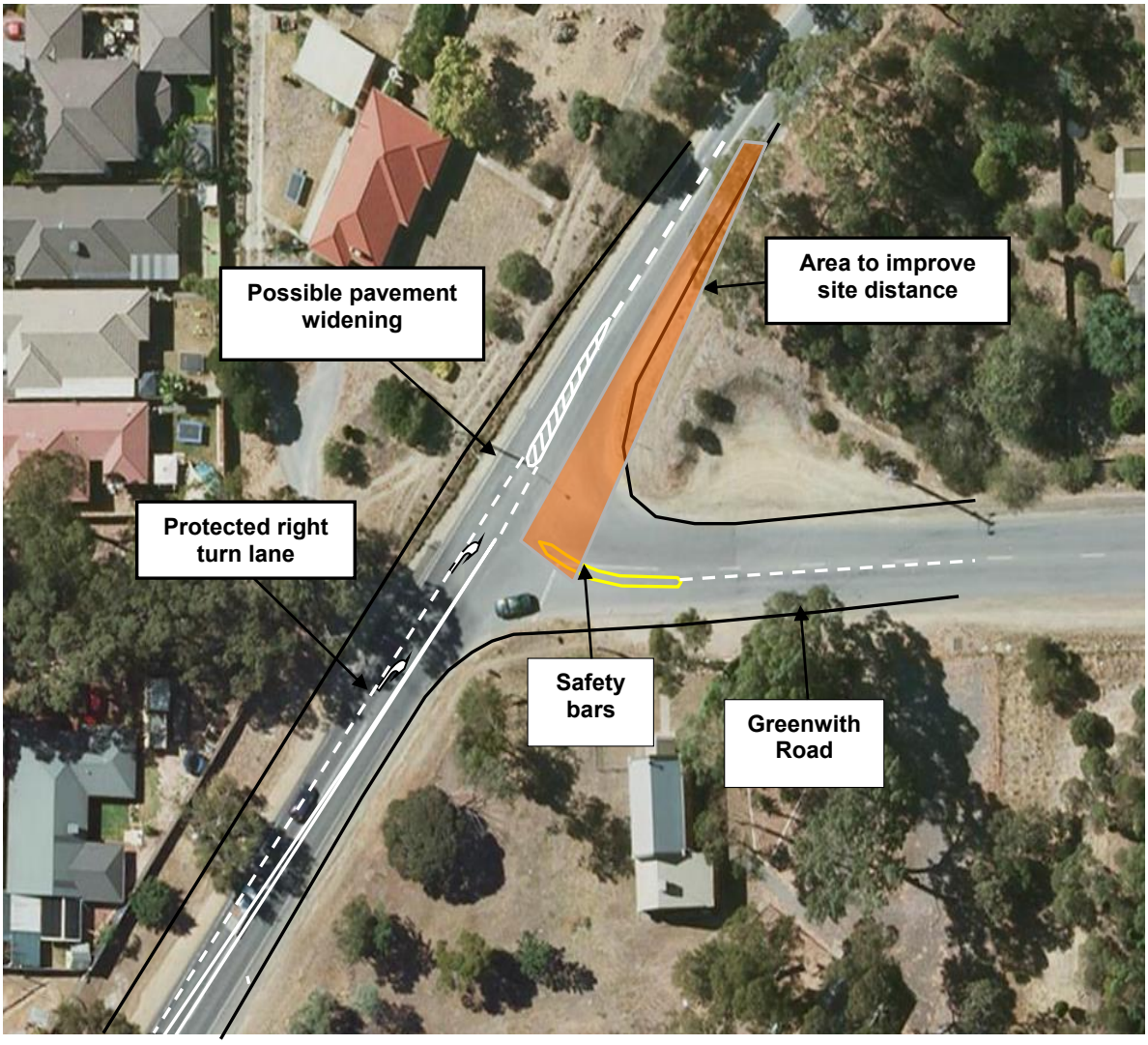

Figure 7.3: Current plans for Golden Grove Road / Greenwith Road Intersection

7.1.4 Golden Grove Road / John Road

There were a total of 7 crashes at this junction over the period 2005 – 2009, with 3 crashes resulting in casualties. Four of the crashes were hit fixed object type crashes (all occurring at night) and 3 were right angle type crashes (with 1 at night).

This location does meet the Black Spot criteria, however there are some 395 other unsignalised locations with a poorer safety record over the same period.

At the time of the site inspection, the linemarking at the junction required maintenance to improve the delineation through this location (refer Figure 7.4). Linemarking maintenance is generally undertaken through a cyclical program, with Golden Grove Road programmed to be revisited every 2 years. The road is scheduled to receive maintenance work in the first half of 2011.

There may be some benefit in converting the current junction treatment (installed in the mid 1990's) to a more conventional arrangement, whereby the existing "acceleration lane" for those vehicles turning right out of John Road is removed, and vehicles are required to store within the central median area (refer Figure 7.5), similar to that recently installed at the Park Lake Drive junction (refer 7.1.10). This may negatively impact on the efficiency of the junction and will need to be further assessed.

Consideration should also be given to improve the road lighting standard through the junction, as it is currently only lit by a single "flag" light. However, given there have been no recorded crashes involving pedestrians at night, this location would be a low priority.

Figure 7.4: Current plan for John Road junction

Figure 7.5: Conventional Channelised Right Turn Lane

7.1.5 Golden Grove Road / Hancock Road

There were 3 recorded crashes at this junction in the period 2005 – 2009, with no injuries sustained in any of the crashes. Two of the crashes were right angle type crashes.

Due to concerns with safety at this junction and vehicle speeds entering Hancock Road from Golden Grove Road (north), DTEI undertook modifications to this junction in March 2001, essentially removing the “sweeping” left turn movement to reduce vehicle speed.

In the medium term, it is considered appropriate to upgrade the junction to include a protected right turn lane as shown in Figure 7.6 as per the recommended treatment in this RMP (refer Figure 5.1). However given the low number of recorded crashes at this junction, such a treatment would be considered a low priority.

In addition to this, the provision of a channelised left turn deceleration lane into Hancock Rd should be considered to improve sight lines for vehicles exiting Hancock Rd (refer Figure 7.7).

A longer term treatment would be the installation of a roundabout at this junction to control traffic movements (refer Figure 7.8).

Figure 7.6: Current plan for Golden Grove Rd / Hancock Rd Intersection (channelised right turn lane)

Figure 7.7: Channelised right turn lane with left turn deceleration lane concept design for Golden Grove Rd / Hancock Rd Intersection

