ROAD MANAGEMENT PLAN
EDITION 2
(SHORT TO MEDIUM TERM)

MAIN ROAD (RN6452)

(Belair Road to Shepherds Hill Road)

SHEPHERDS HILL ROAD (RN6467)

(Main Road to Seymour Street)

February 2015

Transport Services Division

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Government of South Australia
Department of Planning, Transport and Infrastructure

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Department of Planning,
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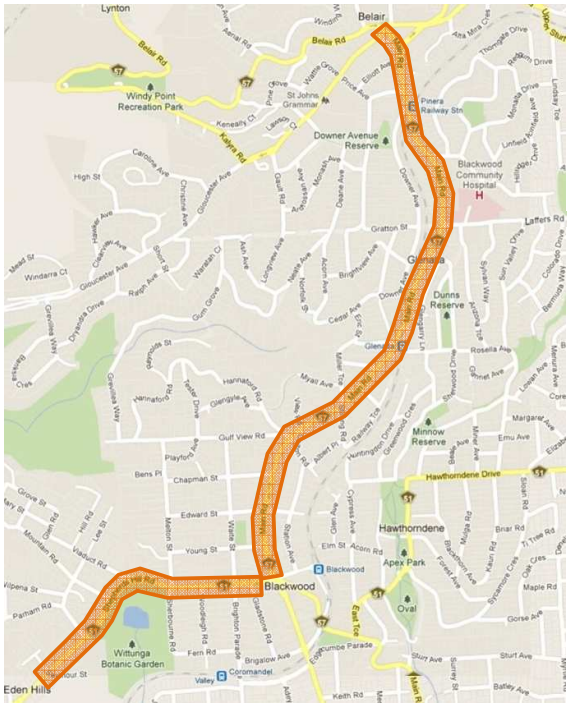
Date	Revisions	Amended by
26/02/2014	Council feedback	C Taylor
27/01/2015	Updated Crash Data / rankings and all references and tables	S Hartland
02/02/2015	All traffic volume info updated where possible	S Hartland
02/02/2015	All figures and tables within report updated	S Hartland
02/02/2015	General formatting updates	S Hartland
02/02/2015	Blackspot funding requirements updated	S Hartland
11/02/2015	Junction of Main Road and Rosella Ave and Shepherds Hill Road and Gladstone Road to Brighton Parade / Waite Street midblock section removed from intersection crash table – no recorded crashes 2009 to 2013	S Hartland
13/02/2015	Junction of Main Road and Gulfview Rd, Mid-block sections Southern Ave to McDonald Ave and Colton Rd to Gulfview Rd deleted from document due to recorded crashes no longer warranting investigation.	S Hartland
13/02/2015	Intersection of Main Road/ Monalta Drive, Miller Terrace, Colton Road, Chapman Street and Wilpena Road were all reviewed and included in report as 2 or more crashes were recorded.	S Hartland
20/02/2015	Community Feedback added as Appendix	M Elsworthy

EXECUTIVE SUMMARY

Edition 2 of the RMP provides an update to the original RMP prepared in 2006. The intent of this revision is to review the progress of the implementation of the original recommendations made in the 2006 RMP, update the crash statistics to the most recent five year period and re-assess and modify where appropriate any recommendations in the RMP.



The study corridor comprises Main Road, from Belair Road to the Blackwood Roundabout, and Shepherds Hill Road, from the Blackwood Roundabout to Seymour Street as illustrated in the adjacent figure.

Since the release of the 2006 RMP DPTI has delivered numerous infrastructure and safety upgrades along the study corridor. Below summarises the infrastructure and safety upgrades that have occurred in the area since the 2006 RMP;

⇒ **Speed limit reduced to 50kph**

- Main Road, from the Blackwood Roundabout to Burfield Street
- Shepherds Hill Road, from the Blackwood Roundabout to Sherbourne Road

⇒ **New bicycle lanes and upgraded bicycle infrastructure**

- Main Road, Sheoak Road to Elliott Avenue
- Main Road, Southern Avenue to Chapman Street
- Existing bicycle lanes upgraded at junctions with continuity line markings to improve delineation for cyclists at the junction
- Shepherds Hill Road, bicycle lane operating times updated to have consistent times of operation

⇒ **New Pedestrian Actuated Crossing (PAC) near Russell Street**

⇒ **New pedestrian refuges**

- Main Road, between Southern Avenue and McDonald Avenue
- Main Road, between Gulfview Road and Chapman Street

⇒ **Upgraded and new mid-block treatments**

- Upgrade of crash barrier at the Viaduct Road junction
- Raised pavement bars between Gloucester Avenue and Sheoak Road
- Painted median implemented from Southern Avenue to Chapman Street including road lighting upgrades
- Indented bus bay opposite Parham Road (southbound carriageway)

⇒ **Upgrades to intersections along the study corridor**

- Channelised right turn lane into Wittunga Botanic Park
- Miller Terrace / Stirling Road intersection upgraded to formalise a staggered arrangement
- Rosella Avenue centre median alterations to improve safety at the level crossing

- Russell Street junction upgraded as part of the installation of the PAC and relocation of the pedestrian refuge on Russell Street to be located further away from the junction to improve pedestrian safety
- New advanced direction signs on three of the approaches to the Blackwood Roundabout (Main Road north and south and Coromandel Parade)
- Channelised right turn lanes into McDonald Avenue, Burfield Street, View Road, Colton Road, Gulfview Road and Chapman Street (as part of the painted median scheme)

⇒ **Upgrades to public transport infrastructure within the area**

- Belair passenger rail line re-sleepered
- Rebuild of the Belair Interchange heritage building and upgrade to the car park facility at the Blackwood Interchange including lighting improvements and the installation of CCTV camera's
- Rebuild of the Coromandel and Eden Hills train stations
- Upgrade to the car park facility adjacent the Glenalta Railway Station
- Construction of pedestrian overpass at the Blackwood Interchange, passing over the interstate freight line

Key findings from the review of current traffic data and crash statistics, as well as site investigations are summarised below. **It should be noted that on the 1st of January 2013 the minimum value for recording PDO crashes has increased to $5000 (up from ($3000) and this should be considered when directly comparing crashes occurring over different years.**

⇒ Overall traffic volumes have remained reasonably consistent; Average Annual Daily Traffic (AADT) flows varied by around 1% to 2%

⇒ Overall crash rate has reduced by 43% since the 2006 RMP; the number of casualty crashes that occurred along mid-block sections and at intersections decreased by 23% and 9% respectively since the 2006 RMP, with an overall reduction in casualty crashes of 13% along the study corridor

⇒ Laffers Road has experienced an 87% reduction in crashes with a 5% decrease in traffic flows at the junction

⇒ Blackwood Roundabout has experienced a reduction in crashes by approximately 59% since the 2006 RMP, with a 63% reduction in rear end crashes and a 73% reduction in side swipe crashes. Albeit this location maintains a relatively high number of crashes with a total of 48 reported crashes, with six of these being casualty crashes. The recommended treatment of upgrading the geometry of the roundabout provides a balanced short-medium term outcome for the intersection; accounting for the fact that this location needs to cater for high traffic flows through the intersection, access to the surrounding land use and bus circulation routes as well as being located within a pedestrian precinct.

⇒ DPTI considers the following locations to be of high priority based on the high number of casualty crashes recorded during the five year period 2009 to 2013. As such planning work, detailed concept development and design will be undertaken for the treatments recommended in this report and the projects will be submitted for funding and assessed on a state-wide basis;

- Main Road / Russell Street (12 casualty crashes)
- Main Road / Downer Avenue (7 casualty crashes)
- Blackwood Roundabout (6 casualty crashes)
- Shepherds Hill Road / Brighton Parade / Waite Street (8 casualty crashes)
- Shepherds Hill Road / Sherbourne Road / Melton Street (5 casualty crashes)
- Main Road: Monalta Drive to Laffers Road (5 casualty crashes)

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GLOSSARY

AADT	Average Annual Daily Traffic – The number of axle pairs crossing at a specific site per year and dividing this number by 365
Casualty Accident	An accident where at least one fatality, serious injury or minor injury occurs
DDA	Disability Discrimination Act 1992
DPTI	Department for Planning, Transport and Infrastructure
DUI	Driving under the influence of alcohol
Fatal Crash / FAT	An accident for which there is at least one fatality
Fatality	A person who dies within 30 days of an accident as a result of injuries sustained in that accident
Intersection	Place where two or more roads cross
Junction	Place where two or more roads meet
MARWP	Metropolitan Area Road Widening Plan
PAC	Pedestrian Actuated Crossing
Pedestrian Refuge	An island in a carriageway set aside for the exclusive use of pedestrians
PDO	Property damage only, where the estimated damage was greater than $3000
RMP	Road Management Plan

1. OVERVIEW

This Road Management Plan (RMP) provides an overview of the existing operational and safety issues and provides recommendations for traffic management improvements on Main Road / Shepherds Hill Road in the southern suburbs of Adelaide.

It should be noted that this RMP is not intended to address potential longer term and major road improvement needs (e.g. the addition of extra travel lanes or duplication) resulting from future residential, tourist and industrial development. The RMP instead focuses on identifying potential short to medium term road improvement needs to improve safety and traffic operations of the existing roads.

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 key stakeholders
- Information gained from the local community through communications with the department

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; including the draft *Integrated Transport and Land Use Plan* (ITLUP), *Road Safety Strategy*, *Cycling Strategy* and *The 30-Year Plan for Greater Adelaide*
- Role and function of the road; *A Functional Hierarchy for South Australia's Land Transport Network*
- Needs of all modes of transport including, freight, cars, buses, bicycles and pedestrians
- Community and stakeholder needs and expectations
- Ensuring that any treatments are consistent with known longer term plans for the road or area
- Application of appropriate standards and guidelines to ensure safety, consistency and effectiveness of any proposed treatments

This RMP will form the basis for discussion and comments with Mitcham Council, stakeholders and the broader community with a view to further develop the plan.

It should be noted that whilst the RMP proposes a number of recommended traffic management improvements, 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.

1.1 ROAD MANAGEMENT PLAN EDITION 2 UPDATES

This RMP provides an update to the original road management 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 re-assess and modify where appropriate the recommendations based on analysis of the most recent transport data. Accordingly, the data used for the 2006 RMP is now superseded.

Since the release of the 2006 RMP report the following has been installed:

Main Road

- Main Road / Miller Terrace / Stirling Road staggered intersection
- Main Road / Rosella Avenue centre median alterations
- Main Road / Russell Street Pedestrian Actuated Crossing (PAC) and associated road lighting upgrade
- Installation of raised pavement bars on Main Road between Gloucester Avenue and Sheoak Road
- Main Road pedestrian refuge between Southern Avenue and McDonald Avenue (as part of painted median scheme)
- Main Road pedestrian refuge between Stirling Road and View Road
- Main Road pedestrian refuge between Gulfview Road and Chapman Street (as part of painted median scheme)
- Main Road pedestrian refuge between Chapman Street and Edward Street
- Main Road painted median from Southern Avenue to Chapman Street which included channelised right turn lanes into all local roads along this section
- Main Road bicycle lane from Southern Avenue to Chapman Street
- Main Road bicycle lane from Sheoak Road to Elliott Avenue
- Reduced speed limit from the Blackwood Roundabout to just south of Burfield Street
- Advanced direction signs on three of the approaches to the Blackwood Roundabout (Main Road north and south and Coromandel Parade)
- Blackwood Interchange upgrade including a rebuild of the heritage building, lighting upgrade and installation of CCTV cameras in the car park as well as the construction of a pedestrian overpass across the interstate freight line.
- Upgrade to car park facility adjacent the Glenalta Railway Station
- Belair passenger line re-sleepered

Shepherds Hill Road

- Shepherds Hill Road channelised right turn lane into Wittunga Botanic Park
- Speed limit reduced to 50kph on Shepherds Hill Road from the Blackwood Roundabout to just east of Sherbourne Road
- Bicycle lanes along Shepherds Hill Road updated to have consistent times of operation
- Bicycle lanes along Shepherds Hill Road upgraded at junctions with continuity line markings to improve delineation for cyclists at the junctions
- Upgrade of crash barrier at the Viaduct Road junction
- Indented bus bay opposite Parham Road (southbound carriageway)
- Rebuild of the Coromandel train station
- Rebuild of the Eden Hills train station

2. EXISTING ROAD ENVIRONMENT

2.1 General Description

This report focuses on a section of Main Road (Belair Road to Blackwood roundabout) and Shepherds Hill Road (Seymour Street to Blackwood roundabout), located in the southern hills of Adelaide. The roads are located within the City of Mitcham.

Main Road provides a connection between the City (via Belair Road and Old Belair Road) to Blackwood and other southern suburbs. Main Road consists of sections of two lane, two way road and four lane, two way road with sags (dips), crests and sweeping horizontal curves. This road traverses through residential and minor commercial land uses.

Main Road intersects with Shepherds Hill Road at the Blackwood roundabout. Shepherds Hill Road provides a link to South Road and the Southern Expressway (via Sturt Road) and the southern hills suburbs. It is a four lane, two way road which traverses an urban environment. This road has several sweeping bends and is characterised by its long eastward incline where the road ascends through the Adelaide Hills escarpment before levelling out at the entry into Blackwood. Both roads carry significant traffic between Adelaide and the southern Adelaide Hills and are considered major commuter routes.

For the purposes of the report, the road has been divided into five sections of similar cross section and road characteristics (refer to Figure 2.1.1).

Section 1: Main Road, between Belair Road and Russell Street

Section 2: Main Road, between Russell Street and Glenalta Level Crossing

Section 3: Main Road, between Glenalta Level Crossing and Chapman Street

Section 4: Main Road, between Chapman Street and Blackwood Roundabout

Section 5: Shepherds Hill Road, between Blackwood Roundabout and Seymour Street

Figure 2.1.1 - Main Road / Shepherds Hill Road study corridor

2.2 TRAFFIC CHARACTERISTICS AND LAND USE

Main Road (RN6452) begins at Belair Road and continues to the Blackwood Roundabout. It passes through Belair, Glenalta and Blackwood. Traffic volumes vary along the length of road under investigation. Two-way Average Annual Daily Traffic (AADT) volumes for different road sections range from 6,000 – 20,400 vehicles. For the extents of this study area Main Road runs for approximately 2.9 km through the Mitcham region with the abutting land use varying along the length of the road (refer Figure 2.2.1).

Section 1 – Belair Road to Russell Street

This section is a short road length that has commercial activity in the vicinity. The road was upgraded in 2010 with the installation of a PAC and raised median (between the petrol station and the shopping centre) to improve pedestrian safety as a result of community concerns. The section has wide lanes with bicycle lanes, kerbing and has two-way AADT volumes of 6,000 vehicles.

Section 2 – Russell Street to the Glenalta railway level crossing

South of Russell Street, Main Road narrows and passes through residential land use. This section has narrower lanes with no median and no bicycle lanes. Kerbing is provided in places. The geometry and roadside infrastructure/vegetation contributes towards some intersections having poor sight distance.

The Glenalta railway level crossing has a thin raised median near the crossing to reduce vehicular cross movements. Site observations indicate that freight trains can cause significant delays to traffic on Main Road. This section of road has two-way AADT volumes of 17,300 vehicles.

Section 3 – Glenalta railway level crossing to Chapman Street

The road section south of the railway level crossing becomes a mix of residential and commercial uses. The road was upgraded in 2008 with a painted median including channelised right turn lanes. As a part of the upgrade, lighting was upgraded to arterial road standard (V3) and bicycle lanes were also installed.

The road is kerbed for the full length. Medium sized trees are located in the verge along the majority of this section contributing to restricted sight distance issues especially on the bends. This section of road has two-way AADT volumes of 18,900 vehicles.

Section 4 – Chapman Street to Blackwood Roundabout.

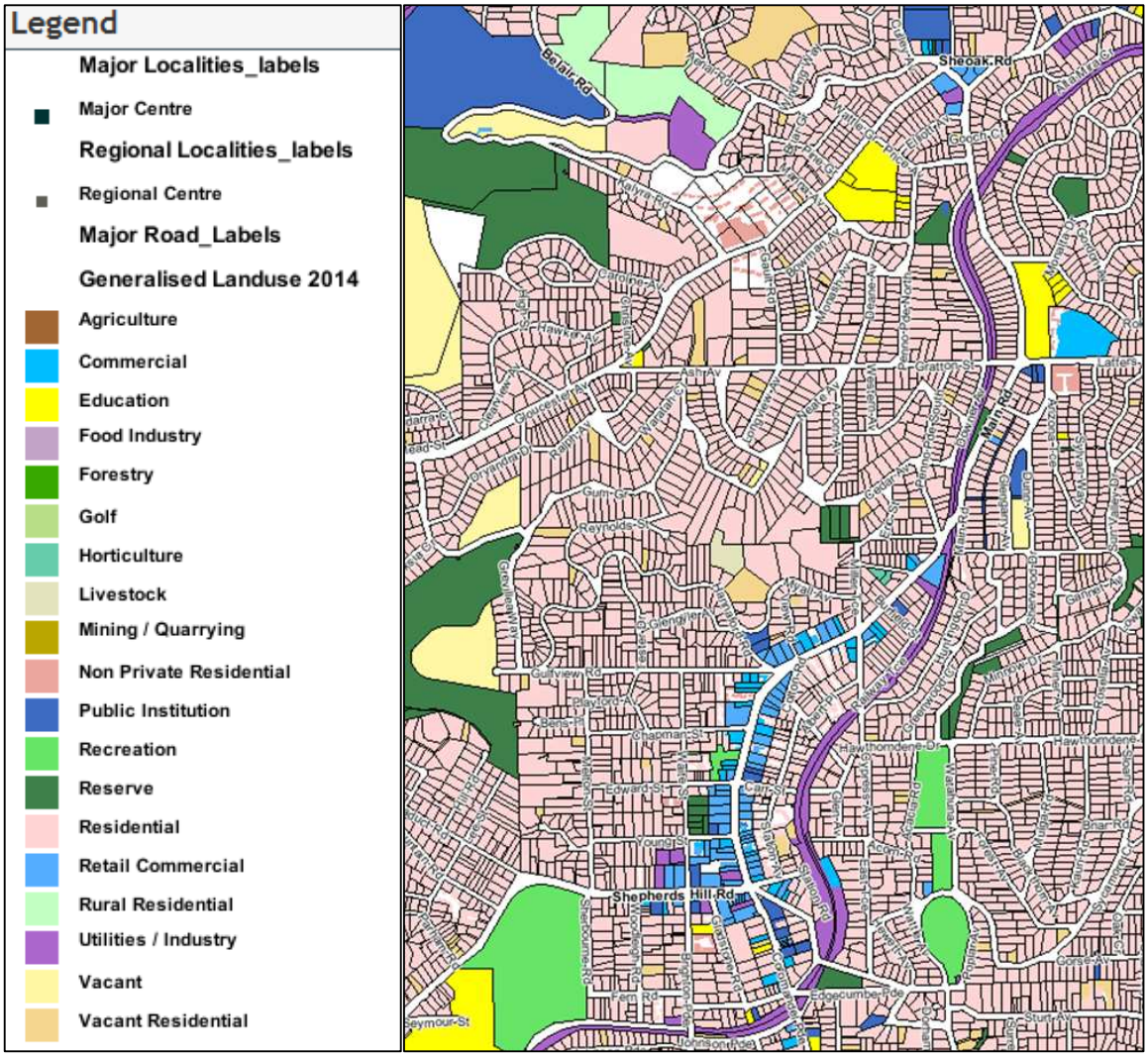
Section 4 is a busy commercial precinct with high demand for access to on and off street parking and high pedestrian activity. The road consists of two lanes in each direction separated by a painted or raised median. Parking where applicable is 2.3m wide. The stretch between Young Street and the roundabout is exceptionally busy and includes a PAC and access to Foodland and other retail facilities. This section of road has two-way AADT volumes of 20,400 vehicles.

Section 5 – Blackwood Roundabout to Seymour Street

Shepherds Hill Road (RN6467) begins at Main South Road, St Marys and ends at Main Road, Blackwood. It passes through St Marys, Eden Hills and Blackwood and has a total length of approximately 5.2km.

The section of Shepherds Hill Road under investigation is a 1.7km segment at the eastern end of the road between Seymour Street and the Blackwood roundabout. The road passes through Blackwood which is a busy commercial precinct and Eden Hills which is primarily residential. The two-way AADT volumes for this section of road are 16,400 vehicles. The road has two lanes in each direction and bicycle lanes for the majority of its length. There is a raised median along the busy commercial area which reduces to a dividing line within the residential section of road.

Figure 2.2.1– Land Use in region adjacent to area of study (Atlas of South Australia 2014)



2.3 Road Cross Section (Existing)

The road cross section varies along the two roads from a single narrow lane in each direction to two lanes in each direction with a bicycle lane and raised median. Main Road crosses the Adelaide – Belair and Melbourne Interstate railway lines at two locations. One is grade separated in the vicinity of Pinera Station (Overway Bridge) and the other at the Glenalta railway level crossing, near Rosella Avenue.

2.3.1 Section 1 – Main Road, Belair Road to Russell Street

This short section lies between Belair Road and Russell Street. The cross section consists of a wide single lane in each direction separated by a raised median. Bicycle lanes 1.5m in width run along both sides of the road.

2.3.2 Section 2 – Main Road, Russell Street to Glenalta railway level crossing

This section of Main Road is predominantly fronted by residential homes and is narrow winding its way down to the Glenalta railway level crossing. The majority of intersections / junctions do not have channelized right turn treatments. Native trees line the majority of this road section. Parts of the road are unkerbed.

The cross section has one lane in each direction with varying width, but typically 3.5m and shoulders which are narrow. This road section has a high volume of traffic during the peak periods and is susceptible to being slowed by turning traffic, slow moving vehicles as well as passenger and freight trains.

2.3.3 Section 3 – Main Road, Glenalta railway level crossing to Chapman Street

This section continues south from the Glenalta railway level crossing and ends at Chapman Street, where the road widens. Section 3 consists of a varying road width, but typically 3.8m wide lanes in each direction separated by a 3m painted median exist.

For most of the section a 1.5m bicycle lane runs along both sides of the road. Due to the painted median, most of the intersections / junctions have channelised right turn treatments.

2.3.4 Section 4 – Main Road, Chapman Street to Blackwood Roundabout

Section 4 is a busy stretch of road with a high level of pedestrian activity and on-street parking movements. The section consists of two 3m lanes in each direction separated by a painted or raised median.

2.3m parallel parks are also provided on both sides of the road, where permissible. The section allows access to/from two major supermarkets and other commercial centres.

2.3.5 Section 5 – Shepherds Hill Road, Blackwood Roundabout to Seymour Street

Shepherds Hill Road comprises of 2 lanes in each direction. Cyclist lanes are provided on both sides for the majority of the road section. Where this is not the case, a wide kerbside lane is provided. The road varies from being separated by a 3m raised median to a single painted dividing line.

2.4 PARKING PROVISION

On-street parking facilities are not provided between Belair Road and the Overway Bridge as this section of road is narrow and kerbed. However, some informal parking does occur within the eastern road verge south of Gooch Court. In Section 2 after the bridge there are opportunities to park on the road edge as it is not kerbed and where it is, there are spaces assigned. Informal parking between trees has been observed along the unkerbed sections. Parking within the vicinity of the Glenalta railway level crossing is not permitted.

Section 3 has dedicated full time bicycle lanes and accordingly on-street parking is not permitted except where indented bays are provided. Section 4 has 2.3m parking lanes provided along most of the road length (majority on the eastern side). The parking interrupts the flow of traffic along this busy section of Main Road.

Shepherds Hill Road has bicycle lanes which are in operation during the peak times (7.30am – 9.00am and 3.00pm – 6.00pm) and parking is allowed at all other times. The busy commercial precinct section of Shepherds Hill Road has no on-road parking except for outside the post office (which the community has expressed safety concerns regarding the interaction between parking vehicles and the roundabout traffic). Off-street parking is available in commercial centres adjacent to Sections 4 and 5.

2.5 PUBLIC TRANSPORT

The Blackwood Railway Station (located off Station Road) is a public transport interchange which links bus and rail services. As shown in Figures 2.5.1 and 2.5.2, there are a high number of bus services that use the Blackwood roundabout. Whilst many of the bus routes that utilise the roundabout service Shepherds Hill Road, other routes also service Main Road (North), Main Road (South) and Coromandel Parade. Adelaide Metro trains run through this area with stops at Pinera, Glenalta, Blackwood and Coromandel.

It is noted that buses generally experience delay at the Blackwood roundabout.