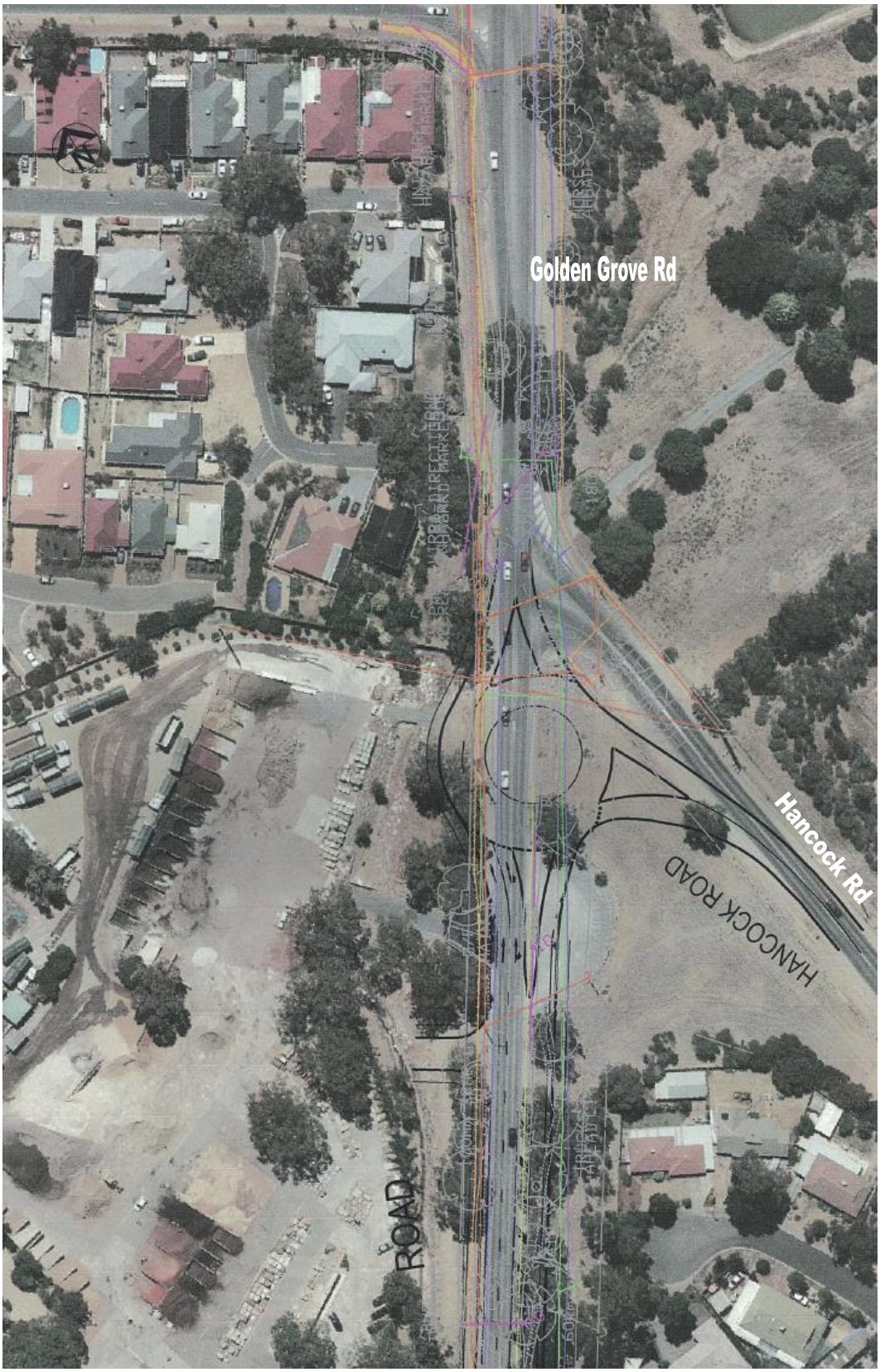

Figure 7.8: Roundabout Concept Design for Golden Grove Rd / Hancock Rd Intersection

7.1.6 Golden Grove Rd / Einstein Drive

During the period 2005 – 2009 there were 5 casualty crashes at this junction involving right turn, right angle, rear end and head on crashes. This location does meet the Black Spot criteria, however there are some 250 other unsignalised locations with a poorer safety record over the same period.

This location does meet the Black Spot criteria, however there are some 160 other unsignalised locations with a poorer safety record over the same period.

A left turn deceleration lane is provided for vehicles entering Einstein Drive, however there is no provision for right turning vehicles on Golden Grove Road to store safely and enable through vehicles to pass. To create such a facility it is likely to require the removal of at least one large tree from the eastern side of the road. It may also be prudent to extend such a treatment further north to provide a safe access into the Garden Grove business, which has an access to the north of the Einstein Drive junction. This would require the removal of additional trees from the eastern side of Golden Grove Road.

Figure 7.9: Current plan for Golden Grove Rd / Einstein Drive Intersection (channelised right turn lane)

7.1.7 Golden Grove Road / Kunzea Way

This junction had one recorded casualty crash for the period 2005 – 2009, this being a right angle type crash.

The junction was originally constructed to include and auxiliary right turn lane to enable through vehicles to pass any stationary vehicle on Golden Grove Road waiting to turn right into Kunzea Way.

For continuity in the road layout for drivers, it is considered appropriate to upgrade the junction to include a protected right turn lane as per the recommended treatment in this RMP (refer Figure 5.1). However given the low number of recorded crashes at this junction, such a treatment would be considered a low priority at this time.

Figure 7.10: Current plan for Golden Grove Rd / Kunzea Way Intersection (channelised right turn lane)

7.1.8 Golden Grove Road / The Grove Way / Yatala Vale Road

There were 17 crashes at this signalised intersection in the period 2005-2009. Of the 17 crashes, 6 of these resulted in injury. This location does meet the Black Spot criteria, however there are more than 300 other signalised locations with a poorer safety record over the same period.

The recorded crashes are primarily rear end and right turn type crashes, generally distributed over each of the four legs of the intersection.

Currently, this intersection (refer Figure 7.11) is congested in the peak periods, with particularly high demand for right turn movements from The Grove Way to Golden Grove Road and the corresponding left turn movement. In an effort to manage the efficiency of this site currently the right turn movements from the west are able to perform filter turns, which require motorists to select appropriate gaps in the oncoming traffic stream. Analysis of the crash data suggests that some crashes have been as a result of drivers not being able to do this successfully.

Given the above, it is proposed to install an additional right turn lane on the western approach to the intersection, which will enable these movements to be fully controlled. This will also include the need to provide an additional lane on the southbound exit of the intersection, which will in turn require the widening of an existing culvert and possible relocation and indenting of nearby bus stops (refer Figure 7.12).