Figure 2.5.1 – Map of bus routes servicing area

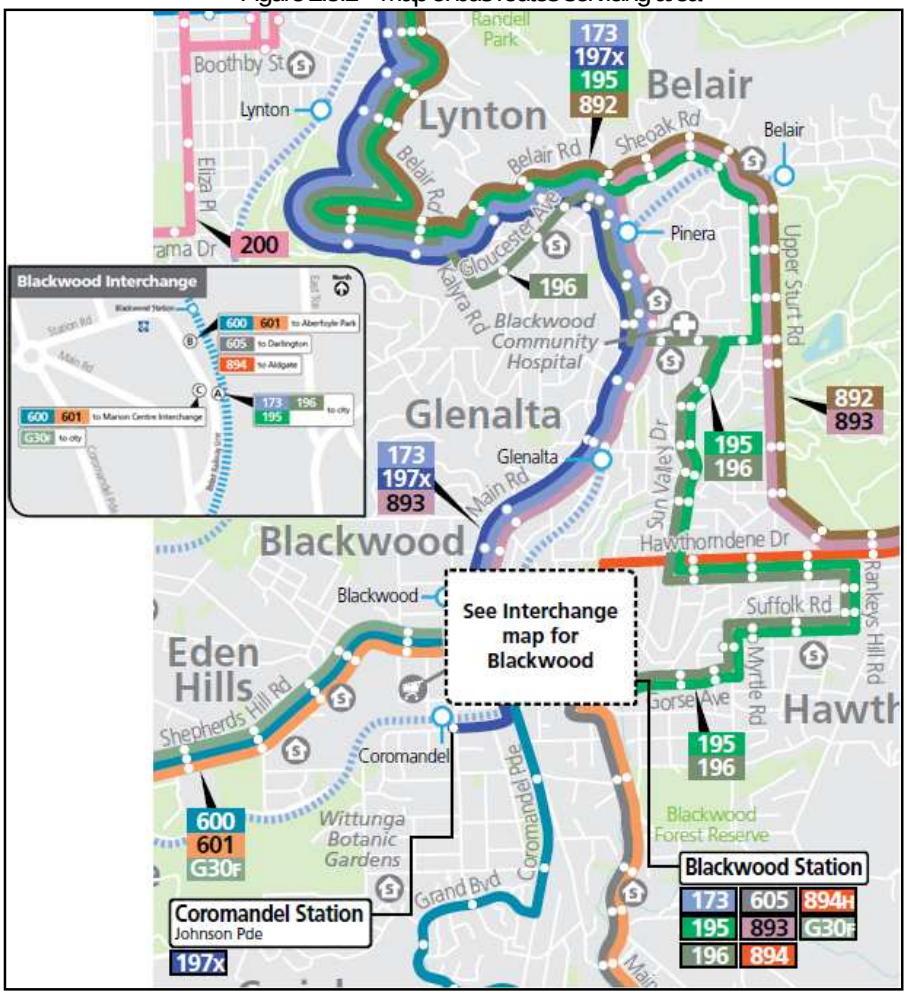
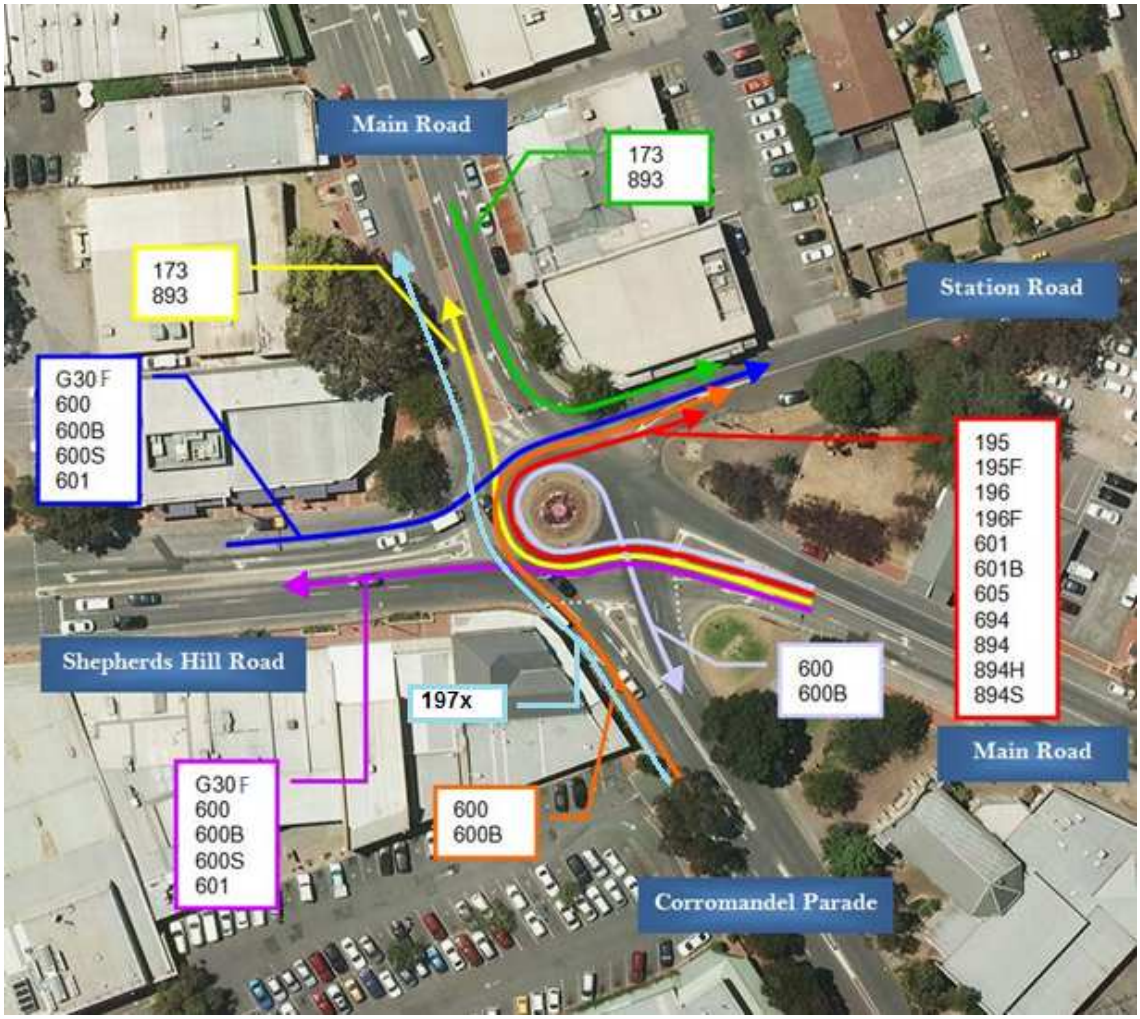


Figure 2.5.2 – Map of bus routes circulating the Blackwood Roundabout



There have been numerous upgrade works carried out on public transport infrastructure within the areas surrounding the study corridor since 2005. These upgrades include:

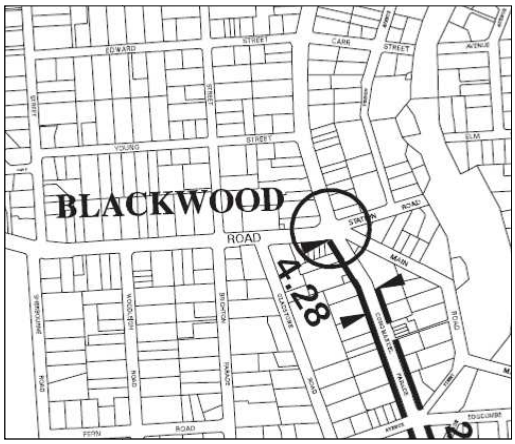
- Belair passenger rail line re-sleepered
- Rebuild of the Belair Interchange heritage building
- Rebuild of the Coromandel train station
- Rebuild of the Eden Hills train station
- Construction of the pedestrian overpass at the Blackwood Interchange, passing over the interstate freight line

2.6 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.

The only location relevant to this RMP that is currently affected by MARWP is the area adjacent to the Blackwood roundabout where a 4.5m road widening requirement exists on both sides of the arterial approach legs of the roundabout (depicted by a circle on the plan). This requirement extends for 200m along the arterial road legs. The western side of Coromandel Parade (council road) immediately south of the Blackwood roundabout is also affected by a 4.28m road widening requirement.

Figure 2.6.1 – Possible future widening adjacent to the Blackwood Roundabout and along Coromandel Parade



2.7 ASSET SUSTAINMENT (ASSET MANAGEMENT)

DPTI undertakes a number of asset sustainment activities across the road network. The key assets that DPTI maintain are road pavements, structures, electrical assets, pavement marking and delineation.

2.7.1 Routine Maintenance

Routine maintenance activities on this road section are typically carried out by DPTI staff. Routine maintenance addresses minor maintenance issues; with larger issues being addressed on a priority basis as funding becomes available.

The activities undertaken as part of routine maintenance are:

- The inspection, recording and reporting of defects
- Preparing a prioritised maintenance program and works program
- Undertaking the repair of defects.

2.7.2 Road Pavement

The road pavement along Main Road was constructed in 1979, while the section of Shepherds Hill Road within the study area was constructed in 1967.

The existing road pavement is generally in good condition with some sections presenting an undulating surface. The undulations are particularly evident along the sections between the Pinera Rail Bridge and the level crossing on Main Road and Seymour Street to the Blackwood Roundabout along the northeast bound carriageway of Shepherds Hill Road.

The condition of the road pavement along the study corridor is consistent with the scheduled maintenance estimating resurfacing being required within the next two to five years and as such no immediate works are considered necessary at this time.

Based on DPTI's periodic maintenance schedule it is estimated that the following sections of road will require resurfacing within the next five years:

- Russell Street to Laffers Road (three to five years)
- Laffers Road to Blackwood Roundabout (two to three years)
- Blackwood Roundabout to Seymour Road (two to four years)

These timeframes are only estimates and are not funded.

2.7.3 Road Lighting

DPTI manage the current electrical assets along this road which includes road lighting, either mounted on SA Power Networks stobie poles or fixed on DPTI tubular light poles, as well as traffic signal infrastructure at Pedestrian Actuated Crossings (PAC's). DPTI aims to provide road lighting to arterial road (V3) standard as described in the Australian Standards.

DPTI maintains approximately 90% of the road lighting along the study area. Council maintain the other 10% (from Penno Parade to Rosella Avenue). The majority of poles are 15-25 years old.

In Section 1 the majority of road lighting is to current arterial road standard. A PAC has been recently installed near Russell Street and the lighting was upgraded as a part of the scheme.

The majority of Section 2 does not comply with current arterial road lighting standards.

The Glenalta railway level crossing and Section 3 were upgraded to arterial road standard in August 2008. This section was upgraded in conjunction with the painted median scheme and the Glenalta Railway Station car park.

Section 4 between Chapman Street and Carr Street does not meet current standards. The remainder of section 4, Carr Street to the roundabout, is well lit to current standards.

The divided section of Shepherds Hill Road within the commercial precinct meets current standards. The remaining section of Shepherds Hill Road does not meet current standards.

Providing enhanced road lighting along the deficient sections of the road needs to be prioritised against other state-wide locations by taking into account the current quality of lighting, crash history and traffic volumes. The cost to upgrade any lighting may also include upgrading the existing poles and supporting electrical infrastructure.

It should be noted that the street lighting mounted on stobie poles is owned by SA Power Networks, with DPTI paying a tariff to ensure the lighting is maintained. Council also pays a tariff on many of the lights.

2.7.4 Structures

The Pinera Overway Bridge is the only structure located within the study corridor. The Bridge was constructed in 1927. This structure does not require any major maintenance work within the next five years. The table below summarises the characteristics of the bridge.

Table 2.7.4.1 – Summary of Structures on Main Road and their Properties

Location	Type	Span	Length (m)	Width (m)	Last Inspected	Health Index	Next Inspection
Overway Bridge at Pinera (PN 3861) – 340m south of Russell Street, Belair.	Bridge	Triple	49	11	Nov 2013	43	2017

3. ROAD ROLE AND FUNCTION

3.1 ROAD ROLE

Main Road is an important arterial route through residential and commercial areas and serves a number of key roles. It provides a key road link for residents of Belair, Glenalta and Blackwood. In particular the road forms an important commuter link between the Adelaide Hills within the Mitcham area and the Adelaide Plains, including the Adelaide CBD. Additionally, the road links to other suburbs and townships within the southern Adelaide Hills.

Similarly, Shepherds Hill Road is a major arterial route through the residential and commercial areas of Belair, Blackwood, Eden Hills and Belleview Heights. This road also serves a number of key roles and forms an important arterial link for commuter traffic between the Mitcham Hills, the western suburbs and the Adelaide plains (including the CBD).

The broader role of these roads is to:

- Provide North-South travel route for commuters in the greater southern Adelaide Hills area
- Provide a link to the western suburbs, Adelaide CBD and to the southern suburbs via South Road and the Southern Expressway
- Provide access to a number of residential, commercial, educational and other precincts of cultural and social activity
- Provide connections and access for cyclists
- Provide safe and accessible pedestrian movements in areas of high pedestrian activity (e.g. near schools, shopping strips, shopping centres, businesses, entertainment and rest homes).

3.2 ROAD FUNCTION

In 2012 DPTI released the document *A Functional Hierarchy for South Australia's Land Transport Network* which defines the function of all transport corridors within South Australia. The document highlights the function of the roads within the study area to be a:

Main Road

- Peak Hour Route
- Priority Pedestrian Area (through the Blackwood commercial precinct)
- Cycling Route

Shepherds Hill Road

- Major Traffic Route
- Public Transport Corridor
- Cycling Route

The document can be accessed via the internet: A Functional Hierarchy for South Australia's Land Transport Network

3.3 ROAD FUNCTIONAL OBJECTIVES

The functional objectives for the study corridor define safety and operational benchmarks to assist in defining traffic management measures that should exist to support the current role and function of the road.

A framework of how Main Road, between Belair Road and the Blackwood Roundabout, and Shepherds Hill Road, between Seymour Street and the Blackwood Roundabout, should function and operate has been developed, as described in Table 3.3.1.

Table 3.3.1 - Functional Objectives and recommended Traffic Management Measures

Road Element	***Functional Objectives***	***Traffic Management Measures***
CAPACITY / LANES	• Provide adequate road space and number of lanes to ensure safe and efficient operation • Cater for cyclists	• Sections 1,2,3 - One operating lane in each direction to cater for existing and expected traffic volumes. • Section 4 and 5 - Two lanes in each direction to cater for higher traffic flows. • Lane widths of 3.5 m lanes or greater • Continuous bicycle lanes • Indented bus bays at bus stops to allow cars to pass stopped buses • No on-street parking. Indented parking to be considered where appropriate
ACCESS AND TURNING TRAFFIC	• Turning traffic should not interfere with the flow of through traffic • Limit direct property access to provide safety and efficiency • Limit right turn movements to occur at junctions, intersections and channelised access points to provide safety and efficiency • Minimise unsafe u-turn movements	• Right turn storage lanes at key intersections or at busy access points • Left turn deceleration lanes at key intersections or at busy access points • Raised medians where road widths permit or where significant numbers of pedestrians cross the road • Flush/painted median where constraints such as limited road reserve width make a raised median impractical • Provide storage lanes in median for vehicles to wait and safely perform a u-turn manoeuvre

Road Element	*Functional Objectives*	*Traffic Management Measures*
SPEED LIMITS	• Speed limits to provide safe and efficient travel on Main Road and Shepherds Hill Road	• 60km/hr speed limit • Consideration of 50km/h limits in busier commercial / pedestrian precincts
SAFETY AT INTERSECTIONS	• Minimise conflict points at busy intersections to reduce crashes • Avoid unsafe right turns	• Active control (e.g. traffic signals/ roundabouts) at major intersections if warranted • Ensure that intersections/junctions are designed to current design and safety standards
LANDSCAPING AND ROADSIDE FURNITURE	• Remove or protect roadside hazards • Provide appropriate landscaping to maintain the safety and character of the road	• Trim or remove vegetation where necessary for road safety and visibility (sight distances) • Remove unprotected roadside obstacles or drop offs (e.g. exposed surface drainage/culverts) • Ensure new landscaping / urban design elements do not create a new hazard
PEDESTRIANS	• Minimise crossing distances • All facilities to be compliant to the Disability Discrimination Act (DDA) requirements • Ensure good visibility at crossing points	• Provide raised median / kerb protuberances / walk throughs at busy pedestrian crossing points • Raised medians at crossing points • Provide appropriate width for walkways and footpaths
CYCLISTS	• Provide consistent and connected bicycle routes, comprising both arterial and local road network • Provide adequate road space for cyclists through the use of cyclist lanes and off-road facilities	• Provide continuous bicycle lanes • Provide off-road bicycle paths where possible
BUSES	• Cater for efficient bus movements • Safe access to and from public transport facilities	• Provide 3.5m lane widths • Indented bus bays at bus stops to allow buses to pass other stationary buses. • Co-locate bus stops and pedestrian crossing facilities • Bus stops on exit side of traffic signals
ROAD LIGHTING	• Provide appropriate road lighting	• Road lighting to V3 arterial road standard

4. VISION

A vision of how Main Road and Shepherds Hill Road should look has been developed based on the functional objectives. The figures below show the preferred general cross section.

Figure 4.1 – Sections 1 to 3 of the study area (single lane in each direction)

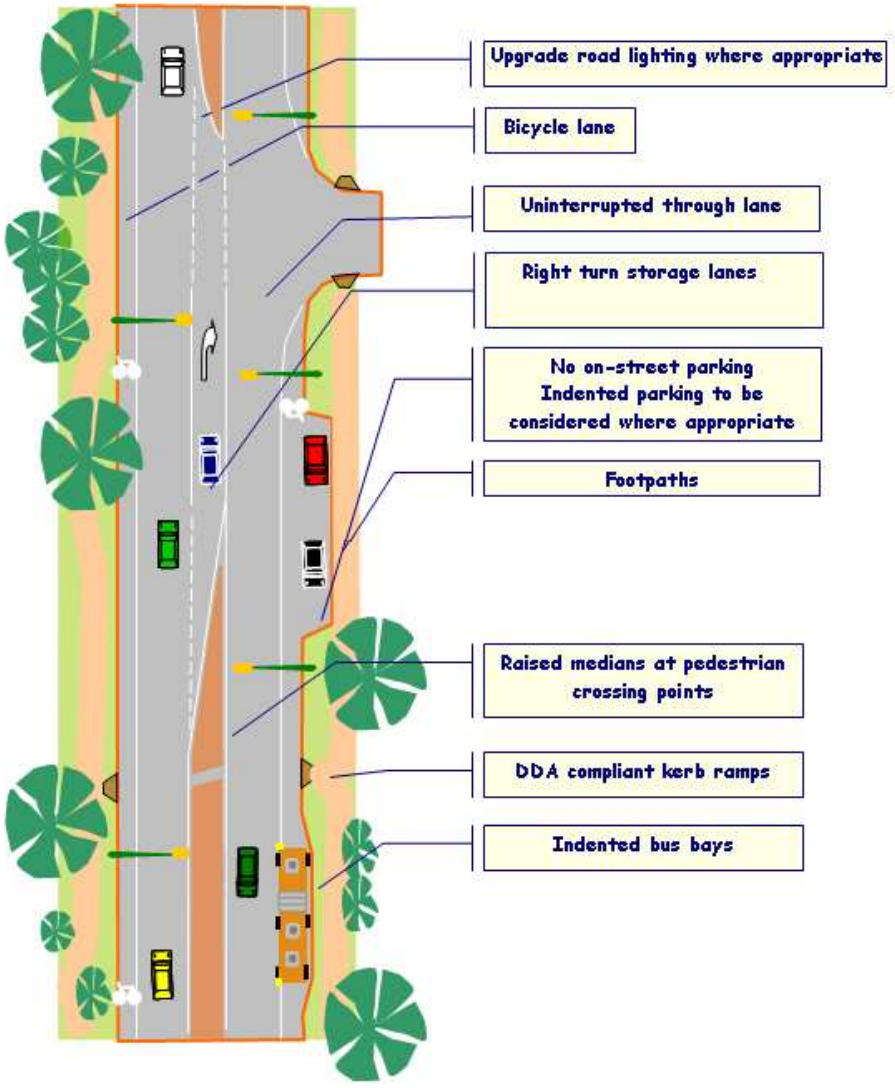
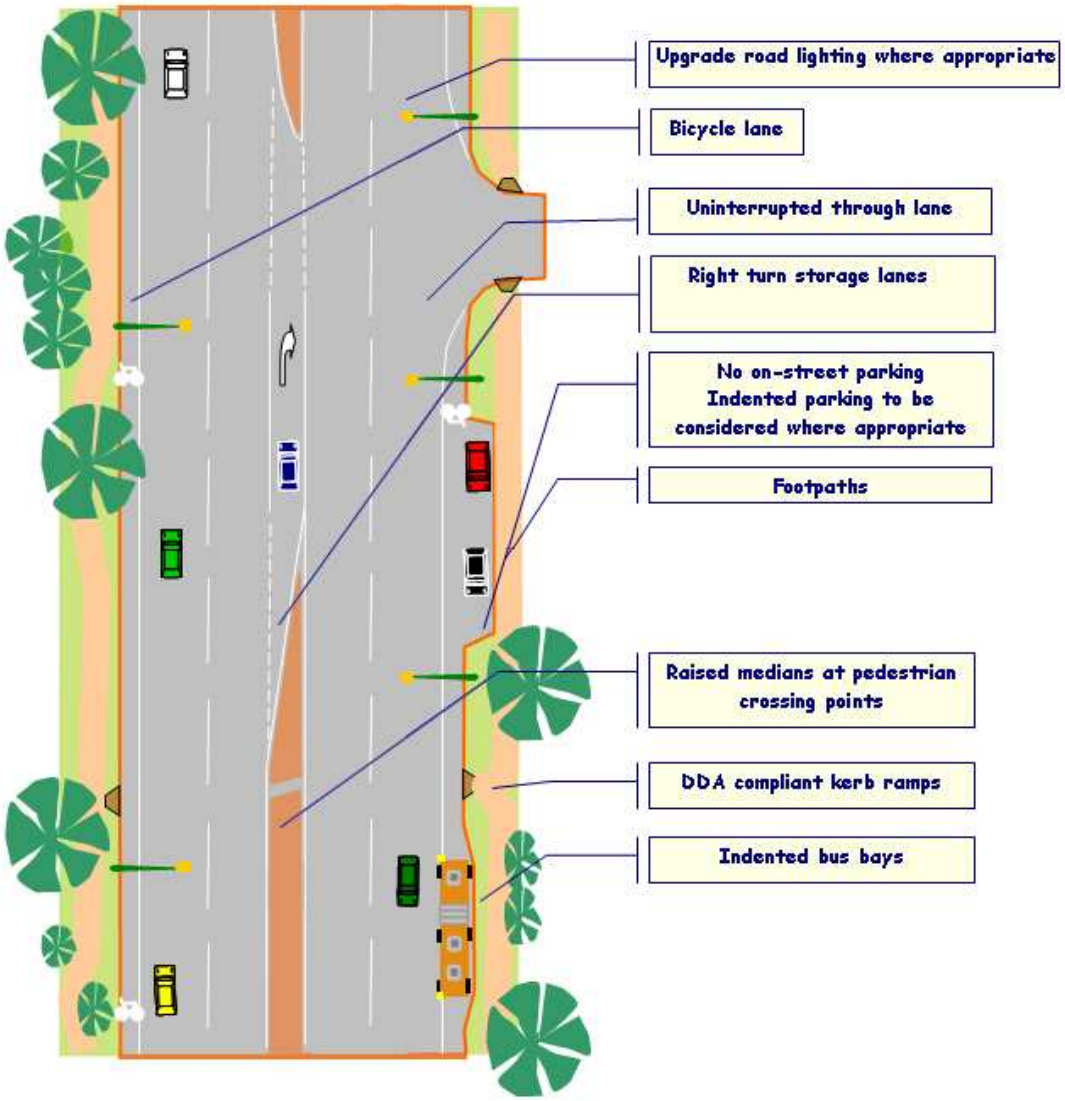


Figure 4.2 – Sections 4 to 5 of the study area (two lanes in each direction)



5. ROAD SAFETY

5.1 CRASH ANALYSIS

Crash analysis is a method used to identify current safety issues at intersections and mid-block sections. It enables the department to focus its attention to locations which are most in need of safety improvements. The department primarily focuses on casualty crashes, however for the purposes of this RMP, property damage only (PDO) crashes (where the value of the damage exceeds $3000) will also be considered. As previously mentioned, on the 1st of January 2013, the minimum value for recording PDO crashes increased to $5000.

It should be noted that the Department prioritises the importance of treating specific crash sites using a ranking system aligned to the criteria used to determine the eligibility for funding of projects under the Black Spot programs (Nation Building and State). The ranking is reviewed each year.

Black Spot programs directly target improvements to the safety of roads with proven crash history or high-risk locations. The funding criteria relate to road safety improvements at intersections and mid block road sections of less than 3 km in length. The minimum eligibility criterion is a history of at least two reported casualty crashes in the last five years at the site.

The crash analysis contained within this Road Management Plan spans a five year period between 2009 and 2013.

Further investigation has been conducted for intersections and junctions that have experienced two or more crashes over the five year period (both PDO and Casualty). Further investigation has also been conducted for mid-blocks (between junctions) with a total of six or more crashes over the five year period (i.e. average of greater than one crash per year).

It should be noted that the accuracy of crash data collected is not always guaranteed and is subject to the interpretation of the individual recording the information.

5.2 CRASH TYPES

The crash types that will be referred to in this Road Management Plan are right angle, right turn, rear end, hit fixed object, side swipe, hit pedestrian, hit parked vehicle, head on, and left road (out of control).

Right angle crashes occur at intersections and junctions and involve vehicles from adjacent approaches. In simpler terms, it means a vehicle on one road crashing into a vehicle from an intersecting road.

Right turn crashes also occur at intersections and junctions but involve vehicles from opposing directions. Typically, this type of crash involves a vehicle intending to turn right failing to select an appropriate gap in the oncoming traffic stream and getting hit as a result.

Rear end crashes are the most common type of crashes and involve vehicles crashing into the vehicle immediately in front of them. This type of crash is typically caused by a trailing vehicle failing to keep a safe distance from the vehicle in front.

Hit fixed object crashes occur when a vehicle leaves the carriageway in an uncontrolled way and collides with a fixed object.

Side swipe crashes occur when vehicles travelling in the same direction collide with each other, typically associated with lane changing manoeuvres.

Head on collisions occur when opposing vehicles collide directly head on with each other. This is more likely on undivided carriageways which are one lane in each direction.

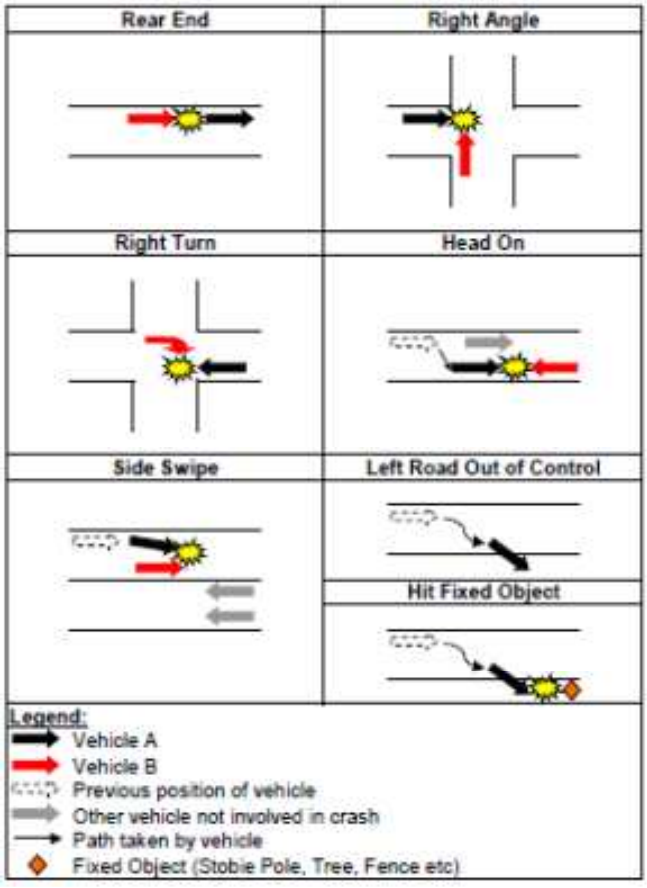
Hit Pedestrian collisions occur when a vehicle hits a pedestrian.

Hit Parked Vehicle crashes occur when a vehicle travelling along the road hits a vehicle that is stationary on the side of the road.