Figure 7.11: Golden Grove Road / The Grove Way / Yatala Vale Road Intersection

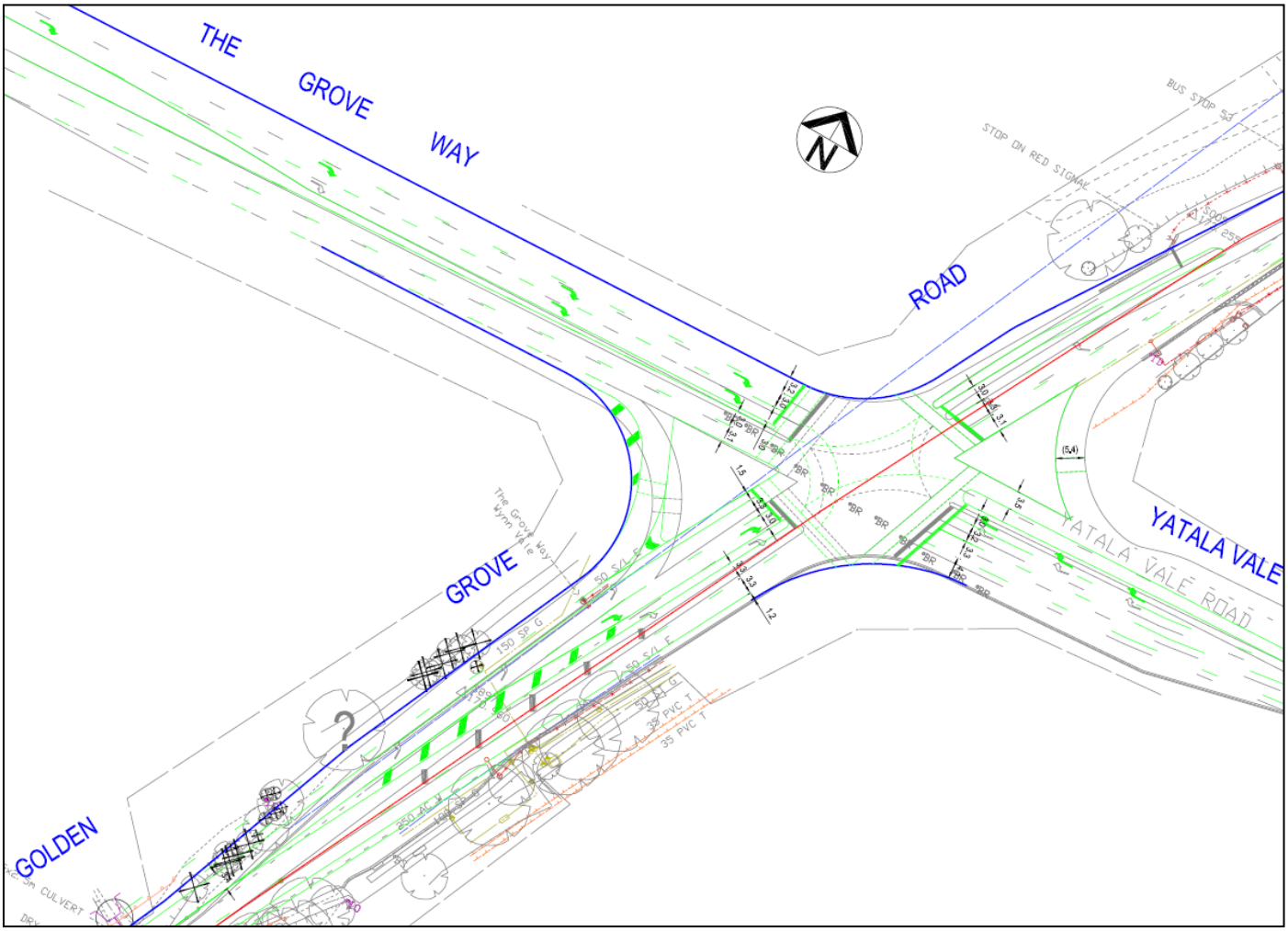

Figure 7.12: Concept design for Golden Grove Road / The Grove Way / Yatala Vale Road Intersection

7.1.9 Golden Grove Road / Highgrove Street

At this junction there was only 1 rear end crash for the period 2005 – 2009.

An on site inspection identified some minor issues with the current layout of the junction, predominately related to delineation of the junction

For continuity in the road layout for drivers, it is considered appropriate to upgrade the junction to include a protected right turn lane as per the recommended treatment in this RMP (refer Figure 5.1). However given the low number of recorded crashes at this junction, such a treatment would be considered a low priority at this time.

Figure 7.13: Current plan for Golden Grove Rd / Highgrove Street Intersection (channelised right turn lane)

7.1.10 Golden Grove Road / Park Lake Drive

There was only one rear end crash recorded at this junction for the period 2005 – 2009.

A standard channelised right turn treatment has already been implemented at this location (refer Figure 7.14), together with a deceleration lane for the left turn into Park Lake Drive. There are also cyclist facilities marked at this intersection. This project was undertaken in 2006.

Given the recent upgrade and the current satisfactory operation of this junction, no further works are recommended at this time.

Figure 7.14: Golden Grove Rd / Park Lake Drive Intersection

7.1.11 Golden Grove Road / Grenfell Road (east)

There have been 16 recorded crashes at this junction in the period 2005-2009. Of these, 7 were casualty crashes and as such, this location does meet the Black Spot criteria, however there are some 40 other unsignalised locations with a poorer safety record over the same period.

The junction is a “seagull” type junction (refer Figure 7.15), with turning movements being able to be undertaken at relatively high speed due to the generous radius of the curves.

The predominant crash types were rear end (5) and right turn (6), with the rear end crashes occurring on the left turn into and out of Grenfell Road (east).

Grenfell Road (east) is located approximately 140m north of the signalised junction of Grenfell Road (west). There is a high demand for left turn out from Grenfell Road (east) to right turn into Grenfell Road (west) and also for the reverse “S” movement. Given the relatively short weave length, it is considered that some of the rear end crashes occurring on the left turn out from Grenfell Road (east) are due to the lead vehicle hesitating in selecting a gap in the oncoming traffic stream to undertake the merge movement to turn right into Grenfell Road (west).

It is recommended that traffic signals are installed on the Grenfell Road (east) junction to be coordinated with the existing signals, with 2 right turn lanes (fully controlled) on the southern and eastern approaches.

Figure 7.15: Golden Grove Rd / Grenfell Road (east) Intersection

7.1.12 Golden Grove Road / Grenfell Road (west)

There have been 29 crashes recorded at this signalised junction in the period 2005-2009, with 12 of these resulting in injury, and as such, this location does meet the Black Spot criteria, however there are some 170 other signalised locations with a poorer safety record over the same period.

The predominant crash types are rear end and right turn.

This junction was upgraded with funding received from the Federal Black Spot Program in the 2005/06 financial to install additional right turn lanes on Golden Grove Road and Grenfell Road and then fully controlling these movements (refer Figure 7.16).

The majority of the right turn crashes that have been recorded at this junction occurred prior to this treatment being implemented. Analysis of the data for those crashes that have occurred after the upgrade indicates that motorists are disobeying the red arrow.

The majority of the rear end type crashes have occurred in the high entry angle left turn slip lane on the western approach of the junction.

It is recommended that consideration be given to fully controlling the left turn lane from Grenfell Road (west) at the time when traffic signals are installed at the Grenfell Road (east) junction.

Figure 7.16: Golden Grove Rd / Grenfell Road (west) Intersection

7.1.13 Golden Grove Road / McPharlin Avenue

There were a total of 9 recorded crashes at this junction for the period 2005 – 2009, including 7 casualty crashes, and as such, this location does meet the Black Spot criteria, however there are some 100 other unsignalised locations with a poorer safety record over the same period.

Of the 9 crashes, 6 were right angle type crashes.

This section of Golden Grove Road has two lanes in each direction, with a raised central median. A protected right turn lane is provided to enable vehicles turning right into McPharlin Avenue to safely store out of the path of the through vehicles.

The median opening also provides the opportunity for vehicles exiting McPharlin Avenue to head north to store within the median area, effectively undertaking the right turn manoeuvre in a two stage process.

A review of the crash data suggests that a majority of the right angle crashes occur with southbound vehicles on Golden Grove Road and right turning vehicles out of McPharlin Avenue. Given the sight distance to the north from McPharlin Avenue meets the required criteria, it is unclear from the data as to why drivers are unable to select an appropriate gap in the oncoming traffic stream. In addition, the latest available traffic counts at this junction indicate a relatively low number of right turn movements out of McPharlin Avenue in the peak periods.

No minor treatments are evident to treat the predominant crash type. A more drastic solution may be to permanently ban the right out of McPharlin Avenue, and force any vehicle wishing to head north to use the local road network via McEwin Avenue to Grenfell Road (east) to access Golden Grove Road.

Such an option will require further consultation with Council and other affected stakeholders.

Figure 7.17: Golden Grove Rd / McPharlin Avenue Intersection

7.1.14 Golden Grove Road / Maughan Avenue

There were only 3 crashes (with 2 injury) recorded at this junction in the period 2005 – 2009.

The southern leg of this junction has a difference in elevation of the two carriageways. This, combined with the presence of mature trees within the central median, reduces sight distance to and from the junction with Maughan Avenue, and also reduces the space available to provide a standard length right turn lane on Golden Grove Road.

However, all three recorded crashes involved vehicles travelling south on Golden Grove Road, hence the concern with level difference of the southern leg has not been reflected in the crashes occurring at this location.

In relation to the recorded crashes, there are no obvious issues identified in relation to the physical road infrastructure at this location, rather the crashes have resulted from poor driver behaviour. Consideration could be given to installing an advance street name sign to alert drivers unfamiliar to the area with the presence of the side road junction.