Left road crashes occur when a vehicle leaves the carriageway in an uncontrolled way.

Various crash types are illustrated in Figure 5.2.1.

Figure 5.2.1 – Typical Crash Types



5.3 Intersection Crashes

The five year crash history (2009 to 2013) for all intersections with at least one reported crash PDO and / or casualty) along the study corridor is listed in Table 5.3.1 below.

All unsignalised intersections within the Adelaide Metropolitan area are ranked according to the number of casualty crashes that have occurred in the last 5 years. Accordingly, this ranking has been included in Table 5.3.1 below.

Analysis and recommendations for sites that have two or more crashes (PDO and casualty) are included in Section 7. A more detailed crash history table is listed in Appendix A.

Table 5.3.1 - Intersection Crashes 2009-2013

Section	Intersection	Crash Type	PDO	Casualty	Total	Metropolitan area-wide Ranking
1	Main Road – Sheoak Road/Gloucester Avenue	Right Angle	5	1	6	1175
		Rear End	1	-	1	
		Total	**6**	**1**	**7**	
1	Main Road – Russell Street	Right Angle	2	6	8	13
		Rear End	2	1	3	
		Right Turn	4	5	9	
		Total	**8**	**12**	**20**	
2	Main Road – Penno Parade North	Rear End	1	-	1	2377
		Total	1	0	1	
2	Main Road – Downer Avenue	Right Angle	1	5	6	67
		Rear End	3	1	3	
		Side Swipe	-	1	1	
		Total	**4**	**7**	**11**	
2	Main Road – Monalta Drive	Rear End	2	1	3	1175
		Total	**2**	**1**	**3**	
2	Main Road – Laffers Road	Rear End	1	-	1	671
		Right Turn	-	2	2	
		Right Angle	-	-	0	
		Total	**1**	**2**	**3**	
2	Main Road – Byrne Street	Right Angle	1	-	1	1175
		Rear End	2	1	3	
		Right Turn	2	-	2	
		Total	**5**	**1**	**6**	
3	Main Road – McDonald Avenue	Side Swipe	1	-	1	2377
		Total	1	0	1	
3	Main Road – Burfield Street	Rear End	1	-	1	2377
		Total	1	0	1	

Section	Intersection	Crash Type	PDO	Casualty	Total	Metropolitan area-wide Ranking
3	Main Road – Stirling Road / Miller Terrace	Right Angle	1	1	2	1175
		Total	**1**	**1**	**2**	
3	Main Road – View Road	Right Angle	1	1	2	1175
		Total	**1**	**1**	**2**	
3	Main Road – Colton Road	Rear End	-	1	1	1175
		Right Angle	1	-	1	
		Total	**1**	**1**	**2**	
3	Main Road – Gulfview Road	Rear End	-	1	1	1175
		Total	**0**	**1**	**1**	
3	Main Road – Chapman Street	Right Angle	1	-	1	2377
		Side Swipe	1	-	1	
		Total	**2**	**0**	**2**	
4	Main Road – Edward St / Carr St	Rear End	1	-	1	1175
		Right Angle	1	1	2	
		Total	**2**	**1**	**3**	
4	Main Road – Young Street	Right Angle	2	3	5	401
		Side Swipe	1	-	1	
		Total	**3**	**3**	**6**	
4	Blackwood Roundabout	Right Angle	24	4	28	114
		Hit Fixed Object	1	-	1	
		Rear End	9	1	10	
		Side Swipe	8	1	9	
		Total	**42**	**6**	**48**	
5	Shepherds Hill Road – Gladstone Road	Right Angle	1	-	1	401
		Hit Fixed Object	1	-	1	
		Head On	1	-	1	
		Rear End	3	1	4	
		Right Turn	-	2	2	
		Total	**6**	**3**	**9**	
5	Shepherds Hill Road – Brighton Parade / Waite Street	Right Angle	19	5	24	45
		Rear End	-	-	-	
		Right Turn	5	1	6	
		Hit Pedestrian	-	1	1	
		Hit Fixed Object	-	1	1	
		Total	**24**	**8**	**32**	
5	Shepherds Hill Road – Woodleigh Road	Rear End	1	-	1	1175
		Total	**1**	**0**	**1**	

Section	Intersection	Crash Type	PDO	Casualty	Total	Metropolitan area-wide Ranking
5	Shepherds Hill Road – Sherbourne Road/ Melton Street	Right Angle	5	3	**8**	**167**
		Hit Fixed Object	1	-	**1**	
		Rear End	-	2	**2**	
		Total	**6**	**5**	**11**	
5	Shepherds Hill Road – Viaduct Road	Rear End	1	-	**1**	**2377**
		Total	1	0	**1**	
5	Shepherds Hill Road – Wilpena Street	Right Angle	2	-	**2**	**1175**
		Roll Over	-	1	1	
		Total	**2**	**1**	**3**	
5	Shepherds Hill Road – Parham Road	Right Angle	1	1	**2**	**671**
		Rear End	-	1	1	
		Total	**1**	**2**	**3**	
5	Shepherds Hill Road – Seymour Street / Wade Street	Right Angle	1	-	**1**	**401**
		Right Turn	2	2	**4**	
		Rear End	1	1	**2**	
		Total	**4**	**3**	**7**	

5.4 MID-BLOCK CRASHES

The five year crash history (2009 to 2013) for all mid-blocks (between junctions) with at least one reported crash along the study corridor is listed in Table 5.4.1 below. Analysis and recommendations for mid-blocks that have six or more crashes (PDO and casualty) are included in Section 7. A more detailed crash history table including all mid-block sections is listed in Appendix B.

Table 5.4.1 - Mid-Block Crashes for 2009 – 2013

Section	Mid-Block Section	Crash Type	PDO	Casualty	Total	Length of Section (km)	Casualty Crashes (per section)
1	Main Road Gloucester Avenue to Russell Street	Right Angle	1	-	1	0.12	1
		Roll Over	-	1	1		
		Total	**1**	**1**	**2**		
2	Main Road Penno Parade North to Downer Avenue	Side Swipe	1	-	1	1.42	9
		Rear End	-	1	1		
		Total	**1**	**1**	**2**		
2	Main Road Downer Avenue to Monalta Drive	Rear End	1	-	1		
		Hit Fixed Object	2	-	2		
		Total	**3**	**0**	**3**		
2	Main Road Monalta Drive to Laffers Road	Head On	-	2	2		
		Rear End	3	1	4		
		Right Angle	-	1	1		
		Roll Over	-	1	1		
		Hit Parked Vehicle	1	-	1		
		Total	4	5	**9**		
2	Main Road Laffers Road to Byrne Street	Rear End	1	-	1		
		Hit Fixed Object	1	-	1		
		Total	**2**	**0**	**2**		
2	Main Road Byrne Street to Rosella Avenue	Hit Fixed Object	2	-	2		
		Side Swipe	-	1	1		
		Total	**2**	**1**	**3**		
2	Main Road Rosella Avenue to Southern Avenue (includes Rail X-ing)	Hit Fixed Object	1	-	1		
		Head On	1	-	1		
		Side Swipe	0	-	0		
		Rear End	3	2	5		
		Total	**5**	**2**	**7**		

Section	Mid-Block Section	Crash Type	PDO	Casualty	Total	Length of Section (km)	Casualty Crashes (per section)
3	Main Road Southern Avenue to McDonald Avenue	Rear End	2	-	2	0.98	3
		Right angle	1	-	1		
		Side Swipe	1	-	1		
		Total	**4**	**0**	**4**		
3	Main Road McDonald Avenue to Burfield Street	Rear End	1	-	1		
		Total	**1**	**0**	**1**		
3	Main Road Stirling Road to View Road	Right angle	1	-	1		
		Total	**1**	**0**	**1**		
3	Main Road Colton Road to Gulfview Road	Right angle	3	-	3		
		Side Swipe	1	-	1		
		Head On	-	1	1		
		Total	**4**	**1**	**5**		
3	Main Road Gulfview Road to Chapman Street	Rear End	-	1	1		
		Right Angle	-	1	1		
		Hit Parked Vehicle	1	-	1		
		Hit Fixed Object	1	-	1		
		Total	**2**	**2**	**4**		
4	Main Road Chapman Street to Edward Street / Carr Street	Side Swipe	1	-	1	0.48	7
		Right Turn	2	-	2		
		Rear End	-	2	2		
		Right Angle	1	1	2		
		Total	**4**	**3**	**7**		
4	Main Road Edward Street / Carr Street to Young Street	Side Swipe	1	-	1		
		Hit Fixed Object	1	1	2		
		Head On	1	-	1		
		Hit Parked Vehicle	2	-	2		
		Total	**5**	**1**	**6**		
4	Main Road Young Street to Blackwood Roundabout	Side Swipe	3	1	4		
		Hit Parked Vehicle	2	-	2		
		Right Angle	1	1	2		
		Right Turn	1	-	2		
		Rear End	-	1			
		Total	**7**	**3**	**10**		

Section	Mid-Block Section	Crash Type	PDO	Casualty	Total	Length of Section (km)	Casualty Crashes (per section)
5	Shepherds Hill Road Blackwood Roundabout to Gladstone Road	Right Angle	1	-	1	1.32	4
		Rear End	2	-	2		
		Total	**3**	**0**	**3**		
5	Shepherds Hill Road Brighton Parade / Waite Street to Woodleigh Road	Right Angle	3	-	3		
		Rear End	1	1	2		
		Total	**4**	**1**	**5**		
5	Shepherds Hill Road Woodleigh Road to Sherbourne Road / Melton Street	Right Angle	-	1	1		
		Rear End	1	-	1		
		Side Swipe	-	1	1		
		Hit Parked Vehicle	1	-	1		
		Total	**2**	**2**	**4**		
5	Shepherds Hill Road Sherbourne Road / Melton Street to Viaduct Road	Hit Fixed Object	1	-	1		
		Total	**1**	**0**	**1**		
5	Shepherds Hill Road Viaduct Road to Wilpena Street	Hit Fixed Object	1	-	1		
		Total	**1**	**0**	**1**		
5	Shepherds Hill Road Wilpena Street to Parham	Hit Fixed Object	1	1	2		
		Rear End	-	1	1		
		Total	**1**	**2**	**3**		
5	Shepherds Hill Road Parham Road to Seymour Street / Wade Street	Rear End	1	-	1		
		Side Swipe	1	-	1		
		Total	**2**	**0**	**3**		

5.5 Speed Environment

Main Road and Shepherds Hill Road are major arterial roads and a 60km/hr speed limit is generally appropriate for the road category, function and environment. Sections of Main Road and Shepherds Hill Road have been reduced to 50km/hr through the Blackwood commercial precinct due to the high level of pedestrian activity. Council have raised further concerns about the speed limit within the Blackwood pedestrian precinct. DPTI would need to work with Council to review the speed limit through this area.

5.6 Pedestrians

Main Road and Shepherds Hill Road have footpaths on both sides of the road. DPTI has installed pedestrian crossings and refuges to enable pedestrians to safely cross these roads. A list of these facilities is provided below. An analysis of the crash data showed that there was 1 crash involving a vehicle hitting a pedestrian in the last 5 years. DPTI will work with council to address any future pedestrian needs along Main Road.

Table 5.6.1 – List of Pedestrian Actuated Crossings

Pedestrian crossing	Road	Midblock section
PC351	Main Road	Gloucester Avenue – Russell Street
PC117	Main Road	Monalta Drive – Laffers Road
PC189	Main Road	Young Street – Blackwood Roundabout
PC068	Main Road	Gladstone Road – Blackwood Roundabout
PC188	Shepherds Hill Road	Wilpena Street – Parham Road

Table 5.6.2 – List of all Pedestrian Refuges

Road	Midblock section
Main Road	Southern Avenue – McDonald Avenue
Main Road	Stirling Road – View Road
Main Road	Gulf View Road – Chapman Street
Main Road	Chapman Street – Edward Street
Main Road	Edward Street – Young Street

5.7 CYCLING

Bicycle lanes have been provided along lengths of Main Road and Shepherds Hill Road. Both Main Road and Shepherds Hill Road are classified as secondary cycling routes. The vision for these roads is to have continuous bicycle lanes as illustrated in Section 4.

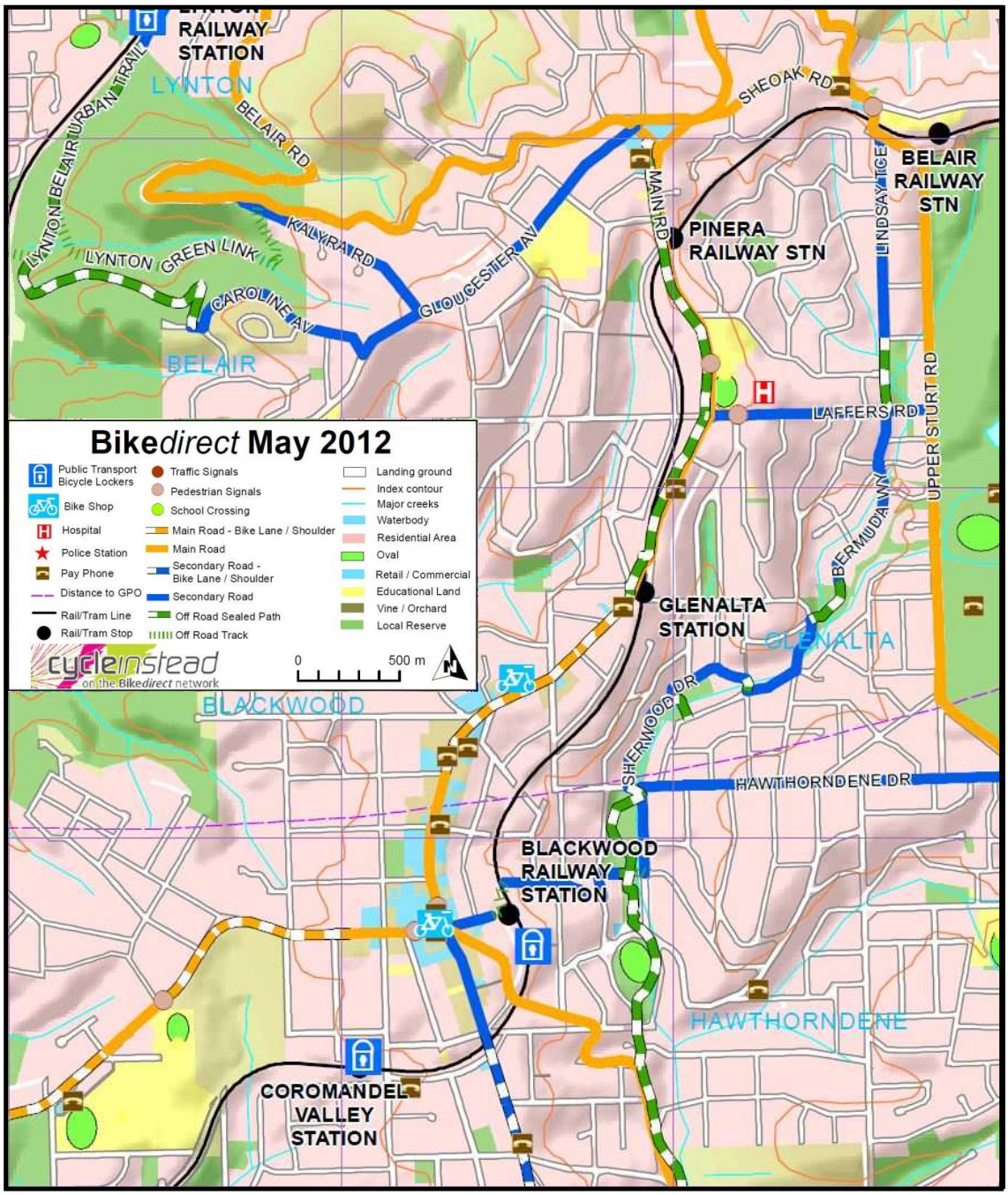
The table below provides an overview of the bicycle facilities that are currently provided along Main Road and Shepherds Hill Road (see also Figure 5.7.1).

Table 5.7.1 – List of bicycle facilities

Approximate width	Road	Midblock section
2m	Main Road	Belair Road – Gooch Court
Off-road shared path	Main Road	Russell Street – Southern Avenue
1.5m	Main Road	Southern Avenue – Chapman Street
1.5m	Main Road	Blackwood Roundabout – Gladstone Road
4.5m (shared kerbside lane)	Shepherds Hill Road	Gladstone Road – Woodleigh Road
2m	Shepherds Hill Road	Woodleigh Road – Viaduct Road
1.5	Shepherds Hill Road	Viaduct Road – Parham Road

Other cycling facilities within the area include public transport bicycle lockers at the Blackwood, Coromandel Valley and Eden Hills train stations as well as off road cycling, mountain biking and recreational trails such as the Lynton Reserve Trail, Lynton Green Link, Watiparinga Trail and Craigburn Shared Use Trails.

Figure 5.7.1 – Bike Direct Map 2012



6. ROAD CAPACITY

6.1 CURRENT TRAFFIC VOLUMES

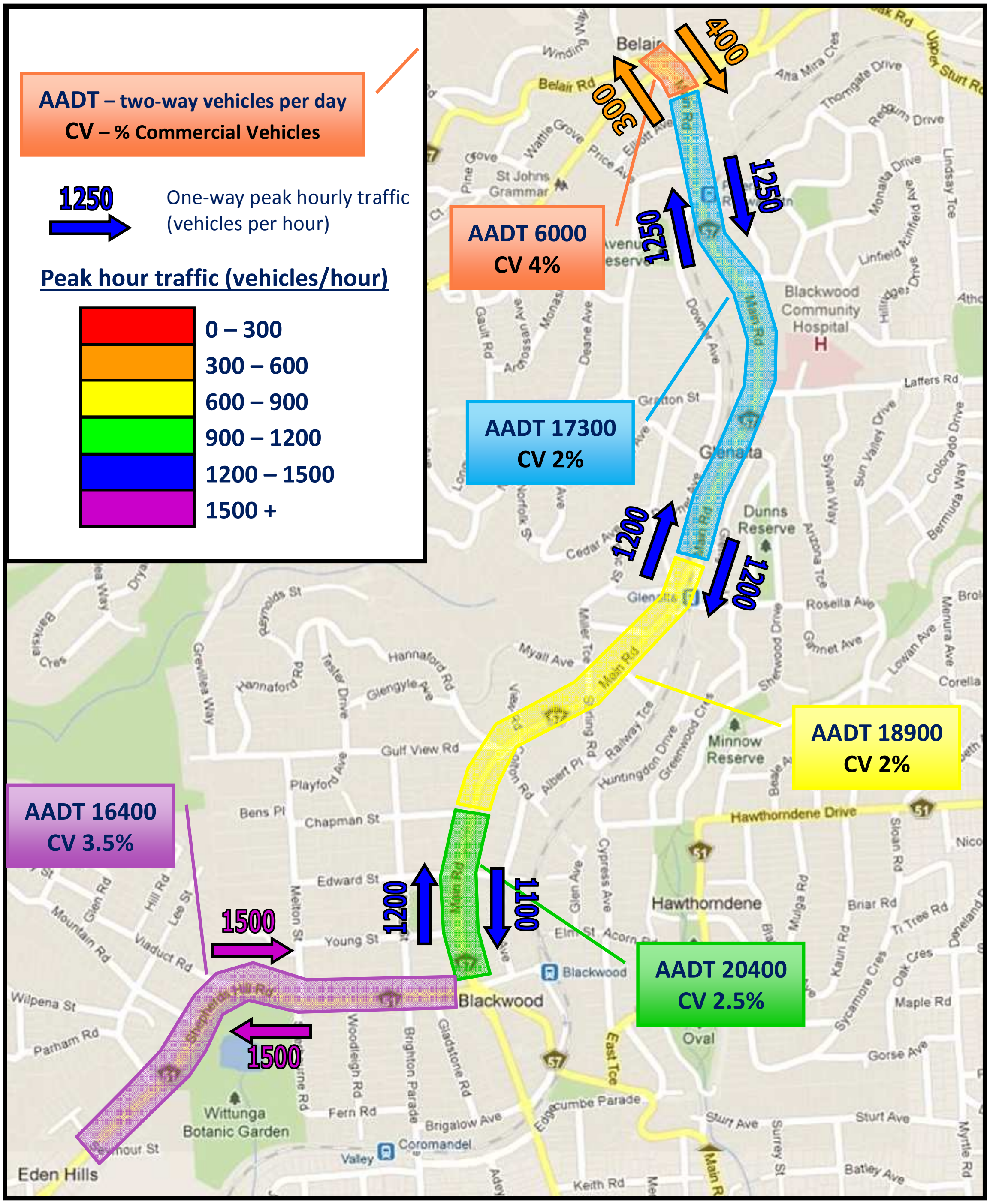
The two-way Annual Average Daily Traffic (AADT) volumes for Main Road vary from 20,400 vehicles within the commercial precinct to 17,300 vehicles along the northern sections of Main Road, with the exception of Section 1 which has an AADT of 6,000 vehicles. The two-way AADT volume along the section of Shepherds Hill Road, within the study corridor, is 16,400 vehicles.

Figure 6.1.1 shows the two-way AADT volumes, one-way peak hour traffic flows, and the commercial vehicle percentage of traffic for Main Road and Shepherds Hill Road (Sections 1 to 5).

It should be noted that a single clear lane of traffic has the capacity to cater for 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 & Analysis – Section 5.2.1).

In recognition that there are side road interactions, the current lane configuration is still considered appropriate to support the recorded traffic volumes with the exception of Section two. Section two of Main Road is nearing capacity during the morning and evening peak periods due to turning traffic and stopping buses impeding through traffic, caused by the narrow road width, and the closure of the level crossing. Implementation of the vision (Figure 4.1) as illustrated in Section 4 of the RMP is desirable.

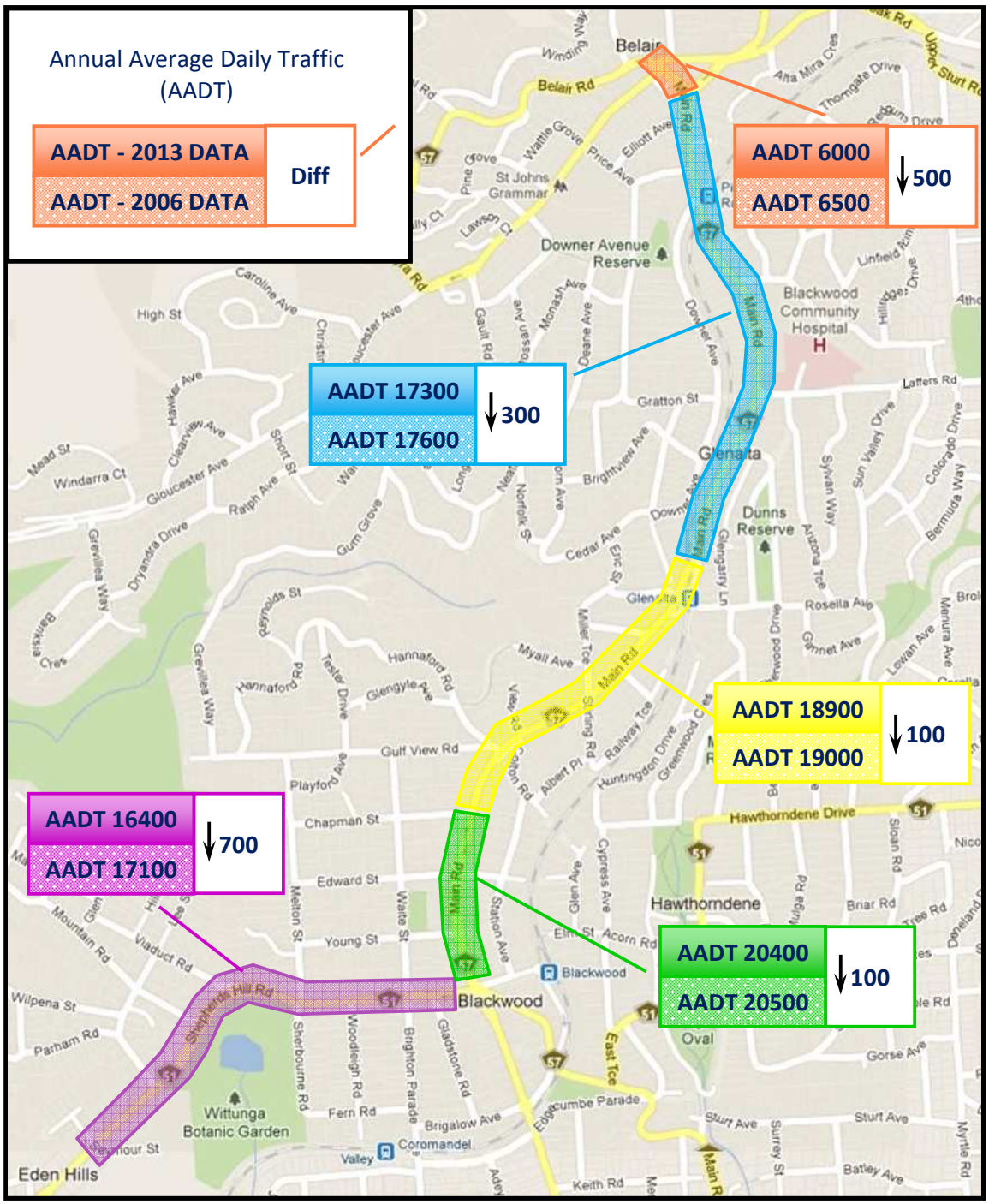
Figure 6.1.1 - Average Annual Daily Traffic (AADT) and one-way peak hour traffic flows



6.2 TRENDS IN TRAFFIC VOLUMES OVER TIME

The AADT volumes along the study corridor have remained reasonably consistent over the five year period, 2006 to 2011, with only a slight variance of around 1% to 2% in daily traffic volumes. Figure 6.2.1 shows comparisons of traffic volumes from 2013 to 2006.

Figure 6.2.1 - Comparison of AADT from 2006 RMP to 2013 RMP



7. DISCUSSION AND RECOMMENDATIONS

7.1 RECOMMENDATIONS FOR INTERSECTIONS/ JUNCTIONS

Intersections that have 2 or more crashes (PDO and casualty) over a five year period (2009 - 2013) are further investigated in this section. The following list of locations did not meet the 'investigation' criteria;

- Main Road / Sheoak Road (*no crashes*).
- Main Road / Elliot Avenue (*no crashes*).
- Main Road / Gooch Court (*no crashes*).
- Main Road / Penno Parade North (*1 crash*).
- Main Road / Glengarry Access Lane (*no crashes*).
- Main Road / Rosella Avenue (no *crashes*).
- Main Road / Southern Avenue (*no crashes*).
- Main Road / McDonald Avenue (*1 crash*).
- Main Road / Burfield Street (*1 crash*).
- Main Road / Gulfview Road (1 crash).
- Shepherds Hill Rd / Woodleigh Road (1 crash).
- Shepherds Hill Rd / Viaduct Rd (*1 crash*).

7.1.1 Main Road – Sheoak Road/ Gloucester Avenue

There were 7 reported crashes (6 PDO's and 1 casualty) at this T-Junction between the years 2009 and 2013. The predominant crash type at the junction is right angle involving vehicles turning right out from Gloucester Avenue.

All unsignalised intersections within the Adelaide Metropolitan area are ranked based on the number of casualty crashes that have occurred in the last five years. Accordingly, this location is ranked 1,175th. Table 7.1.1.1 below summarises the crash history at this location over the past five years.

Table 7.1.1.1 - Summary of crashes at Main Road / Sheoak Road/ Gloucester Avenue T Junction.

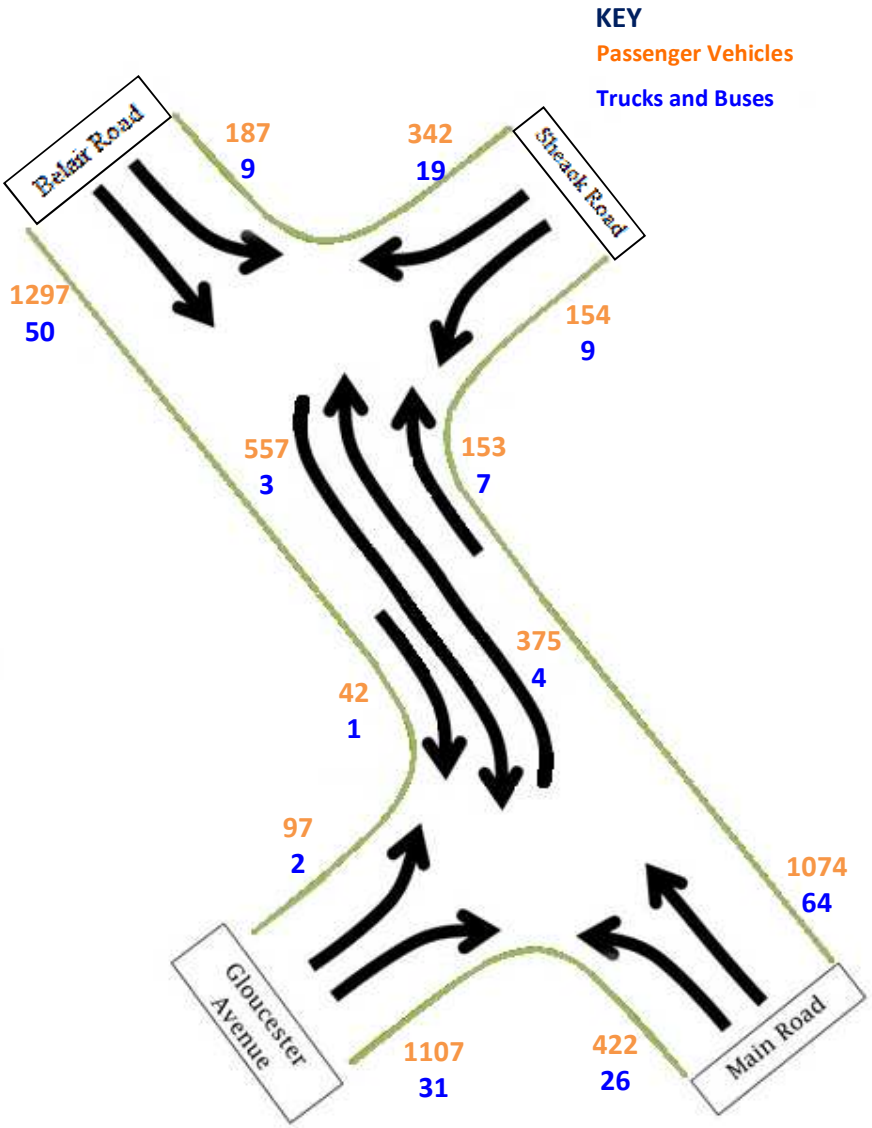
Crash Type	*PDO*	*Casualty*	*2009*	*2010*	*2011*	*2012*	*2013*	*Total*
Right Angle	3	1	1	-	2	1	2	**6**
Rear End	1	-	-	-	-	1	-	**1**
Total	**4**	**1**	**1**	**0**	**2**	**2**	**2**	**7**

Gloucester Avenue is located on the inside of a sweeping bend between Belair Road and Russell Street. There is a separate channelised left turn lane from Main Road as well as bicycle lanes in both directions. The junction is located within close proximity to Sheoak Road creating a staggered T-junction.

Figure 7.1.1.1 - Aerial Image of Junction (2012)

The predominant traffic movements at the junction are through vehicles along Main Road and right turn traffic from Gloucester Avenue. Figure 7.1.1.2 summarises the traffic volumes surveyed over an 11 hour period.

Figure 7.1.1.2 - Turning Count Volume – 11 hours (2014)

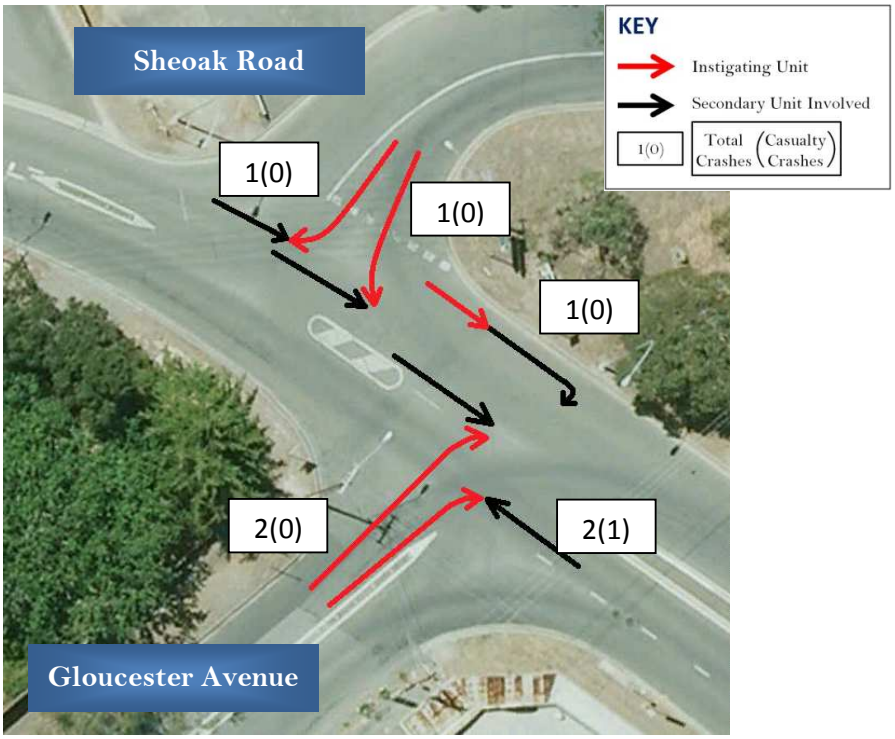


Gloucester Avenue provides access to residential properties, St Johns Grammar School, Jessie Brown Kindergarten, Kalyara Aged Care Facility and other retail and leisure facilities. There is a cluster of retail shops and restaurants on the southern corner of the intersection, with access via Main Road and Gloucester Avenue.

Bus route 196 turns left into Gloucester Avenue and right out of Gloucester Avenue. There are bus stops on both sides of the road just south of Gloucester Avenue, with one located in the separate channelised left turn lane into Gloucester Avenue.

In 2010 a PAC was installed south of Gloucester Avenue to primarily accommodate safe crossing for students and patrons of the nearby retail facilities. Bicycle lanes were also implemented in the same year. In 2011 raised pavement bars were installed along the centre of Main Road to guide traffic in a safe manner between Sheoak Road and Gloucester Avenue.

Figure 7.1.1.3 Crash Diagram (2009 – 2013)



Detailed analysis of the crash data indicates that factors contributing to crashes include poor sight distance in conjunction with a high volume of vehicles turning right from Gloucester Avenue. All of the crashes reported at the junction occurred during daylight hours, of which four of these occurred during either the weekday morning or evening peak periods.

The community has raised concerns about this junction due to the increasing traffic volumes using Gloucester Avenue. A summary of this feedback has been listed as an appendix to this report.

TREATMENTS

There are various options that could be implemented to address right angle crashes at this intersection. Banning the right turn out from Gloucester Avenue is one option but is not considered appropriate because of the importance of this movement and the access it

provides for the community. Traffic signals are also not warranted based on traffic volumes and crash history criteria.

DPTI has investigated the following treatment options aimed to improve safety and operation of the junction:

a. Roundabout (four leg – including Sheoak Road approach)
b. Channelised right turn treatment (including Sheoak Road approach)

The four leg roundabout was considered to address the right angle crashes and provide greater priority to vehicles exiting right out of Gloucester Avenue. The roundabout would require southbound vehicles on Main Road to give way to right turning vehicles exiting Gloucester reducing the potential for right angle crashes. Additionally, the roundabout would remove the visibility issues experienced by the right turning vehicles from Gloucester Avenue as they will no longer have to judge gaps in southbound traffic on Main Road or monitor simultaneous movements from Sheoak Road to Gloucester Avenue. The roundabout would require vehicles on Main Road to give way introducing nominal travel time delay. Both Gloucester Avenue and Sheoak Road would experience similar levels of delay and queuing as currently experienced. The roundabout would require significant roadwork's and land acquisition attracting a high cost for implementation.

A second option for this location is a channelised right turn treatment along Main Road. The treatment would provide a sheltered area for vehicles to wait before turning right into Gloucester Avenue and Sheoak Road. It would also provide vehicles exiting right out of Gloucester Avenue an opportunity to perform a two stage manoeuvre by storing in the middle of the road and reduces the potential for right angle crashes. Vehicles would still experience the same level of delays and queues on both side roads as currently experienced.

RECOMMENDATION

Both options are recommended treatments; however treatment b. is considered the most feasible option due to the lower cost for implementation. Given there has only been one casualty crash during the past five years, this treatment would be considered a low priority when compared against other state-wide priorities

7.1.2 Main Road – Russell Street

There were 20 reported crashes (8 PDO's and 12 Casualties) at this T-Junction between the years 2009 and 2013 which has seen a 13% reduction in crashes (3 fewer crashes) since the 2006 RMP. The predominant crash types are right angle crashes (8) involving vehicles turning left and right out from Russell Street and right turn crashes (9) involving vehicles turning right into Russell Street.

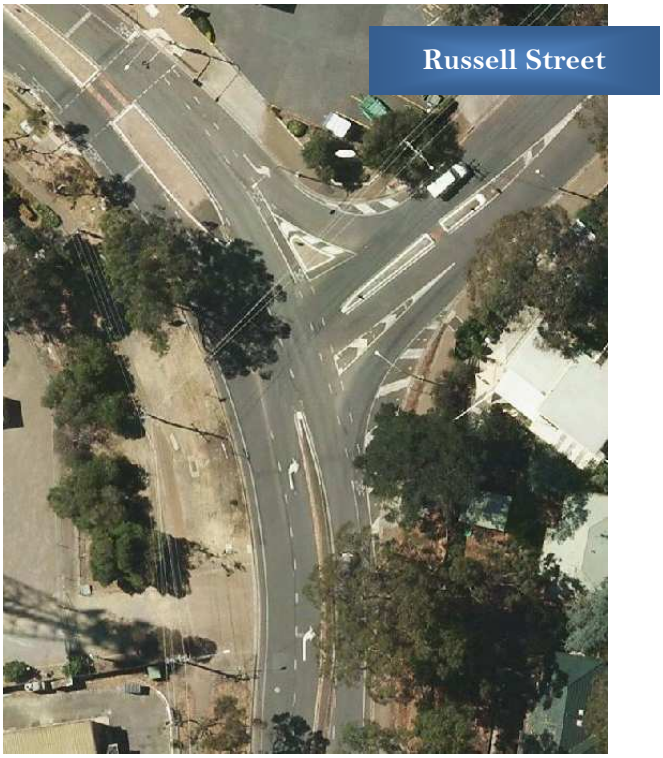
All unsignalised intersections within the Adelaide Metropolitan area are ranked based on the number of casualty crashes that have occurred in the last five years. Accordingly, this location is ranked 13th. Table 7.1.2.1 below summarises the crash history at this location over the past five years.

Table 7.1.2.1 - Summary of crashes at Main Road / Russell Street T Junction.

Crash Type	*PDO*	*Casualty*	*2009*	*2010*	*2011*	*2012*	*2013*	*Total*
Right Angle	2	6	-	3	2	2	1	**8**
Rear End	2	1	-	-	-	1	2	**3**
Right Turn	4	5	1	2	-	2	4	**9**
Total	**8**	**12**	**1**	**5**	**2**	**5**	**7**	**20**

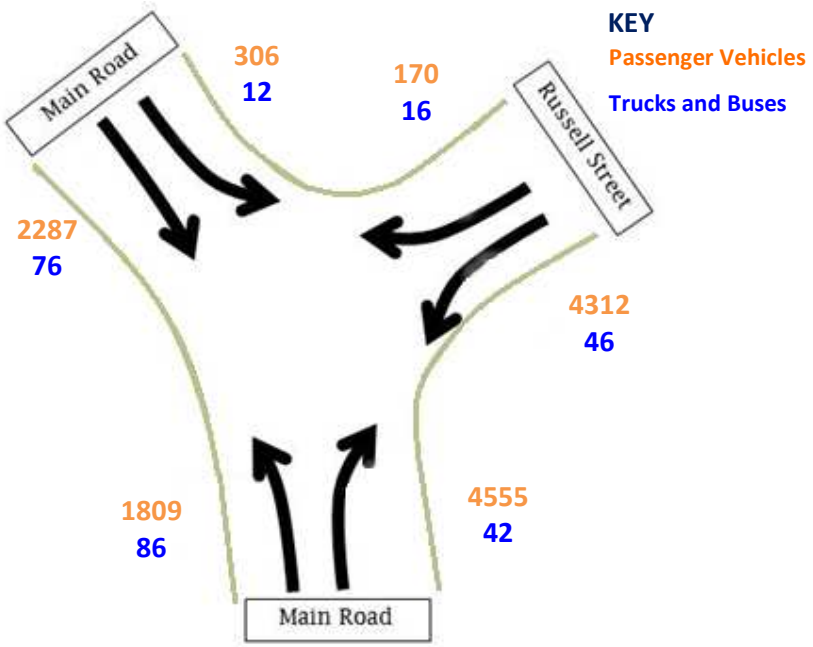
This T-Junction is located on the outside apex of a bend and has separate channelised turning lanes for each traffic movement at the intersection. Main Road provides a single lane for through traffic and bicycle lanes in each direction. There is a pedestrian refuge located immediately northeast of the junction on Russell Street and a pedestrian actuated crossing (PAC) immediately north on Main Road facilitating safe access between the service station, bus stops and adjacent shops.

Figure 7.1.2.1 Aerial Image of Junction (2012)



The predominant traffic movements through the junction are northbound and southbound along Main Road and right turn into / left turn out from Russell Street. Figure 7.1.2.2 below summarises the traffic volumes surveyed over an 11 hour period. Observations revealed that there are lengthy delays experienced by vehicles turning right out from Russell Street during the morning and evening peak periods. Vehicles turning right into or left out from Russell Street were also observed as exhibiting assertive behaviour i.e. not always stopping before turning and choosing small gaps in the traffic.

Figure 7.1.2.2 Turning Count Volume – 11 hours (2014)

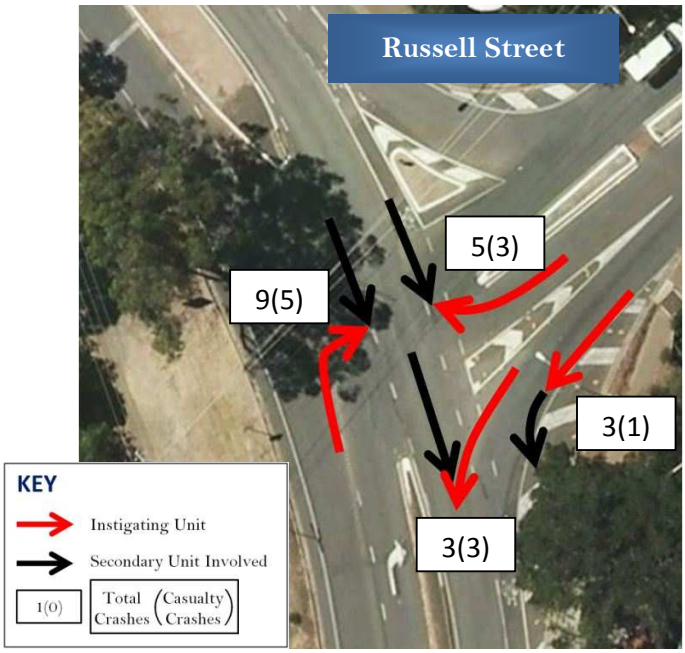


There is a BP service station located on the northern corner of the junction with direct access to Main Road and Russell Street located within close proximity to the junction. There is also a small group of shops just north-west of the junction with access via Main Road. Bus route 893 turns right into and left out of Russell Street. Bus routes 195, 195F and 892 turn left into and right out of Russell Street. There are bus stops on both sides of the road north of Russell Street.

In 2010 a PAC was installed north of Russell Street to primarily accommodate safe crossing for students and patrons of the nearby retail facilities. The PAC may also enable more opportunities for vehicles to turn right into Russell Street by stopping southbound traffic when activated.

Bicycle lanes were also implemented in the same year. The pedestrian refuge and kerb ramps on Russell Street were upgraded and relocated further north-east in 2010 to improve the safety for patrons crossing Russell Street by channelising pedestrian movements further away from the junction. In October 2012, the department altered the line marking at the left turn lane into Russell Street near the corner island and added a continuity line to reinforce to left turning drivers that they need to give way to right turning drivers heading into Russell Street.

Figure 7.1.2.3 Crash Diagram (2009 – 2013)



Detailed analysis of the crash data indicates that 50% of the crashes occurred in the morning and evening peak traffic periods. Furthermore most of the crashes (75%) were associated with the right in / left out movement to Russel Street which correlates with the highest traffic movements through the junction. Of note, four of the casualty right angle crashes involved vehicles exiting Russell Street colliding with southbound cyclists on Main Road and two of the casualty crashes involving vehicles exiting Russell Street were reported as DUI crashes.

Since the 2006 RMP the number of reported right turn crashes has remained the same and the number of reported rear ends has decreased by nearly 62%. The implementation of the PAC appears to benefit the current operation and safety of the T-Junction by providing gaps in southbound traffic flow along Main Road

TREATMENTS

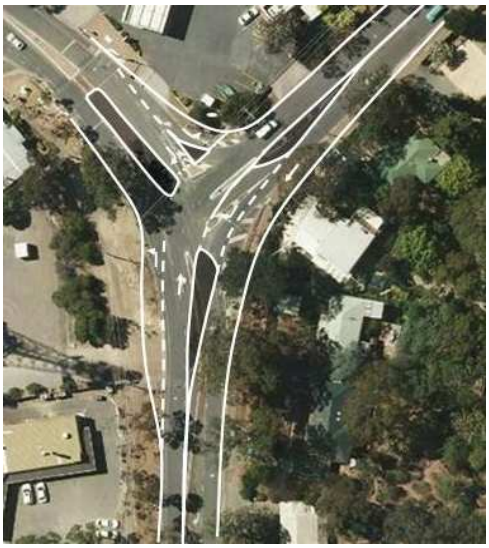
There are various options that could be implemented to address the crashes at this intersection. Banning the right turn out movement from Russell Street is one option but is not considered appropriate because of the importance of this movement and the need to facilitate bus routes.

DPTI has investigated the following treatment options aimed to improve safety and operation of the junction:

a. One-way triangle (clockwise gyratory) linking Main Road, Sheoak Road and Russell Street
b. Three leg roundabout
c. Changing of priority at the junction
d. Traffic signals

The one-way triangle was considered as a network treatment to reduce the potential for crashes at Russell Street. The treatment requires all vehicles approaching the triangle to circulate in a clockwise direction along Main Road, Sheoak Road and Russell Street. The treatment would improve safety for all roads intersecting the triangle by reducing the number of turning movements at each junction which would simplify the road environment for motorists. However the one-way triangle would result increased travel time delays through the area. Traffic modelling indicated the triangle operated worst in the weekday morning peak period with Gloucester Avenue and Belair Road experiencing noticeable queues and delays compared to existing conditions. The treatment would also introduce weaving manoeuvres over short distances between the junctions which would increase the potential for mid-block crashes around the triangle. Due to the increase in overall travel time delay and the increased potential for mid-block crashes this option is not considered viable.

A roundabout has also been considered to primarily address the right angle/turn crashes and provide greater priority to vehicle movements to and from Russell Street. The roundabout would slow vehicle speeds through the junction, simplify vehicle movements and reduce travel time delays for vehicles exiting Russell Street including buses. The roundabout requires north and southbound vehicles on Main Road to give way introducing travel time delays which are not excessive. The close proximity of the PAC would impact the operation of the roundabout by causing queues back to the roundabout potentially blocking lanes. The roundabout would require considerable roadwork's and land acquisition attracting a high cost for implementation.



A reconfigured T-Junction was considered in order to change vehicle priority at the junction to reflect the predominant traffic movements between Main Road (south) & Russell Street and to address the right angle/turn crashes. The T-Junction would require Main Road (north) vehicles to give way to Russell Street traffic and allows uninterrupted traffic flow between Main Road (south) and Russell Street. This treatment removes travel time delays for vehicles moving between Russell Street and Main Road (south), however at the same time would introduce significant travel time delays and queues on Main Road (north) approach which would not be acceptable to road users. This option still presents the same number of conflicting vehicle movements as existing. Some level of land acquisition would be required to implement this scheme.

Traffic Signals were also investigated to provide greater priority to vehicle movements to and from Russell Street and to improve safety by controlling conflicting traffic movements through the junction. The traffic signals would require the existing PAC to be removed and integrated within the signals. The traffic signals require north and southbound vehicles on Main Road to stop introducing travel time delays. The right turn out of Russell Street would see an improvement in travel time. Overall, this treatment provides some level of safety improvement. At the same time additional travel time delay and queues are introduced to Main Road traffic however, these are within acceptable limits. The treatment would require considerable roadwork's and land acquisition attracting a high cost for implementation.

RECOMMENDATION

Given the high volume of traffic turning to and from Russell Street and the continuing trend in right turn and right angle crashes it is recommended that a roundabout be implemented. The roundabout is the preferred treatment as it provides the best level of safety and provides greater priority to the high volume of traffic turning to and from Russell Street. However, this treatment would need to be prioritised against all other state-wide projects.

7.1.3 Main Road – Downer Avenue

There were 11 crashes (4 PDO's and 7 casualties) reported at this T-Junction between the years 2009 and 2013, which is a 15% decrease (2 crashes) since the 2006 RMP. The predominant crash types at this location are right angle crashes (6) involving vehicles exiting Downer Avenue and rear end collisions (4) involving vehicles turning right into Downer Avenue.

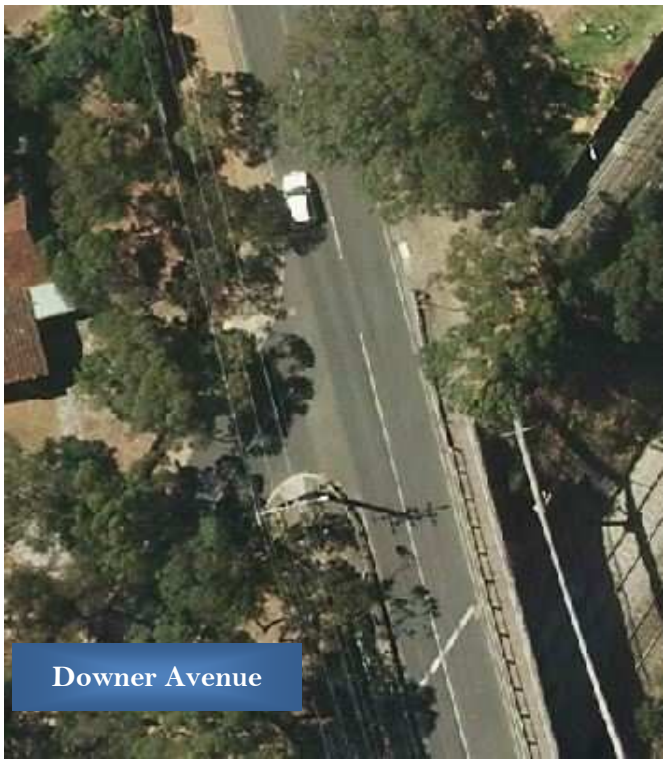
All unsignalised intersections within the Adelaide Metropolitan area are ranked based on the number of casualty crashes that have occurred in the last five years. Accordingly, this location is ranked 67th. Table 7.1.3.1 below summarises the crash history at this location over the past five years.

Table 7.1.3.1 - Summary of crashes at Main Road / Downer Avenue T Junction.

Crash Type	PDO	Casualty	2009	2010	2011	2012	2013	Total
Right Angle	1	5	1	2	2	-	1	**6**
Rear End	3	1	-	3	-	1	-	**4**
Side Swipe	-	1	-	-	1	-	-	**1**
Total	**4**	**7**	**1**	**5**	**3**	**1**	**1**	**11**

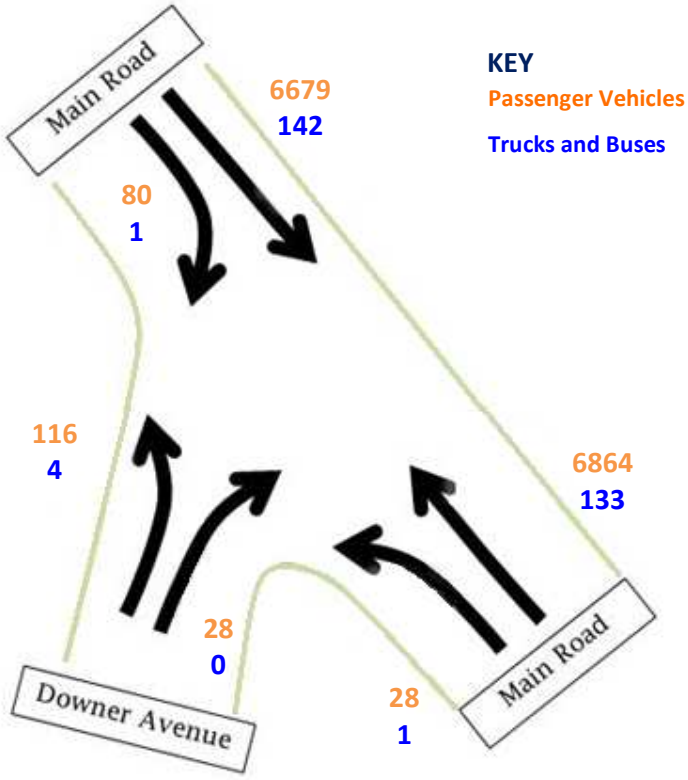
This junction is located immediately north of the Pinera Railway Station Overway Bridge. The road at this point is narrow due to the road bridge to the south of the junction. Downer Avenue approaches Main Road at a steep incline and meets Main Road at an acute angle. There are no separate channelised left or right turn lanes at this junction and both Main Road and Downer Avenue comprise a single traffic lane in each direction.