Figure 7.18: Golden Grove Rd / Maughan Avenue Intersection

7.1.15 Golden Grove Road / Milne Road (west)

Milne Road forms an offset junction arrangement with Golden Grove Road, with both junctions being controlled by traffic signals.

An analysis of the crash data for the western leg with Golden Grove Road indicates that 41 crashes have occurred at the junction in the period 2005-2009, with 13 of these resulting in injury and as such this location does meet the Black Spot criteria, however there are some 155 other signalised locations with a poorer safety record over the same period.

The predominant crash types are rear end (14), right turn (14) and right angle (10). It should be noted that 9 of the 10 right angle crashes were caused by a vehicle on the southern approach running a red light and colliding with a vehicle taking off to turn right from Milne Rd on a green arrow. The existing “wet film” safety camera is planned to be replaced with a new digital installation in 2011 which may be a more effective deterrent to the current incidence of red light running.

Of the 14 right turn crashes, 6 of them were during peak traffic periods (i.e. between either 0700-0900 or 1600-1800 Monday to Friday). To enable the right turn from the north to be fully controlled, consideration would need to be given to the potential increase in right turn storage capacity required to accommodate this signal operation.

Another option would be to control the right turn outside of the peak hours – this would address 60% of the recorded right turn crashes. The option selected will be determined through further modelling of the operation of the junction, and the ability to add the required right turn storage capacity due to geometric design and environmental constraints at this location.

Given the curvilinear alignment of the northern approach to the intersection and the potential for queues to form back in the peak periods, consideration should be given to provide advance warning to southbound vehicles via an Intelligent Transport System (ITS) solution. The installation of traffic signal mast arms may also provide some benefit to improve the sight distance to traffic signals for approaching vehicles from the north. The mast arm should be located on the SW corner of the junction.

Figure 7.19: Golden Grove Rd / Milne Road (west) Intersection

7.1.16 Golden Grove Road / Milne Road (east)

There were 27 crashes at this junction in the period 2005-2009, with 7 of these crashes resulting in injury and as such this location does meet the Black Spot criteria, however there are some 290 other signalised locations with a poorer safety record over the same period.

The recorded crashes are primarily rear end (4), right angle (5) and right turn (15) type crashes.

Of the 15 right turn crashes, 6 of them were during peak traffic periods (i.e. between either 0700-0900 or 1600-1800 M-F). Three of the four rear end crashes occurred on the northern approach to the intersection.

The right turn movment from Golden Grove Road into Milne Road is not controlled (ie a “filter turn” movement), which requires motorists to determine an appropriate gap in the oncoming traffic stream.

Given the relatively high incidence of right turn type crashes it is suggested that the right turn movement is fully controlled. This will require further traffic analysis to determine the impact on the intersection efficiency, the capacity required to store the vehicles for the right turn movement and the ability to provide this extra capacity within the existing site constraints.

An alternative may be to partially control the right turns outside of the peak hours, if insufficient right turn storage capacity can be provided on site. This option would treat 60% of the total right turn crashes occurring at this location.

Figure 7.20: Golden Grove Rd / Milne Road (east) Intersection

7.1.17 Golden Grove Road / Oratanga Road

There were 4 crashes at this junction during the period 2005 – 2009, of which only one crash resulted in injury. Based on these statistics, this site would not meet the Black spot criteria.

Given the relatively low crash rate, no specific action is recommended at this location at this time, however on site observations indicate a slight impediment to sight distance due to vegetation both north and south of the junction. Further detailed inspection of the site is required to determine the extent of any tree pruning or removal required to address this issue.

Figure 7.21: Golden Grove Rd / Oratanga Road Intersection

7.1.18 Golden Grove Road / Hazel Grove

There were a total of 9 crashes at this junction for the period 2005 – 2009,with 4 of these crashes resulting in casualties and as such this location does meet the Black Spot criteria, however there are some 250 other unsignalised locations with a poorer safety record over the same period. Of the total crashes, 4 were right angle and 4 were rear end type crashes.

Three of the rear end crashes (one of which resulted in casualty) were on the northern approach to the junction and were the result of a motorist slowing down to turn left into Hazel Grove being hit from a following vehicle.

All of the right angle crashes (with 2 resulting in casualties) involved a vehicle heading southbound hitting a vehicle exiting Hazel Grove (2 were turning left onto Golden Grove Road and 2 were turning right onto Golden Grove Road).

No obvious issues were identified in relation to the physical road infrastructure at this location, rather the crashes have resulted from poor driver behaviour. Consideration could be given to installing an advance street name sign to alert drivers unfamiliar to the area with the presence of the side road junction.

Figure 7.22: Golden Grove Rd / Hazel Grove Intersection

7.1.19 Golden Grove Road / Rawlings Road

There were a total of 4 crashes at this junction in the period 2005 – 2009, with 2 of these crashes resulting in casualties. As such, this site does not meet the Black Spot criteria.

Of the four recorded crashes, there was no consistent crash pattern identified.

Given the above, and the existing standard channelised right turn treatment and right turn storage on Golden Grove Road, no further treatments are considered warranted at this time.

Figure 7.23: Golden Grove Rd / Rawlings Road Intersection

7.1.20 Golden Grove Road / Dewer Avenue

There were 5 crashes recorded at this junction for the period 2005 – 2009, with 3 of the crashes resulting in injury and as such this location does meet the Black Spot criteria, however there are some 395 other unsignalised locations with a poorer safety record over the same period.

Four of the crashes were right angle type crashes. All of these involved a southbound vehicle. There are no obvious factors contributing to the crashes at this location, and given the low crash rate there are no plans to undertake any works at this location at this time.

Figure 7.24: Golden Grove Rd / Dewer Avenue Intersection

7.1.21 Golden Grove Road / Gold Court

There was only one crash recorded at this junction for the period 2005 – 2009 which involved a rear end type collision in the left turn merge lane from North East Road.

Given the low crash history at this junction, no works are proposed for this site.

Figure 7.25: Golden Grove Rd / Gold Court Intersection

7.1.22 Golden Grove Road / North East Road

There were a high number of crashes (34) recorded at this signalised intersection for the period 2005 – 2009, with 3 of the crashes resulting in injury and as such this location does meet the Black Spot criteria, however there are some 300 other signalised locations with a poorer safety record over the same period.

The recorded crashes are primarily the rear end type crashes (21), with hit fixed object (6) and right angle (4) type being the other consistent crash patterns.

Given the high incidence of rear end crashes, consideration will be given to installing mast arms on the arterial road approaches to the intersection.

In the longer term, consideration should be given to installing two left turn lanes from North East Road into Golden Grove Road. There currently exists a right turn capacity issue for North East Road on both the eastern and western approaches during peak hours and during business hours that currently affects the safety and efficiency of the intersection. Installation of two right turn lanes on both the eastern and western approaches of North East Road should be considered in conjunction with any other upgrades at this site, which may include future expansion of the shopping centre. Further traffic modelling, based on projected traffic volumes, will need to be undertaken to determine the scale of any major upgrade to this intersection.

Figure 7.26: Golden Grove Rd / North East Road Intersection

7.2 RECOMMENDATION FOR MID BLOCK SECTIONS

7.2.1 One Tree Hill Road to Greenwith Road

There have only been 3 crashes recorded along this section of road for the period 2005 – 2009, with none of these involving injury.

Given the very low number of crashes recorded along this section of road, there are no specific recommendations for this section of road.

Figure 7.27: Golden Grove Road - One Tree Hill Road to Greenwith Road

7.2.2 Greenwith Road to The Grove Way / Yatala Vale Road

There were 5 recorded crashes, including 4 injury crashes, along this section of road for the period 2005 – 2009. Two of these crashes relate to queuing on the northern approach to the intersection with The Grove Way / Yatala Vale Road.