Figure 7.1.3.1 - Aerial Image of Junction (2012)



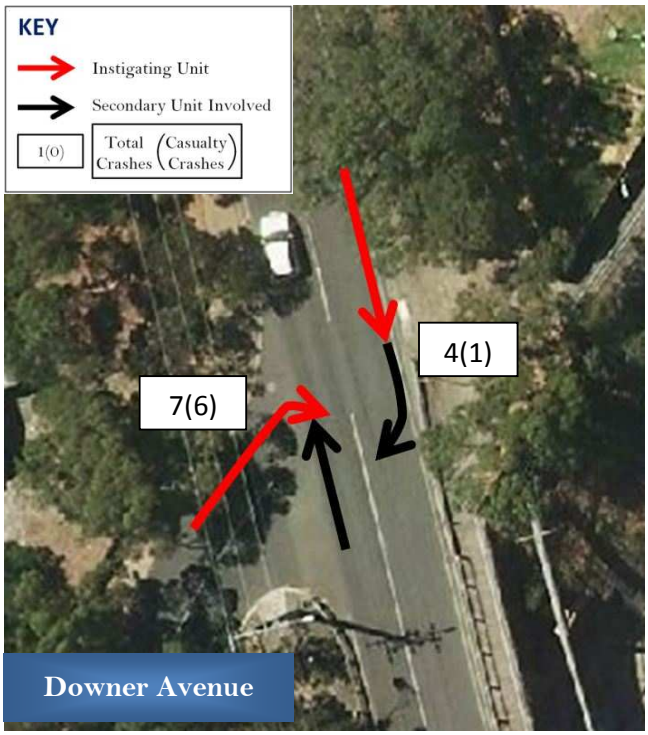
The predominant traffic movements at the junction are through vehicles along Main Road, with the turning volumes to and from Downer Avenue being very low. Figure 7.1.3.2 summarises the traffic volumes surveyed over an 11 hour period.

Figure 7.1.3.2 - Turning Count Volume – 11 hours (2012)



Downer Avenue provides access to residential properties, Downer Reserve and the Belair Scouts facility. There is a bus stop on either side of Main Road, just north of Downer Avenue, with the bus stop located on the eastern side of Main Road indented to allow southbound through vehicles to pass a stopping bus. Opposite Downer Avenue, to the east of Main Road, there is a narrow walkway providing pedestrian and cyclist access to the Pinera Railway Station.

Figure 7.1.3.3 - Crash Diagram (2009 – 2013)



Detailed analysis of the crash data indicates that the right angle crashes all involved northbound vehicles on Main Road colliding with right turning vehicles out of Downer Avenue. Of these crashes, 45% occurred at night or in wet weather and 55% occurred on a weekend. All rear end crashes occurred when traffic travelling southbound on Main Road collided with a stationary vehicle waiting to turn right into Downer Avenue during daylight hours.

Factors that may have contributed to the crashes at this location include poor sight distance for vehicles exiting the side road due to the steep incline, close proximity of the bridge infrastructure and acute angle at Downer Avenue where it meets Main Road. It is considered there are a high number of crashes at this location for the relatively low volume of turning traffic. Figure 7.1.3.4 illustrates the visibility issues at the junction.

There is also community concern about the difficulty pedestrians (including school children) experience when crossing Main Road to access the bus stop adjacent Downer Avenue and Pinera Railway Station. A contributing factor is pedestrians feel they need to cross Main Road in one movement due to no waiting space in the centre of the road to make the crossing in two stages.

Figure 7.1.3.4 - Main Road / Downer Avenue

TREATMENTS

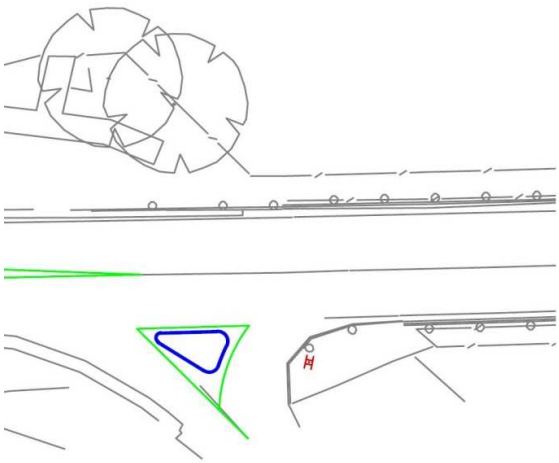
A channelised right turn treatment would be the most appropriate treatment to address the crashes by providing a sheltered area for vehicles to wait before turning right into Downer Avenue. It would also provide vehicles exiting right out of Downer Avenue an opportunity to perform a two stage manoeuvre by storing in the middle of the road and reduces the potential for right angle crashes, however due to close proximity of the bridge there is limited opportunity for road widening therefore discounting this option as a feasible treatment.

DPTI has investigated the following treatment options aimed to improve safety and operation of the junction:

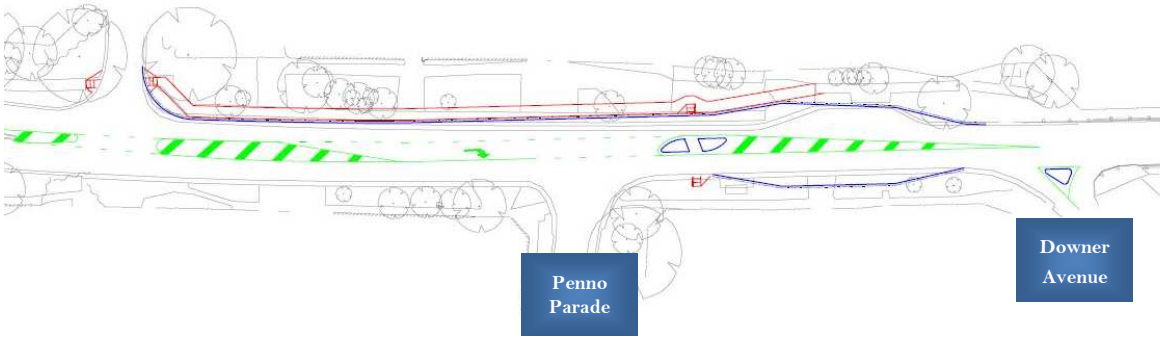
a. Downer Avenue operating as left in and left out access only (i.e. restricting right turn movements to and from Downer Avenue).

b. Option a, including a channelised right turn treatment at the Penno Parade North junction.

The left in / left out treatment would require the installation of a median at the entrance to Downer Avenue to restrict right turn movements. This was considered because it eliminates the vehicular turn movements that are associated with the crashes at the junction. This treatment would be considered effective, however motorists would need to access the local network via alternative roads with Penno Parade being the most likely to attract vehicles. This treatment would increase travel distances for vehicles that currently turn right into and out of Downer Avenue.



The channelised right turn treatment at Penno Parade was considered as an extension to option a. This treatment would eliminate the vehicular turn movements associated with the crashes at the Downer Avenue junction and also to provide a safe alternative access for the right turn movements within close proximity to Downer Avenue. The treatment would provide a sheltered area for vehicles to wait before turning right into Penno Parade and improve safety. This treatment is also consistent with the vision for this section of road as illustrated in Section 4. This option would also improve traffic flow along Main Road by partially indenting the bus stops. It also improves pedestrian safety by providing a pedestrian refuge in the middle of Main Road to allow pedestrians to cross the road in two stages. The treatment would require road widening attracting a high cost for implementation.



Note that this treatment may be considered as a two stage treatment as follows;

1. Ban only the right turn out from Downer Avenue

2. Upgrade Penno Parade North and remove the right turn in to Downer Avenue

RECOMMENDATION

The recommended treatment for this location is the channelised right turn treatment at Penno Parade with Downer Avenue operating as left in and left out. Given the relatively high number of casualty crashes compared to the cost of the treatment this is considered an appropriate and feasible solution. However, this treatment would need to be prioritised against all other state-wide projects.

7.1.4 Main Road – Monalta Drive

There were 3 crashes (2 PDO's and 1casualty) reported at this T-Junction between the years 2009 and 2013. The predominant crash types at this location are rear end crashes all involving vehicles conducting a right turn into Monalta Drive from Main Road.

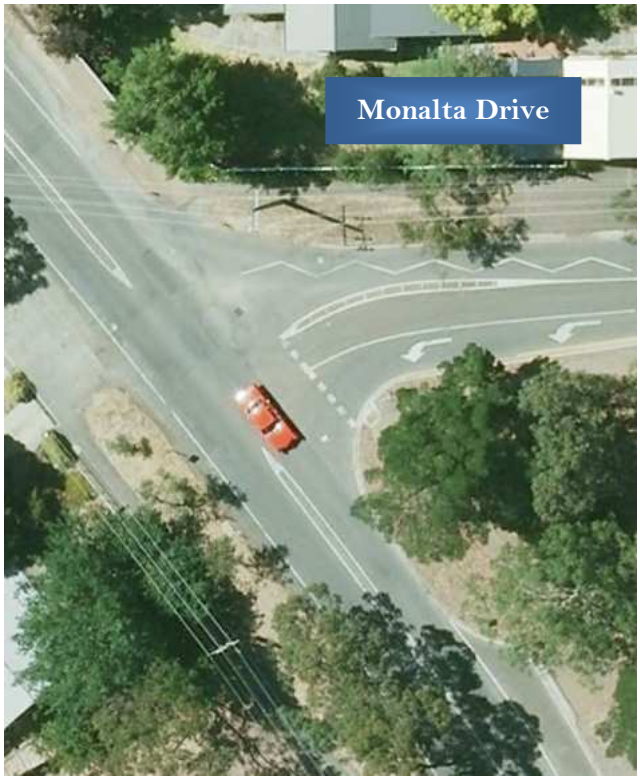
All unsignalised intersections within the Adelaide Metropolitan area are ranked based on the number of casualty crashes that have occurred in the last five years. Accordingly, this location is ranked 1,175th. Table 7.1.4.1 below summarises the crash history at this location over the past five years.

Table 7.1.4.1 - Summary of crashes at Main Road / Downer Avenue T Junction.

Crash Type	*PDO*	*Casualty*	*2009*	*2010*	*2011*	*2012*	*2013*	*Total*
Rear End	2	1	1	-	1	-	1	**3**
Total	**2**	**1**	**1**	**0**	**1**	**0**	**1**	**3**

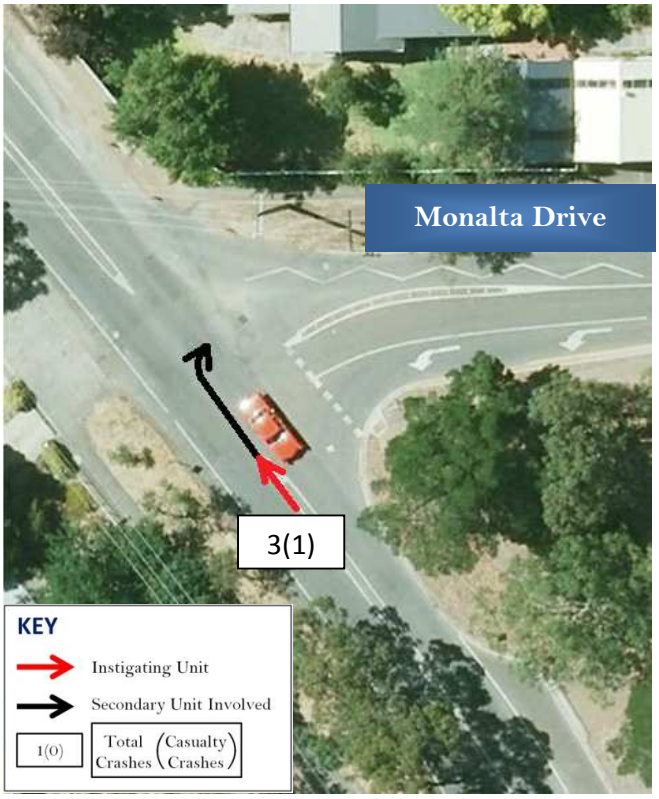
Figure 7.1.4.1 - Aerial Image of Junction (2014)

This junction is located north of the Laffers Road. Monalta Drive intersects Main Road at an incline. The road runs at an angle to Main Road but straightens up at the intersection to meet the road at a right angle. Monalta Drive allows for concurrent left and right turn lanes onto Main Road. Monalta Drive comprises a single traffic lane in each direction. This junction has a school located on the southern corner.



Monalta Drive provides access to residential properties, Rokewood Avenue and Thorngate Drive. There is a bus stop located just north of the junction on either side of the road on Main Road as well as multiple bus services that cater for the needs of Belair Primary School. There is a PAC located approximately 145m south of the junction.

Figure 7.1.4.2 - Crash Diagram (2009 – 2013)



Detailed analysis of the crash data indicates that the rear end crashes all involved northbound vehicles on Main Road colliding with stationary vehicles waiting to turn right onto Monalta Drive. Of these crashes, 2 occurred at night and in wet weather conditions. One of the rear end crashes resulted in a fatality.

Figure 7.1.4.3 - Main Road / Monalta Drive

TREATMENTS

A separate channelised right turn lane would provide a sheltered area for vehicles to wait before turning right into Monalta Drive reducing the potential for rear end crashes.

RECOMMENDATION

Refer Section 7.2.1

7.1.5 Main Road – Laffers Road

There were 3 reported crashes (1 PDO's and 2 casualty) at this T-Junction between the years 2009 and 2013 which has seen an 87% reduction in crashes (20 fewer crashes in total) since the 2006 RMP (noting there was a fatal crash reported in October 2013). The crash history does not indicate any particular trends in crash type.

All unsignalised intersections within the Adelaide Metropolitan area are ranked based on the number of casualty crashes that have occurred in the last five years. Accordingly, this location is ranked 671st. Table 7.1.5.1 below summarises the crash history at this location over the past five years.

Table 7.1.5.1 - Summary of crashes at Main Road / Laffers Road T Junction.

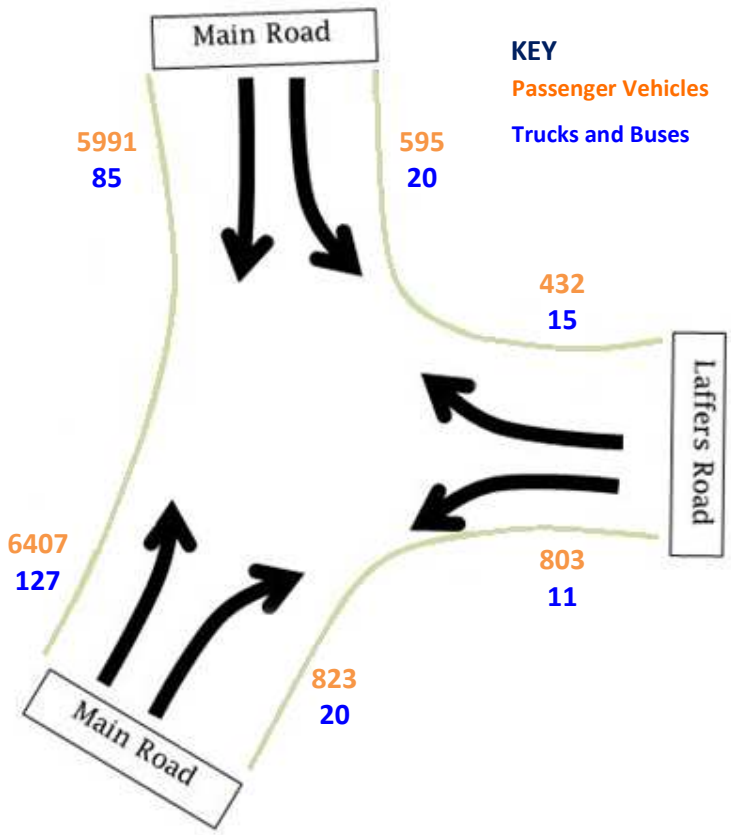
Crash Type	*PDO*	*Casualty*	*2009*	*2010*	*2011*	*2012*	*2013*	*Total*
Right Turn	-	2	-	1	-	-	1	**2**
Rear End	1	-	1	-	-	-	-	**1**
Total	**1**	**2**	**1**	**1**	**0**	**0**	**0**	**3**

The Laffers Road junction is located on the outside apex of a bend and has a single lane in each direction on Main Road with separate channelised left and right turning lanes for vehicular movements into Laffers Road. Laffers Road flares on approach to Main Road to provide separate left and right turn exit lanes. There is a PAC located approximately 160m north of the junction in front of Belair Primary School.

Figure 7.1.5.1 Aerial Image of Junction (2012)

The predominant traffic movements at the junction are vehicles travelling north and south on Main Road. Figures 7.1.5.2 below summarise the traffic volumes at the junction surveyed over an 11 hour period.

Figure 7.1.5.2 - Turning Count Volume – 11 hours (2014)



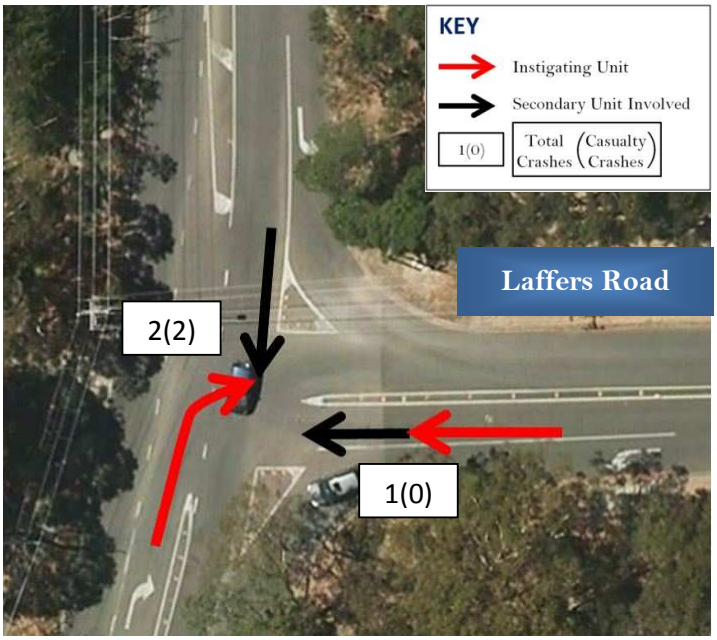
Laffers Road functions as a collector road providing a link between Upper Sturt Road and Main Road and provides access to Belair Primary pick-up / drop-off area, Blackwood Community Hospital site, residential properties, kindergarten and 'Our Lady of the Way' church. A PAC is located 80 metres east on Laffers Road.

Bus routes 195, 195F, 196, 196F use the junction, where 195F turns to/from Main Road (north) and 196 and 196F turn to/from Main Road (south). There are bus stops located on both sides of Main Road just north of Laffers Road. The eastern bus stop is located in the left turn lane into Laffers Road.

In early 2012 line marking was added to the junction to reinforce left turning vehicles have to give way to right turning vehicles into Laffers Road. This intersection has been identified by the community as a difficult junction to negotiate when turning right out to head north on Main

Road. Of note, there has been a 24% (138) decrease in vehicles turning right out from Laffers Road between 2005 and 2014. The difficulty in negotiating this junction may have contributed towards the reduction in the number of right turning vehicles as motorists may now be choosing alternative routes to access Main Road.

Figure 7.1.5.3 - Crash Diagram (2009 – 2013)



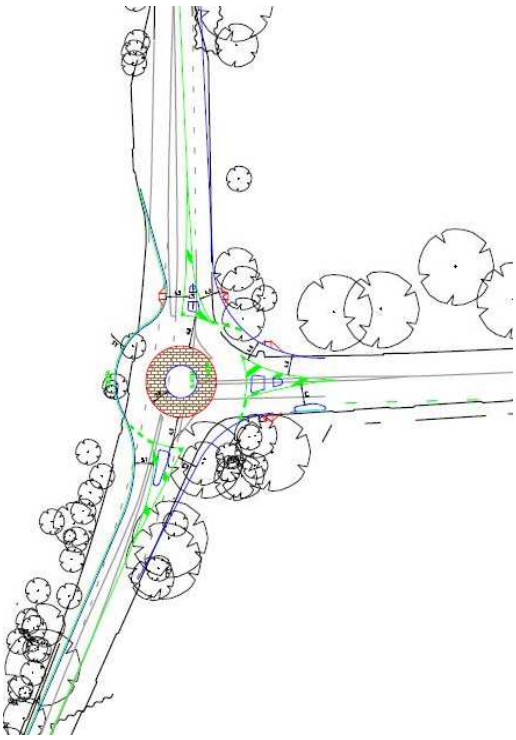
Detailed analysis of the crash data indicates no specific trends in crash type. Two of the crashes involved right turning traffic into Laffers Drive, one of which collided with a southbound motor cyclist resulting in a fatality. Of the three crashes at the junction, two of these occurred during daylight hours on a weekend. The five year crash history at this site is not reflective of any unsafe driver behaviour associated with motorists having difficulty negotiating the right turn out from Laffers Road onto Main Road.

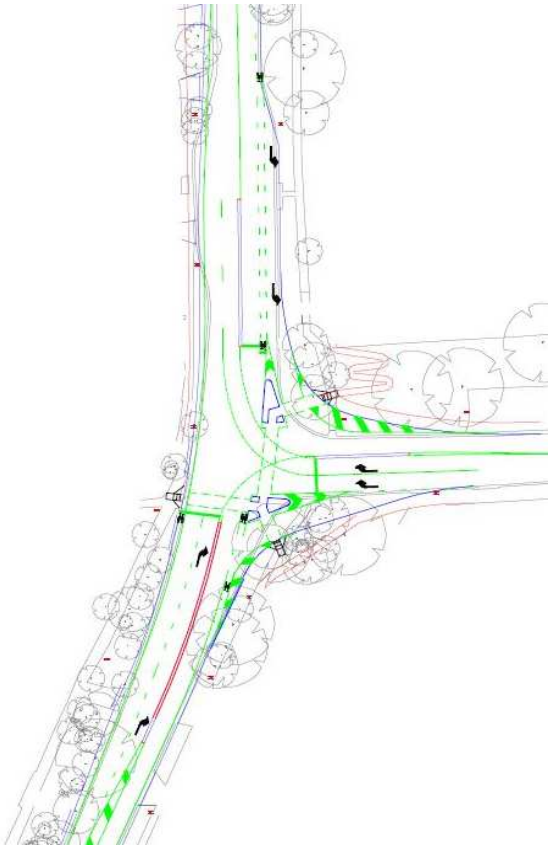
TREATMENTS

The 2006 RMP recommends further investigation into traffic signals and a roundabout as possible treatments at this location. Although there has been a significant reduction in crashes at the junction (87% fewer crashes). DPTI have investigated the following treatment options as recommended in the 2006 RMP which are aimed at improving safety at the junction:

a. Roundabout
b. Traffic signals

The implementation of a roundabout at this location was considered to provide a greater priority to vehicle movements to and from Laffers Road and improve safety at the junction by slowing vehicle speeds and simplifying vehicles movements at the junction. This treatment would require northbound traffic to give way to traffic exiting Laffers Road. This treatment would improve the travel time for vehicles exiting Laffers Road. However, the investigation revealed that the shift in turning movement priority at the junction, introduced by a roundabout, generates significant delays and long queues along Main Road during the weekday morning peak period. This treatment would require a substantial amount of road works attracting a high cost for implementation.





Traffic signals were also investigated to provide a greater priority to vehicle movements to and from Laffers Road and improve safety at the junction by controlling conflicting traffic movements. Traffic signals would provide safer crossing facilities for pedestrians at the junction as well as greater priority for Laffers Road traffic, including bus routes. Traffic signals would require north and southbound vehicles on Main Road to stop introducing travel time delays, albeit these are within an acceptable range. The traffic movements from Laffers Road would see an improvement in travel time. Traffic signals also allow for the provision of control measures to minimise the risk of vehicles queuing over the rail level crossing to the south of the junction if required. This treatment would require considerable road works attracting a high cost for implementation.

RECOMMENDATION

It is recommended that this site continue to be monitored. Should the trend in crashes at the junction increase then the implementation of traffic signals would be the preferred treatment at this location as it would improve the safety at the junction as well as provide controlled access for Laffers Road traffic. Unlike the roundabout, traffic signals also allow for the provision of safety measures to mitigate the risk for any queuing to extend back to the rail level crossing, south of the junction, if required. Should the trend in crashes at the junction increase, this treatment would need to be prioritised against all other state-wide projects.

7.1.6 Main Road – Byrne Street

There were 6 reported crashes (5 PDO and 1 casualty) at this T-Junction between the years 2009 and 2013 which has seen the number of crashes more than double (4 additional crashes) since the 2006 RMP. Crashes at the junction predominantly involve vehicles turning right into Byrne Street and right out from Byrne Street.

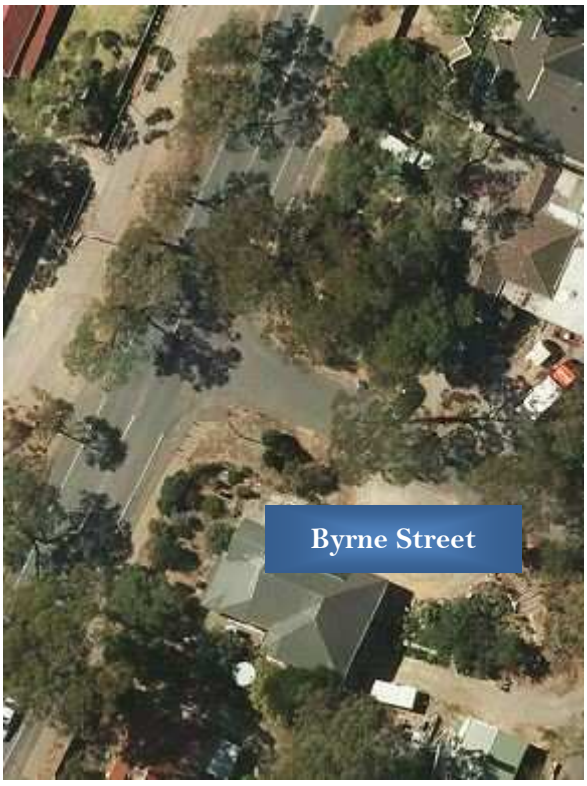
All unsignalised intersections within the Adelaide Metropolitan area are ranked based on the number of casualty crashes that have occurred in the last five years. Accordingly, this location is ranked 1,175th. Table 7.1.6.1 below summarises the crash history at this location over the past five years.

Table 7.1.6.1 - Summary of crashes at Main Road / Byrne Street T Junction

Crash Type	*PDO*	*Casualty*	*2009*	*2010*	*2011*	*2012*	*2013*	*Total*
Right Angle	1	-	1	-	-	-	-	**1**
Rear End	2	1	1	1	-	-	1	**3**
Right Turn	2	-	1	-	-	1	-	**2**
Total	**5**	**1**	**3**	**1**	**0**	**1**	**1**	**6**

The junction comprises a single traffic lane in each direction with no separate channelised turning lanes for left or right turning vehicles from Main Road. Byrne Street has a 7m wide carriageway carrying two-way traffic with no central line marking.

Figure 7.1.6.1 Aerial Image of Junction (2012)



Byrne Street provides access to residential properties, the Dunn Reserve and Rosella Avenue. The 2005 level crossing safety upgrade saw access restrictions at the junctions of Rosella Avenue and Glengarry Access causing traffic pattern changes through the local road network and at Byrne Street. Opposite the junction with Byrne Street is an access road serves several residential properties.

The levels of the road at the junction require vehicles to slow down significantly to manoeuvre to and from Byrne Street to avoid scraping the underside of vehicles. The road levels also channelise water across the side road down Main Road.

Figure 7.1.6.2 - Crash Diagram (2009 – 2013)

Detailed analysis of the crash data indicates that most of the crashes (83%) occurred during the morning and evening peak hour periods, with the majority occurring in daylight hours during the evening peak. The two rear end crashes occurred when a vehicle travelling northbound on Main Road collided with a stationary vehicle waiting to turn right into Byrne Street. Two of the crashes at the junction involved vehicles entering Byrne Street colliding with a south-bound cyclist on Main Road; one was reported as a right turn crash and the other as a right angle crash. One of the casualty crashes involved a vehicle travelling southbound on Main Road colliding with a stationary vehicle waiting to turn right into a residential access just north of Byrne Street.

Factors that may have contributed to the crashes at this location include traffic turning right into Byrne Street impeding through traffic on Main Road, the raised mound of bitumen on the Byrne Street approach slowing vehicle movement to and from the side road and limited visibility for vehicles exiting the side road.

TREATMENTS

A separate channelised right turn lane would provide a sheltered area for vehicles to wait before turning right into Byrne Street reducing the potential for rear end crashes. It would also allow vehicles turning right out of Byrne Street to perform a two stage manoeuvre by storing in the middle of the road reducing the potential for right angle crashes. This treatment is considered an appropriate treatment to improve the safety and is in accordance with the vision for this section of road (refer to Figure 4.1). This treatment would require road widening and possibly the removal of some roadside vegetation. Additionally the Department would need to work with Council to address the level issues on the side road approach to Main Road, which are currently undesirable.

RECOMMENDATION

It is recommended that a channelised right turn treatment be implemented at this location in accordance with the standard layout in Section 4. As part of this treatment the Department would need to work with Council to address the level issues on the side road. Given there has only been one casualty crash during the past 5 years, this treatment would be considered a low priority when compared against other state-wide priorities.

7.1.7 Main Road – Stirling Road/ Miller Terrace

There were 2 reported crashes (1 PDO and 1 casualty) along this section between 2009 and 2013.

All unsignalised intersections within the Adelaide Metropolitan area are ranked based on the number of casualty crashes that have occurred in the last five years. Accordingly, this location is ranked 1,175th. Table 7.1.7.1 below summarises the crash history at this location over the past five years.

Table 7.1.7.1 - Summary of crashes at Main Road / Stirling Road/ Miller Terrace

Crash Type	*PDO*	*Casualty*	*2009*	*2010*	*2011*	*2012*	*2013*	*Total*
Rear End	1	1	1	1	-	-	-	**2**
Total	**1**	**1**	**1**	**1**	**0**	**0**	**0**	**2**

This offset junction is located on the south of Burfield Street and north of the View Road and Colton Road junction. Main Road at this location provides one traffic lane and a cyclist lane in each direction as well as a separate channelised right turn lane for vehicles turning right into Miller Terrace and Stirling Road. Miller Terrace has one lane in each direction and Stirling Road also has one lane in each direction with both streets allowing all turning movements onto Main Road.

Figure 7.1.7.1 - Aerial of Junction (2014)

Stirling Road and Miller Terrace both provide access to residential properties as well as local businesses located on Stirling Road. There is a cluster of shops and business to the south-east of the junction with the majority of the properties on the north-western side being residential in nature. The access points for the majority of the retail/commercial properties are located on Main Road and parking is provided at most of the local businesses.

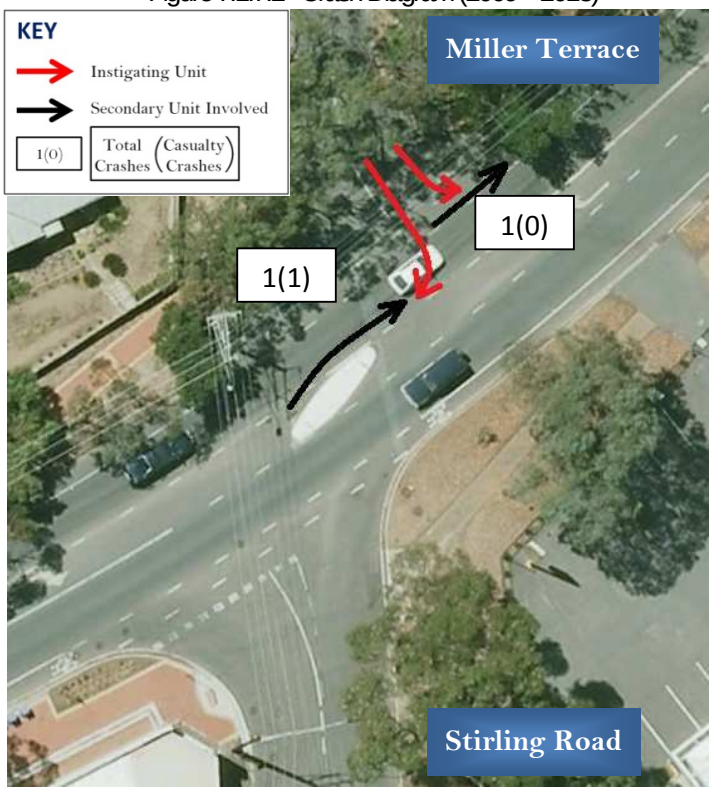
There is a small solid median in the centre of the junction at the end of both turning lanes to guide commuters through the junction and provide a degree of separation between the turning movements.

The lighting along this mid-block was upgraded in 2008 to current arterial road standards.

In 2009 the intersection was upgraded as part of a painted median scheme implemented along Main Road from Southern Avenue to Chapman Street. The upgrade included a separate right turn storage lane at Stirling Road and Miller Terrace, cyclist lanes along Main Road and a more formalised staggered intersection. This upgrade was intended to improve the safety and operation at this intersection by creating a storage lane for vehicles wishing to cross the intersection in two stages. The upgrade was also intended to improve safety for both cyclists and pedestrians with added bike lanes and improved pedestrian ramps with the addition of coloured pedestrian walkways.

The speed limit through the intersection was reduced from 60kph to 50kph in 2007 as part of a corridor speed reduction initiative between Burfield Street (50 metres south of) and Blackwood Roundabout.

Figure 7.1.7.2 - Crash Diagram (2009 – 2013)



TREATMENTS

There are no alterations proposed at this intersection at this time. The intersection was upgraded as recommended in the 2006 RMP and the speed limit along Main Road has been reduced since the 2006 RMP. The upgrade at the intersection has been implemented primarily to separate and guide turning movements to and from the side roads along this section and provide a sheltered area for vehicles to wait before turning right into Miller Terrace and Stirling Road. The reduction in speed limit along this section of Main Road, providing a slower driving environment, allows motorists and pedestrians' greater time to react to other vehicular activity.

RECOMMENDATION

It is recommended that this site continue to be monitored.

7.1.8 Main Road – View Road

There were 2 reported crashes (1 PDO and 1 casualty) at this intersection between the years 2009 and 2013 which has seen the number of reported crashes triple (2 additional crashes) since the 2006 RMP. All of the recorded crashes are right angle (2) involving vehicles turning right out from View Road colliding with northbound vehicles on Main Road.

All unsignalised intersections within the Adelaide Metropolitan area are ranked based on the number of casualty crashes that have occurred in the last five years. Accordingly, this location is ranked 1,175th. Table 7.1.8.1 below summarises the crash history at this location over the past five years.

Table 7.1.8.1 - Summary of crashes at Main Road / View Road T-Junction

Crash Type	PDO	Casualty	2009	2010	2011	2012	2013	Total
Right Angle	1	1	-	1	-	1	-	2
Total	**1**	**1**	**0**	**1**	**0**	**1**	**0**	**2**

This T-junction is located on the outside apex of a bend with the Colton Road junction and a service road access located just south. Main Road at this location provides two traffic lanes and a cyclist lane in each direction as well as channelised right turn bays on Main Road to allow vehicles turning right into the side roads to safely wait without slowing through traffic on Main Road. The channelised treatment also provides motorists the opportunity to make the right turn out manoeuvre from View Road and Colton Road safely in two stages. There is a short section of painted median located between View Road and Colton Road to separate turning traffic and to prevent unsafe straight through movements between the side roads.

Figure 7.1.8.1 - Aerial Image of Intersection (2012)

View Road provides access to residential properties as well as providing additional access to the dine-in and fast food restaurants located on the north-west corner. The intersection also has residential properties and retail businesses fronting Main Road.

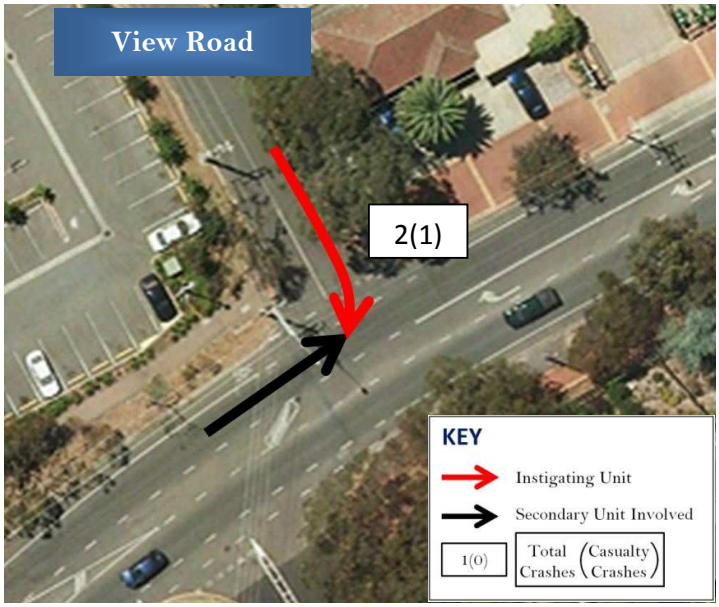
The lighting along this mid-block was upgraded in 2008 to current arterial road standards.

In 2009 the intersection was upgraded as part of a painted median scheme implemented along Main Road from Southern Avenue to Chapman Street. The upgrade included a separate right

turn storage lane at View Road and Colton Road, cyclist lanes along Main Road. This upgrade was intended to improve the safety and operation at these junctions by separating and guiding the right turn movements to and from Main Road, providing road space for cyclists through delineation and at specific locations providing raised refuge areas for pedestrians to cross Main Road in two-stages.

The speed limit through the intersection was reduced from 60km/h to 50km/h in 2007 as part of a corridor speed reduction initiative between Burfield Street (50 metres south of) and Blackwood Roundabout.

Figure 7.1.8.2 - Crash Diagram (2009 – 2013)



Detailed analysis of the crash data indicates that all of the crashes occurred in the evening, with two being reported to occur at night. Factors that may have contributed to crashes at this junction include roadside vegetation and stobie poles obstructing visibility for vehicles exiting the side road, the number of junctions and access points along a short section of Main Road and the conflict between the volume of turning traffic generated by the surrounding land use and through traffic along Main Road.

TREATMENTS

There are no significant alterations proposed at this intersection. The intersection was recently upgraded as recommended in the 2006 RMP and the speed limit along Main Road has been reduced since the 2006 RMP. The upgrade at the intersection has been implemented primarily to separate and guide right turn movements to and from the side roads and provide a sheltered area for vehicles to wait before turning into View Road or Colton Road. The reduction in speed limit along this section of Main Road, providing a slower driving environment, allows motorists greater time to react to other vehicular activity.

Trimming or removal of roadside vegetation as well as relocation or removal of the stobie pole on the north-west corner would improve the visibility for vehicles exiting Miller Terrace.

RECOMMENDATION

On review of the crash data it is recommended the roadside vegetation be trimmed back or removed where necessary and the stobie pole on the north-west corner be relocated or removed (i.e. the power lines redirected to be underground). Given there has only been one casualty crash during the past five years, this treatment would be considered a low priority when compared against other state-wide priorities

7.1.9 Main Road – Colton Road

There were 2 reported crashes (1 PDO and 1 casualty) along this section between 2009 and 2013, which has seen a 33% reduction in crashes (1 less crash) since the 2006 RMP. The crash history does not indicate any particular trends in crash type.

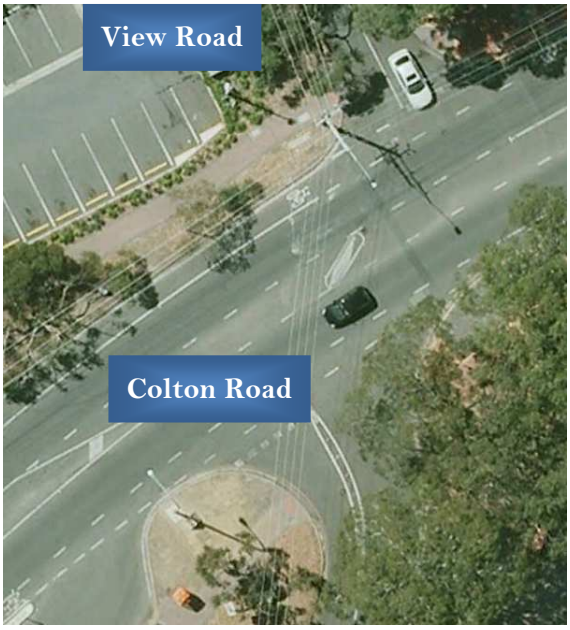
All unsignalised intersections within the Adelaide Metropolitan area are ranked based on the number of casualty crashes that have occurred in the last five years. Accordingly, this location is ranked 1,175th. Table 7.1.9.1 below summarises the crash history at this location over the past five years.

Table 7.1.9.1 - Summary of crashes at Main Road / Colton Road

Crash Type	PDO	Casualty	2009	2010	2011	2012	2013	Total
Rear End	-	1	-	1	-	-	-	**1**
Right Angle	1	-	-	-	-	-	1	**1**
Total	**1**	**1**	**0**	**1**	**0**	**0**	**1**	**2**

This junction is located on a sweeping bend just south of View Street and north of the Gulfview Road. Main Road at this location provides one traffic lane and a cyclist lane in each direction as well as a separate channelised right turn lane for vehicles turning right into Colton Road.

Figure 7.1.9.1 - Aerial of Junction (2014)



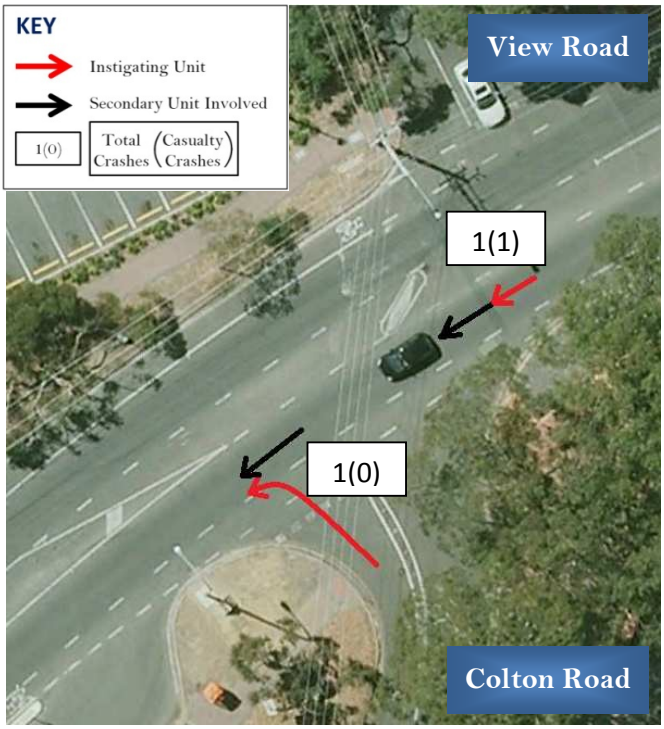
There is a narrow solid median providing some separation between Main Road and the service road, the median also channelises the entry and exit points for the service road away from the Gulfview Road T-junction.

The lighting along this mid-block was upgraded in 2008 to current arterial road standards.

In 2009 the intersection was upgraded as part of a painted median scheme implemented along Main Road from Southern Avenue to Chapman Street. The upgrade included a separate right turn storage lane at Colton Road and View Road, cyclist lanes along Main Road and a more formalised staggered intersection at Colton Road and View Road. This upgrade was intended to improve the safety and operation at this intersection by creating a storage lane for vehicles wishing to cross the intersection in two stages. The upgrade was also intended to improve safety for both cyclists and pedestrians with added bike lanes and improved pedestrian ramps.

The speed limit through the intersection was reduced from 60kph to 50kph in 2007 as part of a corridor speed reduction initiative between Burfield Street (50 metres south of) and Blackwood Roundabout.

Figure 7.1.9.2 - Crash Diagram (2009 – 2013)



Detailed analysis of the crash data indicates that factors that may have contributed to crashes at this junction include the number of junctions and access points along a short section of Main Road and limited sight distance from Colton Road due to the incline and sweeping bend onto Main Road. The crash history does not indicate any particular trends in crash type at this junction.

TREATMENTS

There are no significant alterations proposed at this intersection. The intersection was upgraded as recommended in the 2006 RMP and the speed limit along Main Road has been reduced since the 2006 RMP. The upgrade at the intersection has been implemented primarily to separate and guide turning movements to and from the side roads along this section and provide a sheltered area for vehicles to wait before turning right into Miller Terrace and Stirling Road. The reduction in speed limit along this section of Main Road, providing a slower driving environment, allows motorists and pedestrians' greater time to react to other vehicular activity.

RECOMMENDATION

On review of the crash data it is recommended that this site continue to be monitored.

7.1.10 Main Road – Chapman Street

There were 2 reported crashes (2 PDO and 0 casualties) along this section between 2009 and 2013, which has seen a 60% reduction in crashes (3 fewer crashes) since the 2006 RMP. The crash history does not indicate any particular trends in crash type.

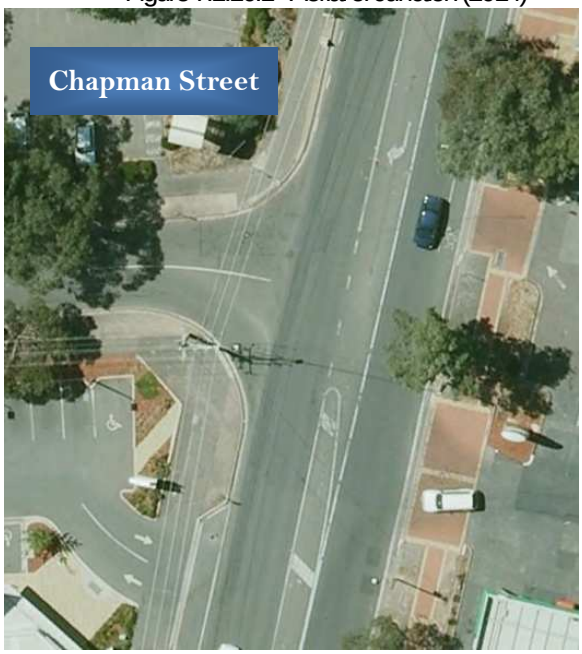
All unsignalised intersections within the Adelaide Metropolitan area are ranked based on the number of casualty crashes that have occurred in the last five years. Accordingly, this location is ranked 2,377th. Table 7.1.10.1 below summarises the crash history at this location over the past five years.

Table 7.1.10.1 - Summary of crashes at Main Road / Chapman

Crash Type	PDO	Casualty	2009	2010	2011	2012	2013	Total
Rear End	1	-	-	1	-	-	-	**1**
Side Swipe	1	-	1	-	-	-	-	**1**
Total	**2**	**0**	**1**	**1**	**0**	**0**	**0**	**2**

This junction is located south of Gulfview Road and north of Edward Street. Main Road at this location provides one traffic lane in each direction as well as a separate channelised right turn lane for vehicles turning right into Colton Road.

Figure 7.1.10.1 - Aerial of Junction (2014)



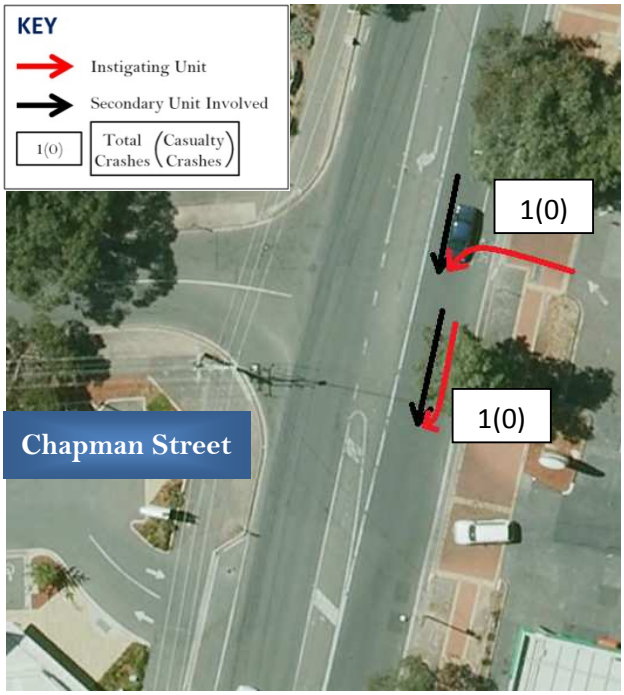
There is a painted median either side of the turning lane into Chapman Road along Main Road. To the south of Chapman Street the road widens to form two traffic lanes in each direction while still providing a bike lane either side of the road. Access to the BP is also provided directly opposite the T-junction adjacent the right turn lane into Chapman Street.

The lighting along this mid-block was upgraded in 2008 to current arterial road standards.

In 2009 the intersection was upgraded as part of a painted median scheme implemented along Main Road from Southern Avenue to Chapman Street. The upgrade included a separate right turn storage lane at Chapman Street, cyclist lanes along Main Road and a more formalised T-junction at Chapman Street. This upgrade was intended to improve the safety and operation at this intersection by creating a storage lane for vehicles wishing to cross the intersection in two stages.

The speed limit through the intersection was reduced from 60kph to 50kph in 2007 as part of a corridor speed reduction initiative between Burfield Street (50 metres south of) and Blackwood Roundabout.

Figure 7.1.10.2 - Crash Diagram (2009 – 2013)



TREATMENTS

There are no alterations proposed at this intersection. The intersection was recently upgraded as recommended in the 2006 RMP and the speed limit along Main Road has been reduced since the 2006 RMP.

RECOMMENDATION

On review of the crash data it is recommended that this site continue to be monitored.

7.1.11 Main Road – Edward Street / Carr Street

There were 3 reported crashes (2 PDO and 1 casualty) along this section between 2009 and 2014, which has seen a 60% reduction in crashes (7 fewer crashes) since the 2006 RMP. The crash history does not indicate any particular trends in crash type.

All unsignalised intersections within the Adelaide Metropolitan area are ranked based on the number of casualty crashes that have occurred in the last five years. Accordingly, this location is ranked 1,175th. Table 7.1.11.1 below summarises the crash history at this location over the past five years.

Table 7.1.11.1 - Summary of crashes at Main Road / Edward Street / Carr Street Intersection

Crash Type	PDO	Casualty	2009	2010	2011	2012	2013	Total
Rear End	1	-	-	-	1	-	-	**1**
Right Angle	1	1	-	1	-	1	-	**2**
Total	**2**	**1**	**0**	**1**	**1**	**1**	**0**	**3**

This intersection is located within the commercial precinct in the heart of Blackwood. At this location Main Road provides two traffic lanes in each direction with a painted median north of the intersection and a solid median to the south. Indented kerbside parking is permitted on both sides of Main Road north of the intersection and along the eastern side of Main Road south of the intersection.

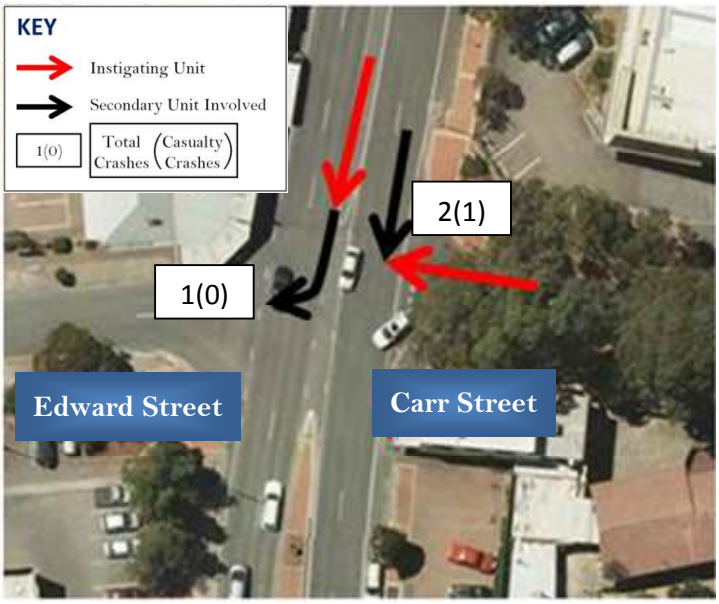
Figure 7.1.11.1 - Aerial Image of Intersection (2012)

This section of Main Road is busy throughout the day with commuter traffic during the weekday morning and evening peak periods as well as traffic generated by the surrounding land use during business hours.