Given there are no consistent types of crashes occurring, there are no recommendations for any specific treatments along this section of Golden Grove Road, apart from implementing the standard 'mid block treatment' as identified in Figure 5.2.

Figure 7.28: Golden Grove Road - Greenwith Road to The Grove Way / Yatala Vale Road

7.2.3 The Grove Way / Yatala Vale Road to Park Lake Drive

There were 11 crashes recorded along this section of road for the period 2005 – 2009, with 3 of these crashes resulting in injury.

Five of these crashes, including 2 injury crashes, are caused by queuing on the southern approach to the intersection of Golden Grove Road and The Grove Way / Yatala Vale Road.

It should be noted that there were no crashes on the section of road from Highgrove Road to Park Lake Drive.

A site inspection revealed that some of the road shoulders through this section are unsealed. It is recommended that the standard treatment shown in Section 5.1 (refer Figure 5.2) is implemented.

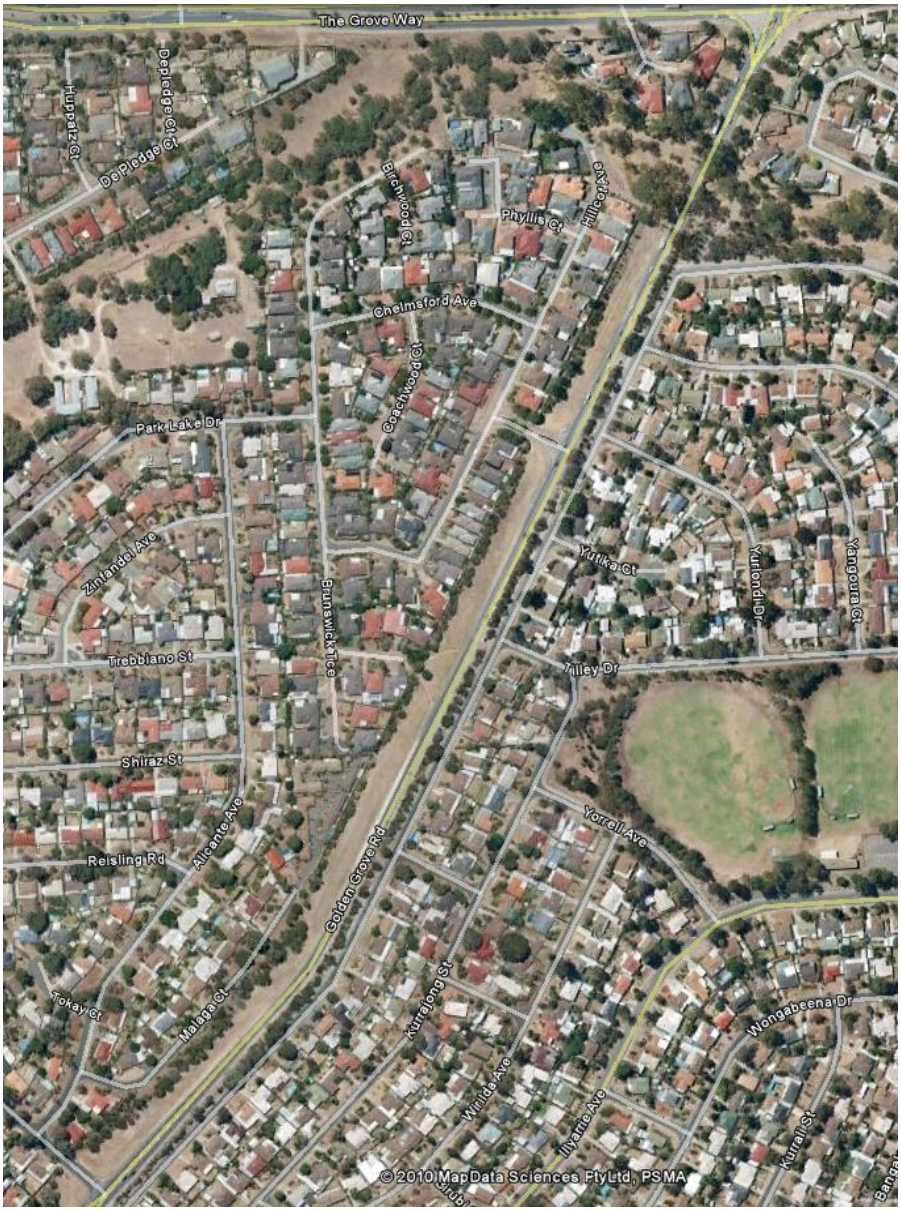

Figure 7.29: Golden Grove Road - The Grove Way / Yatala Vale Road to Park Lake Drive

7.2.4 Park Lake Drive to Grenfell Road (east)

This section of road had 10 crashes (3 with injury) for the period 2005 – 2009.

In conjunction with Council the installation of protected right turn lanes, install of a pedestrian refuge and walkthrough and indenting of bus bays was completed in 2006.

There were predominantly right angle crashes (7) along this section of road, with all of the 10 crashes involving vehicles entering or exiting commercial or retail properties.

Given the recent implementation of the treatment as shown below, no further works are proposed at this time.

Figure 7.30: Golden Grove Road - Park Lake Drive to Grenfell Road (east)

7.2.5 Grenfell Road (east) to Grenfell Road (west)

There were only 2 crashes recorded along this short section of road for the period 2005 – 2009.

There are no specific treatments proposed along this section of road at this time, however the proposed installation of traffic signals on Grenfell Road (east) will change the operating conditions on this length of road.

Figure 7.31: Golden Grove Road - Grenfell Road (east) to Grenfell Road (west)

7.2.6 Grenfell Rd (west) to Milne Road (east)

There were 8 recorded crashes, with 4 resulting in injury, along this section of road for the period 2005 – 2009.

Of these crashes, 2 are related to queuing at the intersection of Golden Grove Road and Milne Road (west) and 1 of the injury crashes was related to queuing at the intersection with Milne Road (east).

There are no specific treatments proposed along this section of road at this time.

Figure 7.32: Golden Grove Road - Grenfell Road (east) to Grenfell Road (west)

7.2.7 Milne Rd (east) to Dewer Avenue

There were 6 crashes recorded along this section of road for the period 2005 – 2009, with only 1 of those resulting in injury.

Most of these crashes are related to vehicles accessing properties adjacent to Golden Grove Road. Given the low crash history, no further treatments are recommended at this time.

Figure 7.33: Golden Grove Road - Milne Rd (east) to Dewer Avenue

7.2.8 Dewer Avenue to North East Road

There were a total of 13 crashes, 5 of which resulted in injuries, during the period 2005-2009.

This section is in the busier commercial section of Golden Grove Road, with direct property access to the road. A signalised pedestrian crossing is also located within this section just to the south of Dewer Avenue to service the school located off Gold Court.

The majority (8) of the crashes are related to either queuing from North East Road or merging from the left turn slip lane from North East Road. There was only one rear end type crash associated with stopping at the pedestrian crossing. The remainder of the crashes appear to be associated with vehicles entering or exiting commercial properties along this section of road.

Recommendations for the high number of crashes associated with queuing from North East Road have been identified previously in section 7.1.23. No other treatments are considered warranted at this time.

Figure 7.34: Golden Grove Road - Dewer Avenue to North East Road

7.3 OTHER TRAFFIC MANAGEMENT ISSUES / COMMUNITY CONCERNS

7.3.1 Bus Stop 56

Concerns have been raised by the public associated with the location of Bus Stop 56 on the northbound route. It has been suggested that most bus passengers alighting from the bus walk in a southerly direction, and therefore it was considered that the bus stop should be relocated further south and closer to their destinations.