There are numerous retail businesses surrounding the junction, most of which provide on and off-street parking for patrons, and the Blackwood Library is located on the north-east corner of the intersection. Edward Street provides access to a large volume of off-street parking spaces for retail and supermarkets within the vicinity of the junction. Carr Street provides access to the Blackwood Library as well as retail, residential dwellings and the Blackwood Station, further south of the intersection. Currently a number of vehicles use this intersection to perform u-turns.

The speed limit through the intersection was reduced from 60kph to 50kph in 2007 as part of a corridor speed reduction initiative between Burfield Street (50 metres south of) and Blackwood Roundabout.

Figure 7.1.11.2 - Crash Diagram (2009 – 2013)



Detailed analysis of the crash data indicates that possible factors contributing to crashes at this location include the number of conflicting traffic movements at the intersection, the conflict between turning traffic generated by the surrounding land use and through traffic along Main Road, the incline on Carr Street approach to the intersection and the visibility from the side roads being impaired by buildings, parked vehicles and roadside vegetation. The reduced speed limit (to 50kph) may have contributed to the reduction in the number of rear end crashes (80% reduction) since the 2006 RMP by providing a slower driving environment which allows motorists greater time to react to other vehicular activity.

There is some community concern about the number of vehicles currently u-turning at the intersection. A pedestrian refuge was installed on Main Road between Edward / Carr Street and Chapman Street to improve pedestrian access in 2014.

TREATMENTS

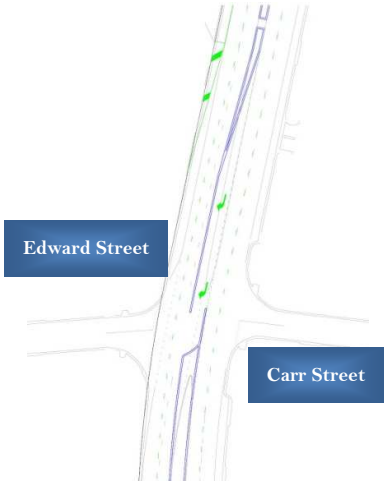
As discussed in the 2006 RMP the implementation of traffic signals at this location is not warranted based on either traffic demand or pedestrian crossing requirements. Therefore this option has not been further investigated.

DPTI has investigated the following treatment options aimed to improve safety and operation of the junction:

a. Channelised right turn treatment for the right turn into Edward Street
b. Channelised right turn treatment for the right turn into Carr Street
c. Widening the median and implement a solid median north of the intersection

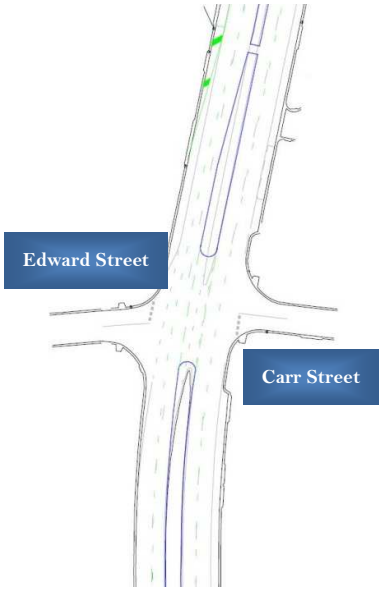
Included in all of the treatment options considered is the provision of a pedestrian refuge north of the intersection. This would improve the safety for pedestrians crossing Main Road by allowing them to cross in two stages.

Providing a channelised right turn treatment into Edward Street would improve the safety at the intersection by reducing the number of conflicting vehicular movements permitted at the intersection as well as providing a separate storage area for vehicles waiting to turn right in to Edward Street. This treatment would result in movement restrictions at this intersection, including no access to Carr Street or the Blackwood Library from the south. It would also impact on the ability to perform at u-turn heading north.



Similarly, providing a channelised right turn treatment into Carr Street would improve the safety at the intersection by reducing the number of conflicting vehicular movements permitted at the intersection as well as providing a separate storage area for vehicles waiting to turn right in to Edward Street. This option would also result in movement restrictions at the intersection, including no access to Edward Street from the north impacting access to a substantial amount of off-street parking associated with retail and supermarket facilities in Blackwood as well as delivery vehicle access to Coles. Albeit, access from the north to these facilities is also available via Chapman Street and Young Street with both of these junctions providing a sheltered right turn lane allowing right turn vehicles to store without impeding through traffic along Main Road.

Widening the median on Main Road at this location would improve the safety at the intersection by providing a storage area for vehicles waiting to turn right into the side roads and allowing vehicles turning right out from the side roads to do so as a two-stage manoeuvre. This option also maintains a high level of access at the intersection.



RECOMMENDATION

It is recommended that the median along Main Road be widened to maintain a high level of access by providing a storage area for both vehicles waiting to turn right into the side roads and vehicles performing a two stage right turn out from the side roads. Given there has only been one casualty crash during the past five years, this treatment would be considered a low priority when compared against other state-wide priorities.

Notwithstanding the abovementioned recommendation, expansions to the Library on the north-east corner of the intersection would require a review of the access and operation at this intersection possibly altering what treatment is preferred at this location.

7.1.12 Main Road – Young Street

There were 6 reported crashes (3 PDO and 3 casualties) at this T-Junction between the years 2009 and 2013 which has seen a 33% reduction in crashes (3 fewer crashes) since the 2006 RMP. The predominant crash type at the junction is right angle (5 crashes), involving vehicles turning right out from Young Street.

All unsignalised intersections within the Adelaide Metropolitan area are ranked based on the number of casualty crashes that have occurred in the last five years. Accordingly, this location is ranked 401th. Table 7.1.12.1 below summarises the crash history at this location over the past five years.

Table 7.1.12.1 - Summary of crashes at Main Road / Young Street Junction

Crash Type	PDO	Casualty	2009	2010	2011	2012	2013	Total
Right Angle	2	3	2	-	1	1	1	**5**
Side Swipe	1	-	-	-	1	-	-	**1**
Total	**3**	**3**	**2**	**0**	**2**	**1**	**1**	**6**

The junction of Main Road and Young Street is located within the commercial precinct in the heart of Blackwood. At this location Main Road provides two traffic lanes in each direction with a separate channelised right turn lane for vehicles turning right into Young Street. South of Young Street there is a PAC on Main Road and kerbside parking is permitted just north (on the eastern side) of Main Road.

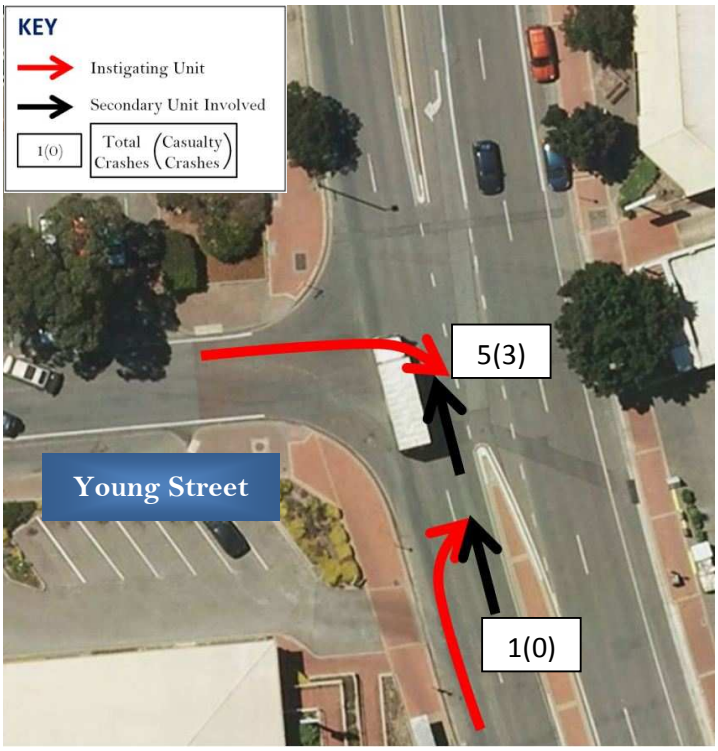
Figure 7.1.12.1 - Aerial Image of Junction (2012)

This section of Main Road is busy throughout the day with commuter traffic during the weekday morning and evening peak periods as well as traffic generated during business hours. Young Street provides access to a large volume of off-street parking spaces for retail and supermarkets. There are numerous retail businesses surrounding the junction, most of which provide on and off-street parking for patrons.

There are bus stops on both sides of Main Road just south of Young Street. The bus stop located on the eastern side of Main Road is indented to allow southbound vehicles in the kerbside lane to pass a stopped bus.

The speed limit through the intersection was reduced from 60kph to 50kph in 2007 as part of a corridor speed reduction initiative between Burfield Street (50 metres south of) and Blackwood Roundabout.

Figure 7.1.12.2 - Crash Diagram (2009 – 2013)



Detailed analysis of the crash data indicates that five of the six crashes at the junction involved vehicles turning right out from Young Street colliding with a northbound vehicle on Main Road, all of which occurred during business hours. The fourth crash resulted when a northbound vehicle changed lanes and side swiped a vehicle in the adjacent lane.

Factors that may have contributed to the 'right angle' crashes at this location include the volume of traffic turning to and from Young Street associated with the businesses, reduced visibility to the south due to the proximity of roadside vegetation and stopping/slowing down buses and/or vehicles (to turn left into Young Street) in the kerbside lane obscuring northbound cars in the outside lane.

TREATMENTS

There are various options that could be implemented to address right angle crashes at this intersection. Banning the right turn out from Young Street is one option but is not considered appropriate because of the importance of this movement and the access it provides for the community.

A separate channelised left turn lane has been considered in order to address the right angle crashes at the junction by separating out left turning vehicles from the northbound through traffic. This would allow motorists on Young Street to see past the left turning vehicles as well as assisting them to judge the behaviour and movements of northbound traffic passing the junction. The separate channelised left turn lane would also act as an indented bus stop and would allow vehicles exiting Young Street to see past stationary buses again improving the visibility from the side road.

Trimming or removal of roadside vegetation to the south of the junction would also improve the visibility for vehicles exiting Young Street.

RECOMMENDATION

On review of the crash data it is recommended the vegetation to the south be trimmed back or removed and the channelised left turn lane be installed. Given there has only been two casualty crashes during the past five years, this treatment would be considered a low priority when compared against other state-wide priorities.

7.1.13 Blackwood Roundabout

There were 48 reported crashes (42 PDO and 6 casualties) at the roundabout between the years 2009 and 2014 which has seen a 59% reduction in crashes (total of 70 fewer crashes) since the 2006 RMP. The predominant crash type at the roundabout is right angle (24 crashes).

All unsignalised intersections within the Adelaide Metropolitan area are ranked based on the number of casualty crashes that have occurred in the last five years. Accordingly, this location is ranked 10th. Table 7.1.13.1 below summarises the crash history at this location over the past five years.

Table 7.1.13.1- Summary of crashes at Blackwood Roundabout

Crash Type	*PDO*	*Casualty*	*2009*	*2010*	*2011*	*2012*	*2013*	*Total*
Right Angle	24	4	7	6	6	8	1	**28**
Hit Fixed Object	1	-	-	1	-	-	-	**1**
Rear End	9	1	1	4	3	1	1	**10**
Side Swipe	8	1	3	1	1	3	1	**9**
Total	**42**	**6**	**11**	**12**	**10**	**12**	**3**	**48**

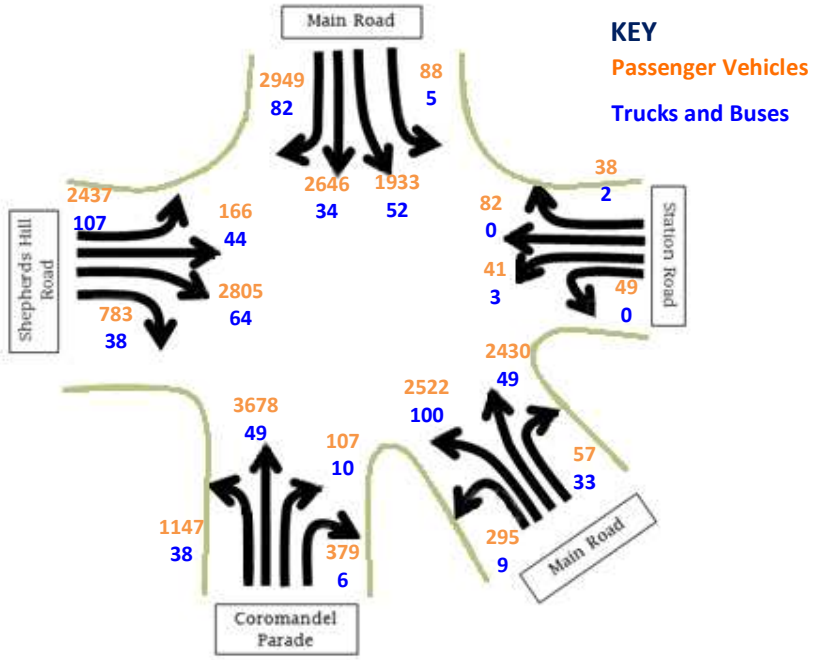
The roundabout has five legs with most providing two approach and exit lanes. Station Road and Main Road (south) are the exception with a single entry & exit lane on Station Road and a single exit lane on Main Road (south). Coromandel Parade & Station Road are under the care and control of Mitcham Council while Main Road & Shepherds Hill Road are under the care and control of DPTI. There are PAC's to the north of the roundabout on Main Road and to the west on Shepherds Hill Road.

Indented kerbside parking is provided along both sides of Main Road, north and south of the roundabout whereas on-street kerbside parking is provided on the northern side of Shepherds Hill Road between the PAC and the roundabout. A level crossing is located south of the roundabout on Main Road adjacent to the Blackwood Interchange. The railway line services both passenger and freight trains.

Figure 7.1.13.1 Aerial Image of Intersection (2012)

Figure 7.1.13.2 below summarises the traffic volumes surveyed over an 11 hour period.

Figure 7.1.13.2 - Turning Count Volume – 11 hours (2013)



The Blackwood Roundabout facilitates vehicular movements between four key roads as well as access to the Blackwood Interchange. The roundabout is located in the heart of Blackwood within a pedestrian precinct and is surrounded by retail facilities. The retail adjacent the roundabout generates high levels of pedestrian and parking activity as well as turning/slowing vehicles accessing shopping centre car parks which affects the capacity and operation of the roundabout.

Numerous bus routes negotiate the roundabout as illustrated in Section 2.5. All buses are required to enter the Blackwood Interchange via Station Road then exit the interchange Main Road (south).

Main Road (north) approach has a shared through and left turn lane (kerbside lane) and a shared through and right turn lane (median lane). The through movement from Main Road (north) is to Coromandel Parade. This approach experiences its peak traffic demand during the weekday evening peak period.

Main Road (south) approach has a short shared through and left turn lane (short kerbside lane) and a shared through and right turn lane (median lane). The through movement from Main Road (south) is to Shepherds Hill Road. This approach experiences its peak traffic demand during the weekday morning peak period.

Coromandel Parade approach has a short shared through and left turn lane (short kerbside lane) and a shared through and right turn lane (median lane). The through movement from Coromandel Parade is to Main Road (north). This approach experiences its peak traffic demand during the weekday morning peak period.

Shepherds Hill Road approach has an exclusive left turn lane (kerbside lane) and a shared through and right turn lane (median lane). The through movement from Shepherds Hill Road is to Main Road (south). This approach experiences its peak traffic demand during the weekday evening peak period.

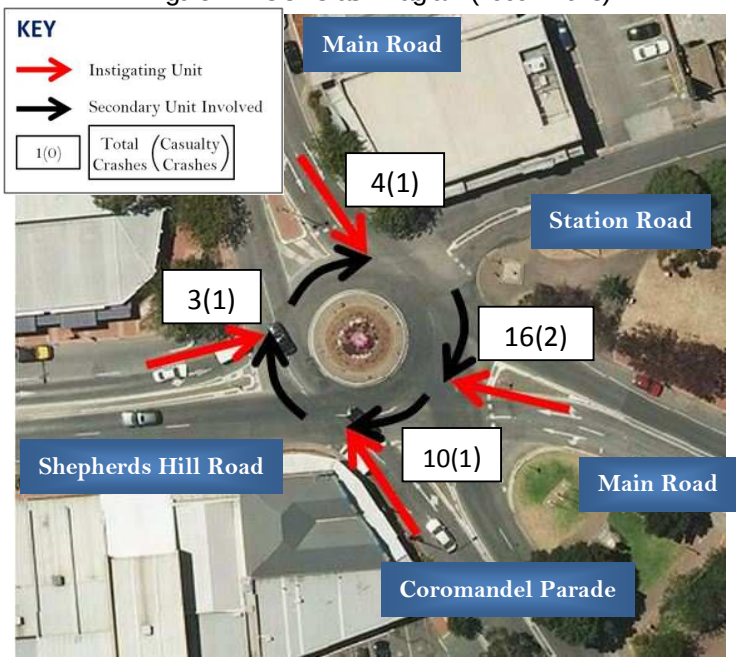
Station Road is a single lane approach, carrying small volumes of traffic and forms part of the Blackwood Interchange circulation route for public transport vehicles. This approach experiences its peak traffic demand during the weekday evening peak period.

Advanced directional signs were implemented on Main Road (north), Coromandel Parade and Main Road (south) approaches in 2008 to improve navigation of the roundabout. In 2008 DPTI also upgraded the pedestrian kerb ramps and crossing facilities on Coromandel Parade, south of the roundabout to improve the access and safety for pedestrians.

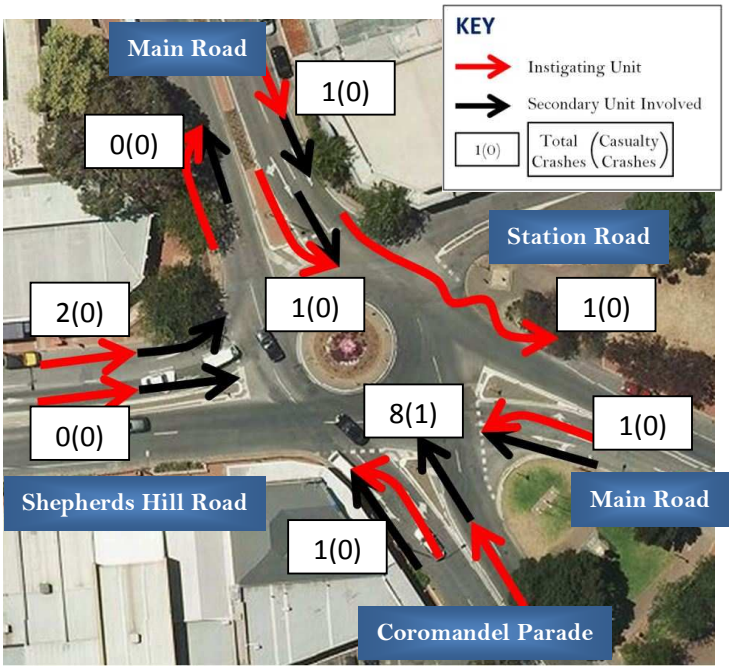
The speed limit on all approaches to the roundabout was reduced from 60kph to 50kph in 2007 as part of a corridor speed reduction initiative between Burfield Street (50 metres south of) and the roundabout on Main Road.

Detailed analysis of the crash data indicates there has been a significant reduction in the number of rear end (63% reduction) and side swipe crashes (73% reduction) at the roundabout since the 2006 RMP. The reduced speed limit (to 50kph) would have contributed to the reduction by providing a slower driving environment so motorists have a greater time to react to other vehicular activity. The advanced directional signage would have also contributed towards the reduction in side swipe crashes by guiding the traffic into the correct approach lane prior to the roundabout which reduces sudden or unexpected lane changing behaviour at the roundabout.

Figure 7.1.13.3 - Crash Diagram (2009 – 2013)



Notwithstanding the reported reduction in crashes, this junction still has a relatively high number of crashes occurring compared to the other intersections and junctions along the study corridor.



Main Road (south) approach has the second highest number of crashes (17) compared to the other approaches with the predominant crash type being 'right angle' entering collide with turning vehicles on the roundabout. Most of the right angle crashes occurred during the afternoon daylight hours, with half of these occurring during the weekday evening peak period. The other reported crashes involved one 'side swipe' and a 'hit fixed object' collision on the approach to the roundabout.

Coromandel Parade approach has the highest number of crashes (19) compared to the other approaches with the predominant crash types being 'rear end' (8) and 'right angle' (10). The eight right angle crashes reported on Coromandel Parade approach involved vehicles that had entered the roundabout from Main Road (south). The other reported crash was a 'side swipe'.

Shepherds Hill Road approach has the lowest reported crash history (5) compared to the other approaches with the predominant crash type being 'right angle'. The three right angle crashes involved vehicles that had entered the roundabout from Coromandel Parade heading to Main Road (north), two of the crashes resulted in casualties. The other reported crash involved a 'rear end' collision on the approach to the roundabout.

Main Road (north) approach has the second lowest reported crash history (6) compared to the other approaches with the predominant crash types being 'right angle' and 'rear end'. The right angle crashes all involved vehicles that had entered the roundabout from Shepherds Hill Road heading south towards Main Road (south).

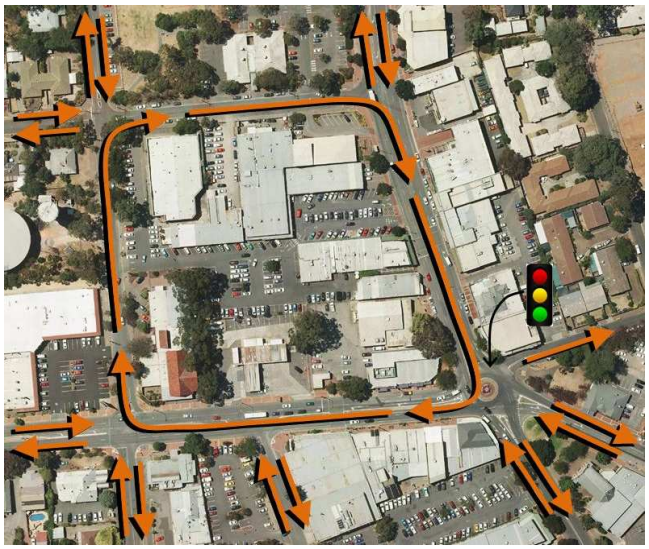
The Blackwood roundabout has been subject to complaints by Mitcham Council and the community for a number of years due to its layout, complexity to negotiate and high traffic volumes. One of the community concerns is that pedestrians (particularly the elderly) are having difficulty crossing the road at Coromandel Parade and Main Road (south).

Factors that may have contributed to the crashes at this location include the relatively high volume of vehicles using the roundabout, parked vehicles near the roundabout, poor delineation not separating vehicles exiting to Main Road (south) and the layout which allows vehicles to move through the roundabout at higher speeds.

TREATMENTS

DPTI has investigated the following treatment options aimed to improve safety and operation of the roundabout:

a. One-way loop (clockwise) comprising Main Road (north), Shepherds Hill Road, Young Street and Waite Street
b. Roundabout metering (similar to Blythewood Roundabout)
c. Traffic signals
d. Reducing the complexity of the roundabout by removing one leg
e. Improving the geometric layout of the current roundabout



A one-way loop was considered as a network treatment to reduce the potential for crashes at the Blackwood Roundabout with minimal widening and land acquisition. The treatment requires all vehicles approaching the one-way loop to circulate in a clockwise direction along Main Road, Shepherds Hill Road, Waite Street and Young Street. The conflicting vehicle movements where Main Road (south) and Coromandel Parade intersect the one-way loop would be controlled using traffic signals. The treatment would improve the safety at all the locations where roads intersect the one-way loop by reducing the number of turning movements at each junction including the intersection of Shepherds Hill Road with Brighton Parade and Waite Street as well as the Main Road junction with Young Street. This treatment would predominantly make use of the current road reserve requiring some relatively minor road widening compared to the implementation of traffic signals or upgrading the geometry of the current roundabout. The one-way circulation would result in some movements appearing anti-directional to motorists and bus drivers compared to the current operation. Traffic modelling indicated that the one-way loop would result in increased travel time delays through the area. The treatment introduces significant amounts of weaving along the mid-block sections between the junctions which would increase the potential for mid-block crashes around the one-way loop as well as safety concerns for cyclist and pedestrians within the commercial precinct which is undesirable. Due to the increase in overall travel time delay and the increased potential for mid-block crashes this treatment is not considered appropriate.

Roundabout metering was considered to reduce the potential for crashes at the roundabout by controlling the flow entering the roundabout resulting in altered traffic priorities at the roundabout during the peak operational periods. This treatment would attempt to even out the queues and delays at the roundabout during the weekday peak operational periods. The treatment would use part time traffic signals to intermittently stop the flow from Main Road (south) approach entering the roundabout to allow the vehicles from Coromandel Parade to enter the roundabout during the weekday morning peak period.

Part time traffic signals would intermittently stop the flow of vehicles from Shepherds Hill Road entering the roundabout to allow vehicles from Main Road (north) to enter the roundabout. This treatment was previously investigated in the 2006 RMP and has been reassessed using more recent traffic volume data. The findings reported in the 2006 RMP are consistent with the findings from recent modelling. Traffic modelling indicates that the installation of part time traffic signals to alter traffic priorities and control traffic flows entering the roundabout would not have any significant overall operational or safety benefits due to the traffic flows on the busier approaches to the roundabout being relatively balanced.

Further traffic modelling is required to adequate assess the impact to the evening peak period in order to identify any potential traffic flow improvements.