DTEI will liaise with the Public Transport Services Division (PTSD) to determine possible options for the relocation of the bus stop.

7.3.2 Bus Stop 53

Concerns have been raised by the public associated with the condition of Bus Stop 53 which is located immediately north of The Grove Way intersection, and opposite the MFS facilities. The concern was related to the lack of sealing of the bus stop and the lack of a suitable place to walk along the roadway.

As per Section 5 “long term vision” and Figure 5.1 the recommended cross-section proposes indented sealed bus bays and footpaths should be provided (by Council) along Golden Grove Road.

7.3.3 Horse SA

Horse SA (the umbrella organisation for the recreation and sporting horse community and industry) has raised concerns relating to the existing horse trails and paths located along Golden Grove Road. The area of Golden Grove is home to a number of horse establishments and there are dedicated horse paths/routes through the areas of Golden Grove and Salisbury.

Concerns have been raised as to the ability for horses and riders to travel/ride safely from their establishments to these trails.

Refer to the concept sketch, Figure 7.35, that indicates the location of the horse trails.

DTEI will investigate allowances for safe and appropriate roadside riding areas and the location for crossing Golden Grove Road.

7.3.4 Speed Limits

Letters have been received requesting that the 70kph speed limit between Grenfell Road and Milne Road be reduced to 60kph; for consistency with adjacent speed limits and to improve safety on that section of Golden Grove Road.

DTEI does not support the reduction of the speed limit at this time.

7.3.5 Footpaths, kerbing and drainage

Council is responsible for the installation of footpaths, kerbing and drainage on all roads within its Council area. There are therefore no specific recommendations related to the provision of these facilities in the RMP.

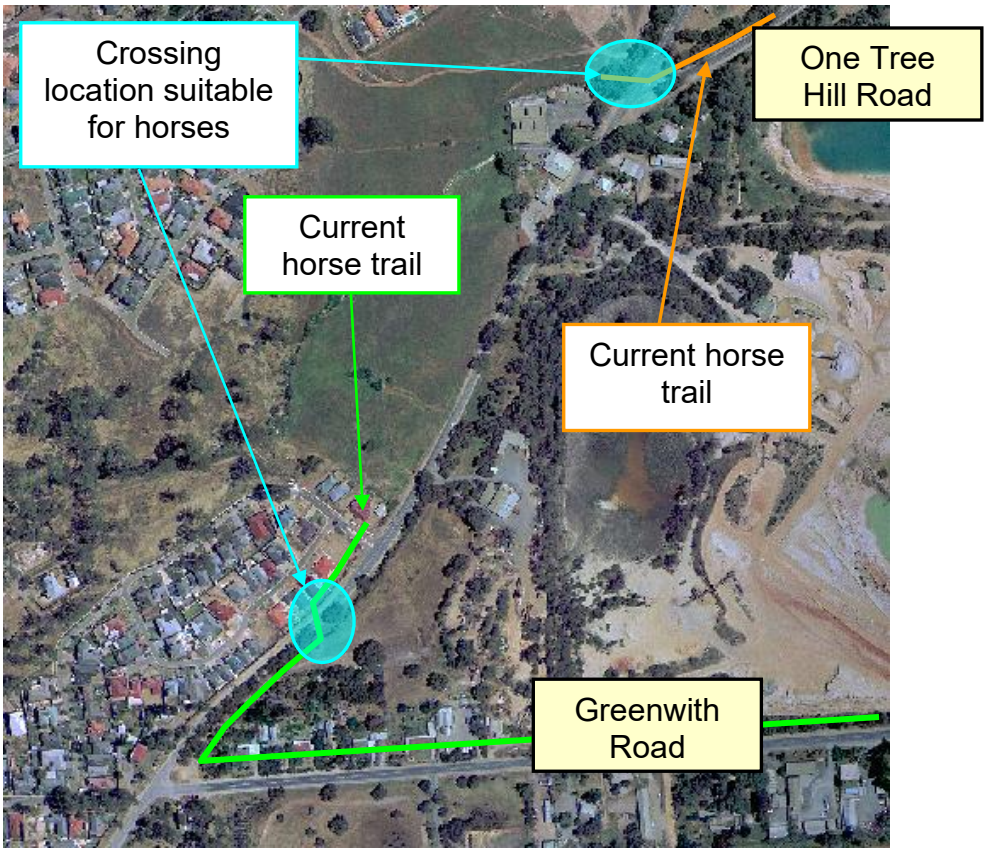

Figure 7.35: Concept Sketch for horse trails

Council have previously requested that the RMP identify the need for kerbing, stormwater drainage and footpaths at the following locations on Golden Grove Road:

- The Grove Way to Kunzea Way
- Einstein Drive to John Road
- Satsuma Crescent to One Tree Hill Road

DTEI will endeavour to work with Council to coordinate any future upgrading works along these sections of road.

7.3.6 Greenwith Road

Greenwith Road has a number of large trucks accessing industrial areas along its length, including PGH and Austral Bricks.

Trucks turn right into and left out of Greenwith Road. Concerns have been raised with regard to the poor condition of the pavement and the difficulties trucks have turning left from Greenwith Road.

This site has been identified as having a moderate number of crashes and treatments to address safety and operational concerns have been recommended in this report (refer to 7.1.3).

8 TREATMENT SUMMARY

A number of traffic management and road maintenance improvements have been recommended in this report. The recommendations are summarised in the following tables. Also included in the table is a priority rating for each of the recommendations.

Three levels of priority are indicated: high (red), medium (orange) and low (yellow).

The priority of treatments has been determined based on:

- Safety benefits, particularly those that improve safety for vulnerable road users (eg pedestrians and cyclists)
- Benefit / cost
- Operational benefits

8.1 MIDBLOCK TREATMENTS

ROAD SECTION	TREATMENT	PRIORITY
One Tree Hill Road to Greenwith Road	• Undertake pavement widening, install painted median where direct access to adjacent properties is required, indent and seal bus bays and install on-road bicycle lanes. • Investigate removal / protection of hazards within 5m from edge of road.* • Refer Section 5, Figures 5.1 and 5.2. • Investigate options and provide suitable facilities for the safe crossing of Golden Grove Road for horses.	**Low**
Greenwith Road to The Grove Way / Yatala Vale Road	• Undertake pavement widening, install painted median where direct access to adjacent properties is required, indent and seal bus bays and install on-road bicycle lanes. • Investigate removal / protection of hazards within 5m from edge of road.* • Refer to standard (Section 5, Figures 5.1 and 5.2).	**Low**
The Grove Way / Yatala Vale Road to Park Lake Drive	• Undertake pavement widening, indent and seal bus bays, and install on-road bicycle lanes. • Investigate removal / protection of hazards within 5m from edge of road.* • Refer Section 5, Figures 5.1 and 5.2.	**Low**
Park Lake Drive to Grenfell Road (west)	• In conjunction with Council, installation of protected turning lanes, install pedestrian refuge, install pedestrian walkthrough, and indented bus bay was completed 2006. • No further recommendations for this section of road. • Investigate removal / protection of hazards within 5m from edge of road.*	**Low**
Grenfell Road (east) to Grenfell Road (west)	• Continue to monitor. • Possible changes to this midblock section resulting from the installation of signals at Grenfell Rd (east)	**Low**
Grenfell Road (west) to Milne Road (east)	• Currently the 70kph speed limit is to be retained. Traffic Investigations currently supports the retention of the 70kph speed limit along this section of road based on the following criteria: 1-there is no direct development access to this section of road 2-the access points to development have provisions for sheltered right turns from Golden Grove Rd. • Upgrade existing median walkthroughs and pedestrian facilities at the traffic signals for compliance with DDA requirements. • Install “no u-turn” signs at all median openings without sheltered turning lanes, to improve safety and traffic flow • Investigate removal / protection of hazards within 5m from edge of road. • Refer Section 5, Figures 5.1 and 5.2.	**Medium**

Milne Road (east) to Dewer Avenue	• Upgrade existing median walkthroughs and pedestrian facilities at the traffic signals for compliance with DDA requirements. • Install “no u-turn” signs at all median openings without sheltered turning lanes, to improve safety and traffic flow • Investigate removal / protection of hazards within 5m from edge of road. • Refer Section 5, Figures 5.1 and 5.2.	**Medium**
Dewer Avenue to North East Road	• Upgrade existing median walkthroughs and pedestrian facilities at the traffic signals for compliance with DDA requirements. • Install “no u-turn” signs at all median openings without sheltered turning lanes, to improve safety and traffic flow • Refer Section 5, Figures 5.1 and 5.2.	**Medium**

8.2 INTERSECTIONS / JUNCTIONS

INTERSECTION / JUNCTION	TREATMENT	PRIORITY
One Tree Hill Road (roundabout)	• Install advanced warning sign on the northern approach to the roundabout. • Replace guard rail fence on the southern exit lane of the roundabout.	**Low**
Satsuma Crescent	• Implement channelised right turn treatment – there is currently enough road width to provide this treatment (proactive safety measure)	**Low**
Greenwith Road	• Stop bar to be marked on the Greenwith Road approach. • Implement channelised right turn treatment – this will possibly require road widening. • Investigate clearing of vegetation and the removal of the embankment to improve site distances at the junction. • Consider installation of safety bars and upgrade delineation on the Greenwith approach to the junction.	**Low**
John Road	• Junction be relined and marked.	**High**
Hancock Road	• Implement channelised right turn treatment. • Investigate the options of either realigning the junction or implementing a roundabout.	**Low**
Einstein Drive	• Implement channelised right turn treatment. • Provide narrow back to back median to assist with delineation and allow 2 openings; one for Garden Grove and one for access to Einstein Drv.	**Medium**
Kunzea Way	• Formalise auxiliary lane as a right turn slot – provide channelised right turn treatment – there is currently enough road width to do this. •	**Low**
The Grove Way / Yatala Vale Road	• Extra exclusive right turn lane on the western approach. • Extra right turn lane requires an extra exit lane on the southern leg of the intersection – implications include the widening of the southern leg on the western side and the widening of a culvert. • Resulting from an extra exit lane on the southern leg requiring to have a merge (length to be determined) consideration also needs to be given to the location of bus stop 53 (eastern side of southern leg) located just north of the culvert – it is a hazard if this bus bay is close to a merging point for vehicles so may need to be relocated.	**Medium**
High Grove	• Formalise right turn bay on Golden Grove Rd – channelised right turn treatment – there is currently enough road width to do this •	**Low**
Grenfell Road (east)	• Signalise the intersection with 2 right turn lanes (fully controlled) on the southern and eastern approaches. • Fully control (with signals) the left turn from the east for safety. • Alter the left turn from the north to be a high entry angle left turn and remove the continuous lane.	**Medium**

Grenfell Road (west)	• Upon signalisation of eastern approach – fully control the left turn from the west. •	**Low**
McPharlin Avenue	• Provide storage in median for right turners from McPharlin Ave. •	**High**
Maughan Avenue	• Extension of right turn lane on Golden Grove Rd. • Provision of right turn storage in median on Golden Grove Rd for right turners from Maughan Ave	**Low**
Milne Road (west)	• Installation of mast arm to increase visibility for vehicles on the northern approach. • Change in traffic signal program to include red run counting – this is to be monitored for the possible provision of safety camera. • Full time right turn control from the north. • Partial right turn control is an option is we cannot provide enough right turn storage at the intersection for full control – further modelling required.	**High**
Milne Road (east)	• Consider installation of mast arm to increase visibility for vehicles. • Full time right turn control for the right turn from the south. • Partial right turn control is also an option if adequate right turn storage cannot be provided for full time right turn control. •	**High**
Oratanga Road	• Consider removal of vegetation. • Provide storage area on Golden Grove Rd for right turners from Oratanga Rd. •	**Medium**
Hazel Grove	• Consider provision of right turn storage on Golden Grove Rd for right turners from Hazel Grv.	**Medium**
North East Road	• Consider installation of mast arm to increase visibility for vehicles – particularly on the northern approach. • Consider skid resistance testing on the eastern and northern approaches. •	**Low**

9 CONCLUSIONS

This RMP has made a number of recommendations to address the operational and safety issues that have been identified along Golden Grove Road.

All of the proposed recommendations are conceptual only, and will therefore require further development and consultation with the City of Tea Tree Gully and the community prior to any proposed implementation.

Importantly, whilst this plan proposes longer-term intentions for traffic management along Golden Grove Road, funding commitments to the initiatives detailed in this plan are subject to normal budgetary processes and priorities.

Initially, implementation of the recommendations are likely to be limited to the higher priority more cost effective treatments that target specific sites with higher crash rates. The design of specific treatments will aim at consistency with and target the longer-term functional outcomes outlined in the RMP.

APPENDIX A – INTERSECTION CRASH DATA

Sect.	Mid-Block Section	Crash Type	PDO $3000+	Casualty	2005	2006	2007	2008	2009	Total
1	One Tree Hill Road/ Kings Avenue	Hit Fixed Object	3	-	1	-	1	-	1	3
		Rear End	1	1			1	1		2
		Left Rd – Out Of Control	1	-	-	-	-	1	-	1
		Total	**5**	**1**	**1**		**2**	**2**	**1**	**6**
1	Ross Road	Hit Pedestrian	-	1					1	1
		Total	**-**	**1**					**1**	**1**
1	Satsuma Crescent	Right Angle	1	-			1			1
		Total	**1**				**1**			**1**
1	Greenwith Road	Rear End	-	-	-	-				
		Right Turn	-	1			1			1
		Total	**-**	**1**			**1**			**1**
1	John Road	Right Angle	2	1	-	-	-	3	-	3
		Hit Fixed Object	2	2	-	-	-	1	3	4
		Total	**4**	**3**	**-**	**-**	**-**	**4**	**3**	**7**
1	Hancock Road	Right Angle	2	-	-	1	-	1	-	2
		Hit Fixed Object	1	-	-	-	-	1	-	1
		Total	**3**	**-**	**-**	**1**	**-**	**2**	**-**	**3**
1	Einstein Drive	Right Angle	-	2	-	1	1	-	-	2
		Rear End	-	1	1	-	-	-	-	1
		Right Turn	-	1	1	-	-	-	-	1
		Head On	-	1	-	-	1	-	-	1
		Total	**-**	**5**	**2**	**1**	**2**	**-**	**-**	**5**
1	Kunzea Way	Right Angle	-	1	-	-	-	1	-	1
		Total	**-**	**1**	**-**	**-**	**-**	**1**	**-**	**1**
1	The Grove Way / Yatala Vale Road	Right Turn	5	1	2	-	3	-	2	6
		Rear End	1	4	1	1	1	-	2	5
		Right Angle	-	2	1	-	1	-	-	2
		Head On	1	-	-	1	-	-	-	1
		Hit Fixed Object	2	-	1	-	1	-	-	2
		Side Swipe	1	-	1	-	-	-	-	1
		Total	**11**	**8**	**7**	**2**	**6**	**-**	**4**	**17**
2	High Grove Road	Rear End	1	-	-				1	1
		Total	**1**	**-**	**-**				**1**	**1**
2	Park Lake Drive	Rear End	1	-					1	1
		Total	**1**	**-**					**1**	**1**
2	Grenfell road (East)	Right Angle	3	-	1	1	-	-	1	3
		Rear End	4	1	2	1	-	-	2	5
		Right Turn	2	4	-	1	3	1	1	6
		Hit Fixed Object	1	-	-	1	-	-	-	1
		Side Swipe	-	1	-	-	-	-	1	1
		Total	**10**	**6**	**3**	**4**	**3**	**1**	**5**	**16**
3	Grenfell Road (West)	Right Turn	6	8	9	-	3	-	2	14
		Rear End	6	3	1	1	1	2	4	9
		Hit Fixed Object	4	1	-	1	-	3	1	5
		Side Swipe	1	-	-	-	1	-	-	1
		Total	**17**	**12**	**10**	**2**	**5**	**5**	**7**	**29**

3	McPharlin Avenue	Right Angle	1	5	2	1	-	2	1	6
		Rear End	-	1	-	-	-	1	-	1
		Roll Over	1	-	-	-	-	1	-	1
		Side Swipe	-	1	-	-	-	-	1	1
		Total	**2**	**7**	**2**	**1**	**-**	**4**	**2**	**9**
3	Maughan Avenue	Right Angle	-	1		1				1
		Rear End	1	-				1		1
		Side Swipe	-	1				1		1
		Total	**1**	**2**		**1**		**2**		**3**
3	Milne Road (West)	Right Turn	9	5	3	-	4	2	5	14
		Rear End	11	3	4	4	2	4	-	14
		Right Angle	6	4	3	1	4	1	1	10
		Hit Fixed Object	2	-	-	-	1	-	1	2
		Side Swipe	1	-	-	1	-	-	-	1
		Other								
		Total	**29**	**12**	**10**	**6**	**11**	**7**	**7**	**41**
3	Milne Road (East)	Right Turn	9	6	4	5	1	3	2	15
		Rear End	4	-	1	1	1	-	1	4
		Right Angle	4	1	-	-	2	-	3	5
		Hit Fixed Object	2	-	-	-	1	1	-	2
		Head On	1	-	-	-	1	-	-	1
		Total	**20**	**7**	**5**	**6**	**6**	**4**	**6**	**27**
3	Jack High Lane	Rear End	1	-	-	-	-	1	-	1
		Total	**1**					**1**		**1**
3	Oratanga Road	Rear End	1	-	1	-	-	-	-	1
		Right Angle	1	1	-	1	1	-	-	2
		Hit Fixed Object	1	-	1	-	-	-	-	1
		Total	**3**	**1**	**2**	**1**	**1**	**-**	**-**	**4**
3	Hazel Grove	Rear End	3	1	-	2	-	-	2	4
		Right Angle	2	2	1	-	2	1	-	4
		Right Turn	-	1	-	-	-	-	1	1
		Total	**5**	**4**	**1**	**2**	**2**	**1**	**3**	**9**
3	Rawlings Road	Right Angle	1	-	-	-	-	1	-	1
		Hit fixed Object	-	1	-	1	-	-	-	1
		Side swipe	1	-	-	1	-	-	-	1
		Rear End	-	1	-	-	-	1	-	1
		Total	**2**	**2**	**-**	**2**	**-**	**2**	**-**	**4**
3	Dewer Avenue	Right Angle	2	2	2	-	1	-	1	4
		Rear End	-	1	-	-	-	-	1	1
		Total	**2**	**3**	**2**	**-**	**1**	**-**	**2**	**5**
3	Gold Court	Rear End	1	-	-	-	-	-	1	1
		Total	**1**	**-**					**1**	**1**
3	North East Road	Rear End	19	2	5	2	4	6	4	21
		Side Swipe	2	-	1	1	-	-	-	2
		Right Angle	3	1	1	2	1	-	-	4
		Hit Fixed Object	6	-	2	-	1	2	1	6
		Right Turn	1	-	-	-	-	1	-	1
		Total	**31**	**3**	**9**	**5**	**6**	**9**	**5**	**34**

APPENDIX B – MID BLOCK CRASH DATA

Sect.	Intersection	Crash Type	PDO $3000+	Casualty	2005	2006	2007	2008	2009	Total
1	Kings Avenue/One Tree Hill Road – Ross Road									
		Total								**0**
1	Ross Road-Satsuma Crescent									
		Total								**0**
1	Satsuma Crescent-Greenwith Road	Hit Fixed Object	1	1	-	-	-	2	-	2
		Total	**1**	**1**				**2**		**2**
1	Greenwith Road-John Road	Hit Pedestrian	-	1	-	-	-	-	1	1
		Total	**-**	**1**					**1**	**1**
1	John Road – Hancock Road	Hit Fixed Object	1	-	-	1	-	-	-	1
		Total	**1**	**-**		**1**				**1**
1	Hancock Road – Einstein Drive	Head on	-	1		1				1
		Total		**1**		**1**				**1**
1	Einstein Drive – Kunzea Way									
		Total								
1	Kunzea Way – The Grove Way/Yatala Vale Road	Rear End	-	1	-	-	-	-	1	1
		Side Swipe	-	1	1		-	-	-	1
		Total	**-**	**2**	**1**				**1**	**2**
2	The Grove Way/Yatala Vale Road – Highgrove Road	Rear End	4	2	3	-	1	1	1	6
		Hit Fixed Object	3	-	2	-	-	-	1	3
		Side Swipe	1	1	1	-	-	-	1	2
		Total	**8**	**3**	**6**	**-**	**1**	**1**	**3**	**11**
2	Highgrove Road – Park Lake Drive									
		Total								
2	Park Lake Drive-Grenfell Road (East)	Right Angle	5	2	-	1	4	2	-	7
		Side Swipe	1	-	1	-	-	-	-	1
		Rear End	1	1	-	-	2	-	-	2
		Total	**7**	**3**	**1**	**1**	**6**	**2**	**-**	**10**
2	Grenfell Road (East) – Grenfell Road (West)	Rear End	1	-	-	-	-	-	1	1
		Hit Pedestrian	-	1	-	-	1	-	-	1
		Total	**1**	**1**	**-**	**-**	**1**	**-**	**1**	**2**
3	Grenfell Road (west) – McPharlin Avenue	Hit Parked Vehicle	1	-					1	1
		Hit Fixed Object	-	1					1	1
		Total	1	**1**					2	2
3	McPharlin Avenue – Maughan Avenue	Hit Fixed Object	1	-			1			1
		Total	1	-			1			**1**
3	Maughan Avenue – Milne Road (west)	Rear End	1	1	1	-	-	1	-	2
		Head On	-	1	1	-	-	-	-	1
		Side Swipe	1	-	-	-	-	1	-	1
		Total	2	**2**	2	**-**	**-**	2	**-**	**4**

3	Milne Road (west) – Milne Road (east)	Rear End		1				1		1
		Head on								
		Total		**1**				**1**		**1**
3	Milne Rd (east) – Jack High Lane	Rear End	1	-			1			1
		Roll Over	-	1		-	1			1
		Side Swipe	1	-					1	1
		Total	**2**	1			2		1	3
3	Oratanga Road – Hazel Grove									
		Total								**0**
3	Hazel Grove - Rawlings Road	Rear End	1	-	-	-	-	1	-	1
		Right Angle	1	-	-	-	-	-	1	1
		Total	2	**-**	-	-	**-**	1	1	**2**
3	Rawlings Road – Dewer Avenue									
		Total								**0**
3	Dewer Avenue – Gold Court	Rear End	1	1	-	-	1	-	1	2
		Total	**1**	**1**	**-**	**-**	`	-	1	**2**
3	Gold Court – North East Road	Rear End	5	2	3	-	3	-	1	7
		Right Angle	1	2	2	-	-	1	-	3
		Hit fixed Object	1	-	1	-	-	-	-	1
		Total	**7**	**4**	6	**-**	**3**	**1**	1	**11**