Traffic signals were also investigated to improve the safety at the intersection by controlling conflicting traffic movements. Traffic signals would provide greater priority to Coromandel Parade traffic during the weekday morning peak period and Main Road (north) traffic during the weekday evening peak period. Traffic signals also allow for the provision of control measures to minimise the risk of vehicles queuing over the rail level crossing to the south-east of the junction. This treatment would include pedestrian crossing facilities improving the pedestrian access at the intersection, although the considerable amount of road widening required on approaches to the intersection would significantly impact the character of the area in an undesirable manner given this area is a pedestrian precinct within the heart of Blackwood. The traffic signals would require a significant amount of road widening including the removal of on-street parking for extended lengths on all approaches to the roundabout as well as movement restrictions at the intersection impacting bus circulating routes through the Blackwood Interchange and reducing access to local businesses in order to achieve travel times through the intersection and approach queues that are within acceptable limits. Traffic signals would increase the speed at which vehicles can negotiate the intersection in comparison to a roundabout resulting in increased vehicle speeds on approaches to the intersection and through the pedestrian precinct. This treatment was previously investigated in the 2006 RMP and has been reassessed using more recent traffic volume data. The findings reported in the 2006 RMP are consistent with the findings from recent modelling. Traffic modelling indicates that traffic signals at this intersection with no significant alterations to the current geometry, other than Station Road operating as in only, would result in the intersection operating far worse than it does currently during the weekday morning and evening peak periods with an additional three to five minutes of travel time delays for vehicles moving through the intersection, on top of current delays experienced, and an increase in the number of vehicles queued at the intersection with up to an additional 200 vehicles queued on an approach to the intersection. Traffic modelling indicates that with substantial road widening and movement restrictions at the intersection travel times for vehicles on Main Road (north) and Shepherds Hill Road would improve during the weekday evening peak period which is predominantly achieved through the significant amount of road widening on Main Road (north) approach. However traffic modelling also suggests that traffic signals would result in an increase in travel times through the intersection for all vehicles during the weekday morning peak period with travel times for traffic on Main Road (south) and Main Road (north) predominantly impacted, albeit these are within acceptable limits. At this stage traffic signals are not considered to be the most appropriate treatment at this location as the signals do not provide any significant improvement to the operation of the intersection, require a substantial amount of road widening on the approaches, significantly detracting from the desired character of the commercial precinct, as well as contributing to a faster speed environment at the intersection and through the pedestrian precinct.

Removing one leg of the roundabout was considered to improve the safety at the intersection by reducing the complexity and number of vehicle movements at the roundabout. Discussed below are the two scenarios investigated as options for reducing the number of approach and exit legs at the roundabout.

The removal of Station Road would reduce the number of approach and exit legs at the intersection resulting in the roundabout resembling more of a standard 4-leg roundabout. This treatment would assist vehicles to select the correct lane as they approach the roundabout as well as reducing the number of conflict points and entry points that motorists need to monitor when judging gaps in circulating flow on the roundabout. Although due to the low volume of traffic using Station Road this option would not improve travel times for vehicles moving through the intersection. This treatment would require vehicles that currently exit Station Road via the Blackwood Roundabout to use alternative roads. As illustrated in Figure 2.5.2 buses are required to enter and circulate the Blackwood Interchange via the Blackwood Roundabout and Station Road hence access into Station Road is considered to be a high priority for the community and public transport services in the area. Accordingly it is considered appropriate that Station Road be reduced to in only access from the Blackwood Roundabout so that the number of entry points to the roundabout is reduced improving safety while maintaining important access for public transport services and the community to the Blackwood Interchange.

The removal of Coromandel Parade would also result in the roundabout resembling more of a standard 4-leg roundabout. This has been considered as a network treatment to simplify the operation and reduce the number of vehicular conflict points on the roundabout. Current traffic survey data in the area suggests that south to west vehicle movements (and vice-versa) to and from Shepherds Hill Road west of the roundabout predominantly occur via local roads including Gladstone Road and Brighton Parade. Accordingly this treatment would predominantly impact traffic movements between Coromandel Parade and Main Road north of the roundabout requiring this traffic to use alternative travel routes to access Main Road. This treatment would improve the pedestrian safety on Coromandel Parade adjacent the intersection by reducing the volume of traffic and speed environment near the retail facilities on the south-west corner of the intersection but will also reduce vehicle access to these retail facilities. If a link road connecting Coromandel to Main Road south of the roundabout was created traffic modelling indicates that there would be no improvement to vehicle travel times through the roundabout. A roundabout at the Shepherds Hill Road intersection with Brighton Parade and Waite Street would provide a safe alternative for the Coromandel Parade traffic to access the local road network however traffic modelling indicates that travel time delays at the Blackwood Roundabout would be similar to that currently experienced assuming most of the northbound traffic still uses the Blackwood Roundabout. Additionally the Department would need to work with Council to discuss access issues associated with the removal of the Coromandel Parade leg of the Blackwood Roundabout. Given this network treatment would require a significant review of the access and traffic flows within the Blackwood area it is not perceived to be a short to medium term treatment and hence this treatment is considered to be outside of the scope of this report.

Altering the geometry of the roundabout would improve the safety at the intersection by remodelling the roundabout to be more like a standard 4-leg roundabout. This treatment would limit Station Road to in only access to simplify the operation and reduce the number of vehicular conflict points on the roundabout while maintaining the access into the Blackwood Interchange for buses and the community. The removal of an entry into the roundabout would also reduce the number of entry points that motorists need to monitor when judging gaps in circulating flow on the roundabout. This treatment would lower vehicle entry speeds into the roundabout by increasing the size of the roundabout island. The alterations to the roundabout would improve the visibility for vehicles entering the roundabout and improve motorist's ability to judge gaps in circulating traffic flows on the roundabout by increasing the distance between and alignment of approach legs as well as lowering the speed of vehicles circulating the roundabout. This treatment would also improve the left turn from Main Road (south) to Coromandel Parade for buses and allow for a pedestrian refuge island on Main Road (south) improving pedestrian facilities and access across Main Road (south). This treatment would improve the safety at the intersection without negatively impacting the character of the area and maintaining access within the Blackwood commercial precinct. Traffic modelling indicates that during the weekday morning peak the critical approaches, Main Road (south) and Coromandel Parade, experience similar travel times through the roundabout when compared to current operation, while there is some improvement in travel times through the intersection for Shepherds Hill Road traffic. The traffic modelling also indicates that the vehicle travel times through the intersection for traffic on Shepherds Hill Road and Main Road (north) are significantly improved by halving the current delays experienced by vehicles on these approaches during the weekday evening peak period. The operational improvement evident in the weekday evening peak period is attributed to the additional through lane from Shepherds Hill Road to Main Road (south) increasing the volume of vehicles that can enter the roundabout from Shepherds Hill Road.

In order to achieve the geometric alterations there would be a significant amount of road works required including relocation of the War Memorial monument, reduction to the parklands area and possibly some land acquisition, attracting a high cost for implementation.

Given that this treatment improves safety, pedestrian crossing facilities and vehicle travel times at the intersection while maintaining access within the Blackwood commercial precinct and the character of the area, as no significant road widening would be required, this treatment is considered to be an appropriate short to medium term option at this location.

RECOMMENDATION

It is recommended that the geometry at the roundabout be altered due to this treatment providing a reasonable balance between an improvement to the safety and the operation of the intersection while maintaining the character of the area and access within the commercial precinct. The community has raised significant concern regarding the impact of this recommendation on the war memorial and parklands. It should be noted that the concept shown above has not been finalised and the project itself is unfunded and needs to be prioritised against other state-wide projects. Concerns relating to the location of the monument are acknowledged and its location will be considered and further consultation will occur with the further development of the concept.

7.1.14 Shepherds Hill Road – Gladstone Road

There were 9 reported crashes (6 PDO and 3 casualty) at this T-Junction between the years 2008 and 2012 which is consistent with the 2006 RMP statistics, but with an increase in the proportion of crashes resulting in injury. The predominant crash type at this location is rear end (4 crashes).

All unsignalised intersections within the Adelaide Metropolitan area are ranked based on the number of casualty crashes that have occurred in the last five years. Accordingly, this location is ranked 401st. Table 7.1.14.1 below summarises the crash history at this location over the past five years.

Table 7.1.14.1 - Summary of crashes at Shepherds Hill Road / Gladstone Road T Junction

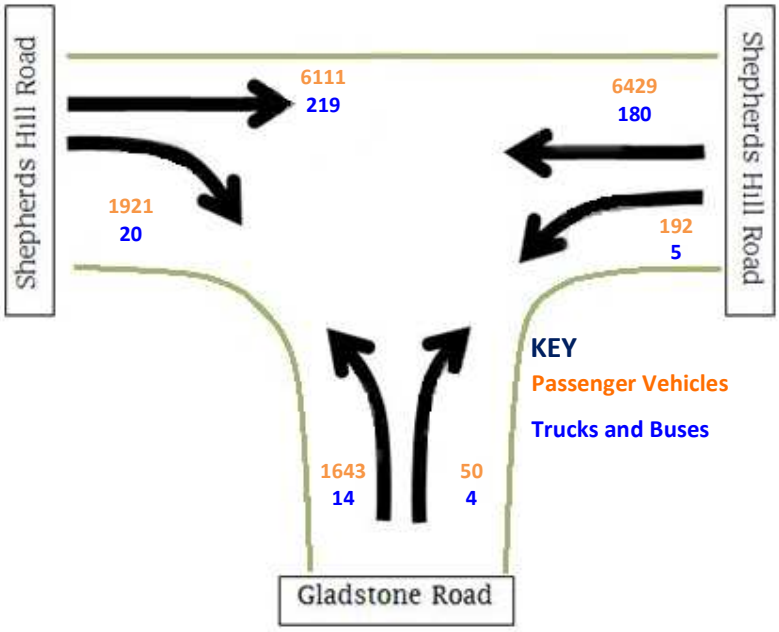
Crash Type	PDO	Casualty	2009	2010	2011	2012	2013	Total
Right Angle	1	-	1	-	-	-	-	**1**
Rear End	3	1	-	2	-	2	-	**4**
Right Turn	-	2	-	2	-	-	-	**2**
Hit Fixed Object	1	-	1	-	-	-	-	**1**
Head On	1	-	-	-	1	-	-	**1**
Total	**6**	**3**	**2**	**4**	**1**	**2**	**0**	**9**

The junction of Shepherds Hill Road and Gladstone Road is located within the commercial precinct in the heart of Blackwood. Shepherds Hill Road at this location provides two traffic lanes in each direction as well as a separate channelised right turn lane for vehicles turning right into Gladstone Road. Gladstone Road provides a single traffic lane in each direction, with indented kerbside parking permitted along both sides of the road. There is a PAC on Main Road just east of Gladstone Road.

Figure 7.1.14.1 - Aerial Image of Junction (2012)

The predominant traffic movements at the junction are through movements along Main Road as well as the right turn into and left turn out of Gladstone Road. Figure 7.1.14.2 summarises the traffic volumes surveyed over an 11 hour period. Although the recent traffic survey data indicates there is a high volume of vehicles turning right into Gladstone Road the proportion of vehicles accessing the off-street parking for the retail facilities versus those using this road to access other facilities and residential properties is not clear. It is noted that delivery vehicles servicing the retail facilities currently turn right into Gladstone Road, with the Woolworths delivery bay being located just south of the junction.

Figure 7.1.14.2 - Turning Count Volume – 11 hours (2012)



Gladstone Road provides access to a substantial amount of parking for the surrounding retail facilities, residential dwellings and other community facilities. The land use surrounding the junction generates high volumes of pedestrians and turning vehicles. Site observations revealed that there is a substantial level of vehicle movement between this junction and the surrounding road network i.e. interactions with the PAC, Blackwood Roundabout and Waite/Brighton Parade intersection, as illustrated in Figure 7.1.11.3 below.

The junction is used to bypass Blackwood roundabout to access Corromandel Parade and vice-versa. The PAC assists the operation of the junction by providing greater opportunity for vehicles to turn right into and left out of Gladstone Road by stopping westbound traffic when activated. Vehicles turning right into or left out from Gladstone Road were observed as exhibiting assertive behaviour i.e. not always stopping before turning, turning at high speeds and choosing small gaps in the traffic.

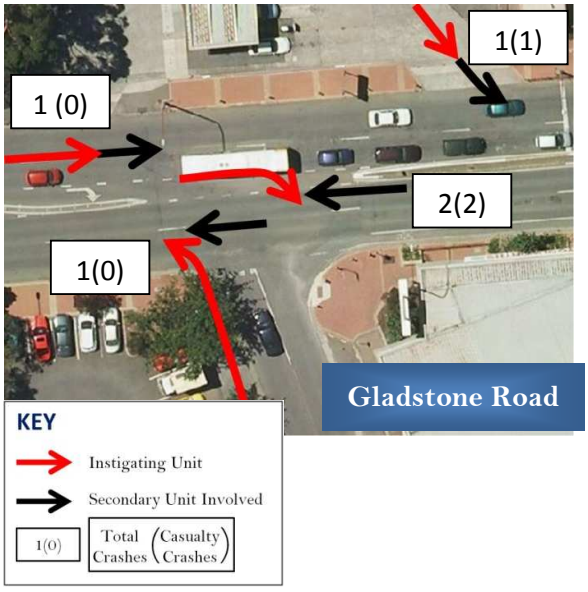
There are bus stops on both sides of Shepherds Hill Road, west of the junction which require buses to stop in the kerbside travel lane.

Figure 7.1.14.3 - Location of Gladstone Road junction along Shepherds Hill Road

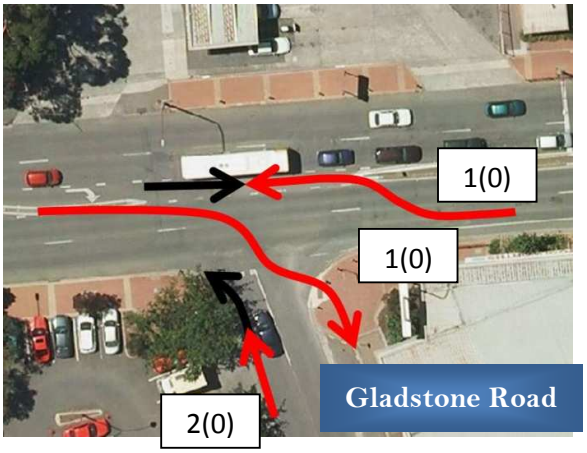
The bicycle lanes along Shepherds Hill Road were all upgraded in 2010 to have uniform 'times of operation'.

The speed limit through the intersection was reduced from 60kph to 50kph in 2007 as part of a corridor speed reduction initiative between Sherbourne Road (30 metres east of) and Blackwood Roundabout.

Figure 7.1.14.4 - Crash Diagram (2009 – 2013)



Detailed analysis of the crash data indicates that five of the nine reported crashes involved vehicles turning to / from the junction on a weekday either at night or in poor/wet weather conditions.

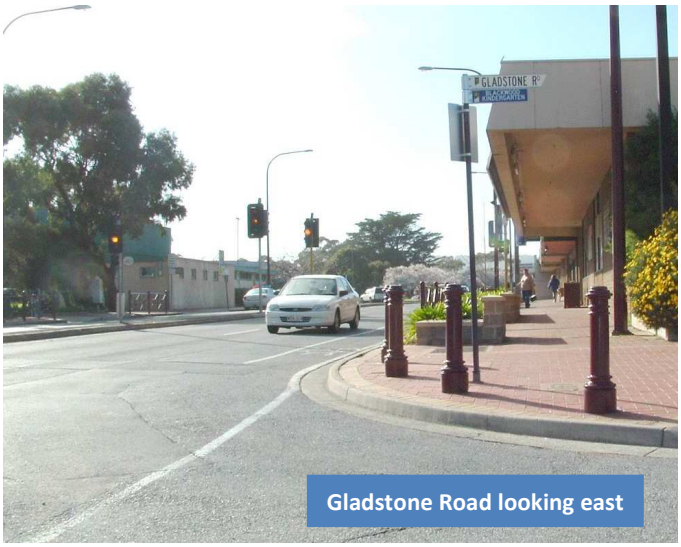


Rear end crashes are the predominant crash type (4) with two of these occurring on the side road approach while the other two rear ends (including one casualty) do not present any specific trend in occurrence.

The two right turn casualty crashes are associated with vehicles turning right into Gladstone Road colliding with westbound vehicles on Shepherds Hill Road, with one of these involving a westbound cyclist. The three other crashes reported at the junction do not present any specific trend.

Factors that may have contributed to the crashes at this location include the angle Gladstone Road intersects Shepherds Hill Road, reduced visibility to the east due to the proximity of roadside vegetation (i.e. planter boxes) and vehicles (possibly turning left into Gladstone Road) in the kerbside lane obscuring westbound cars in the median lane.

Figure 7.1.14.5 - Shepherds Hill Road / Gladstone Road



TREATMENTS

There are various options that could be implemented to address right angle crashes at this junction which account for half of the casualty crashes at the junction. Banning the right turn out from Gladstone Road is one option but is not considered appropriate at this stage due to there being no reported right angle crashes involving vehicles turning right from the side road since the speed limit along Shepherds Hill Road was reduced to 50kph in 2007.

DPTI has investigated the following treatment options aimed to improve safety and operation of the junction:

a. Banning the right turn into Gladstone Road
b. Separate channelised left turn lane to improve sight lines
c. Square up junction to 90 degrees
d. Tree trimming or removal

Banning the right turn into Gladstone Road was considered to eliminate the right turn crashes at the junction by removing the movement associated with these crashes. This treatment would require vehicles that currently turn right into Gladstone Road to access the local road network and facilities south of Shepherds Hill Road via alternative roads with Brighton Parade and Coromandel Parade being the most likely to attract vehicles. The implementation of a roundabout at the Shepherds Hill Road intersection with Brighton Parade and Waite Street would provide a safe alternative for those currently turning right into Gladstone Road that are accessing residential properties further south of Shepherds Hill Road (see Section 7.1.11). Impacts to retail facilities adjacent the junction are unknown at this stage, albeit the Department would need to work with Council to address any possible access issues.

A separate channelised left turn lane has been considered in order to address the right angle crashes at the junction as it would separate out left turning vehicles from the through traffic approaching the junction from the east. This would allow motorists on the side road to be able to see past left turning vehicles improving the visibility from Gladstone Road as well as assisting motorists waiting on the side road to judge the behaviour and movements of traffic approaching from the south. This treatment would require road widening and possibly some land acquisition attracting a high cost for implementation. Given the reduction in right angle crashes that have occurred since the speed limit was lowered on Shepherds Hill Road this treatment is not considered viable at this stage.

Realigning the junction so that Gladstone Road meets Shepherds Hill Road at a 90 degree angle has been considered to address the right angle crashes at the junction. This treatment would improve the visibility for vehicles exiting Gladstone Road by reducing how far motorists need to turn their head to see oncoming traffic from the east along Shepherds Hill Road. This treatment would require some road widening. Again, given the reduction in right angle crashes that have occurred since the speed limit was lowered on Shepherds Hill Road this treatment is not considered viable at this stage.

Trimming or removal of roadside vegetation to the south of the junction would also improve the visibility for vehicles exiting Gladstone Road.

RECOMMENDATION

On review of the crash data it is recommended that the vegetation to the east of the junction be trimmed back or removed. No other significant alterations are recommended at this junction as the reduction in speed limit along Shepherds Hill Road appears to have improved the safety at the junction with the slower driving environment allowing motorists greater time to react to other vehicular activity and the other crashes reported at the junction appearing to be isolated in occurrence. Any treatment at this location would need to be prioritised against all other state-wide projects for funding.

7.1.15 Shepherds Hill Road – Brighton Parade / Waite Street

There were 31 crashes reported (23 PDO and 8 casualty) at this four way junction between the years 2009 to 2013 which is a 31% reduction in crashes since the 2006 RMP. The predominant crash type at this location is right angle (24 crashes) involving vehicles exiting Brighton Parade and Waite Street.

All unsignalised intersections within the Adelaide Metropolitan area are ranked based on the number of casualty crashes that have occurred in the last five years. Accordingly, this location is ranked 45th. Table 7.1.15.1 below summarises the crash history at this location over the past five years.

Table 7.1.15.1 - Summary of crashes at Shepherds Hill Road / Brighton Parade / Waite Street Intersection

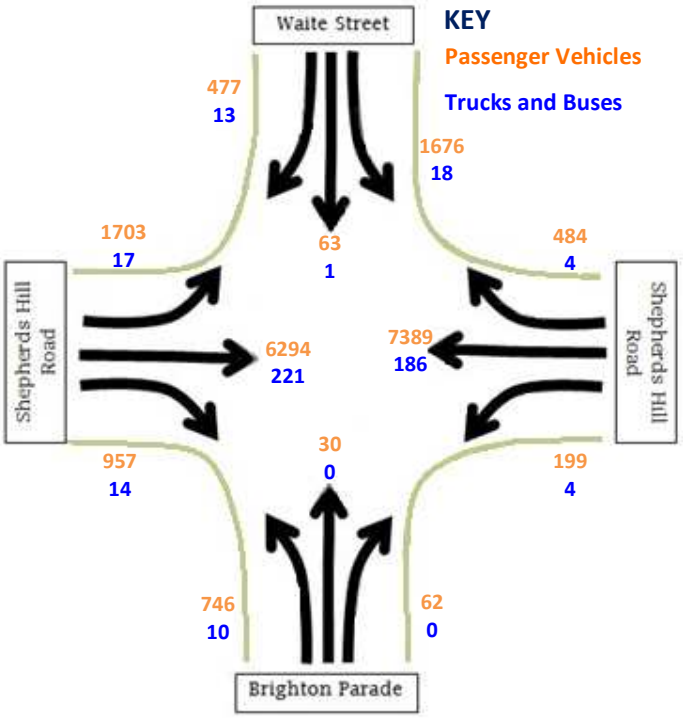
Crash Type	PDO	Casualty	2009	2010	2011	2012	2013	Total
Right Angle	19	5	4	10	3	3	4	**24**
Rear End	-	-	-	-	-	-	-	**0**
Right Turn	4	1	-	1	1	2	1	**5**
Hit Pedestrian	-	1	-	1	-	-	-	**1**
Hit Fixed Object	-	1	-	-	-	-	1	**1**
Total	**24**	**8**	**4**	**12**	**4**	**5**	**6**	**31**

Shepherds Hill Road at this location provides two traffic lanes in each direction as well as a separate channelised right turn lanes for vehicles turning right into Waite Street and Brighton Parade. Waite Street provides a single traffic lane in each direction and flares on the approach to Main Road to provide separate left and right turn lanes under 'stop' control. Brighton Parade provides a single traffic lane in each direction with indented kerbside parking on both sides. Brighton Parade is also under 'stop' control.

Figure 7.1.15.1 - Aerial Image of Intersection (2012)

The predominant traffic movements at the junction are through vehicles along Main Road and the left turn into and out of Waite Street. It is also noted that there is a reasonably high volume of vehicles turning left out of and right into Brighton Parade. Figure 7.1.15.2 summarises the traffic volumes surveyed over an 11 hour period.

Figure 7.1.15.2 - Turning Count Volume 11 hours (2012)



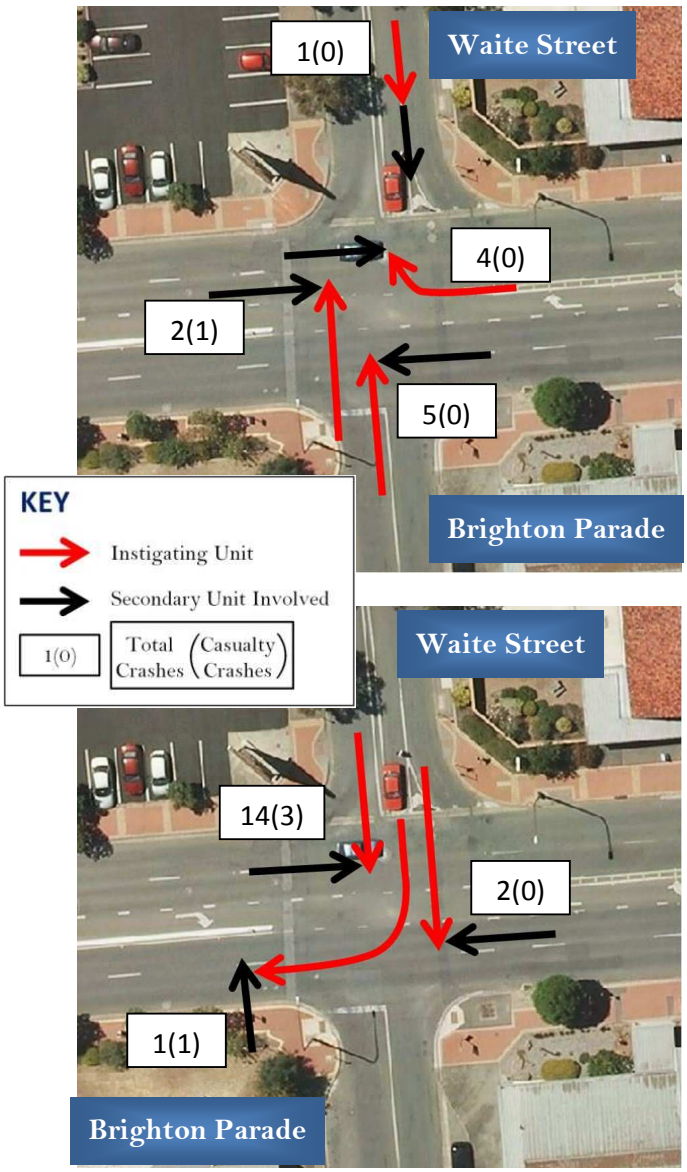
Waite Street provides access to residential properties and the Blackwood commercial precinct including a large volume of off-street parking. Site observations reveal that Waite Street is also used by drivers trying to avoid the Blackwood Roundabout. Brighton Parade provides access to residential properties as well as community facilities such as childcare, kindergarten, Blackwood RSL, St Peters Primary, Coromandel Train Station and recreational facilities. Similar to Gladstone Road junction there is a substantial level of vehicle movement between this junction and the surrounding road network i.e. interactions with the PAC and Blackwood Roundabout, as illustrated in Figure 7.1.15.2. There are kerbside bus stops on both sides of Shepherds Hill Road just east of the intersection.

The speed limit through the intersection was reduced from 60kph to 50kph in 2007 as part of a corridor speed reduction initiative between Sherbourne Road (30 metres east of) and Blackwood Roundabout.

Detailed analysis of the crash data indicates that 86% (25) of the crashes are associated with vehicles turning to and from Waite Street. Of these crashes, most noticeably 13 involved vehicles exiting Waite Street (to head west along Shepherds Hill Road or south to Brighton Parade) colliding with eastbound vehicles and four involved vehicles turning right into Waite Street colliding with eastbound traffic. One of the right angle collisions involved a northbound pedestrian crossing Shepherds Hill Road. Of the seven crashes associated with vehicles exiting Brighton Parade, four involved vehicles heading northbound onto Waite Street. All other crash types reported at the intersection involved a single collision and do not present a trend. Nearly half of all crashes occurred during the weekday evening peak period.

Factors that may have contributed to the crashes at this location include the high level of vehicle and pedestrian activity, queues extending back from the Blackwood Roundabout / PAC (namely in the weekday evening peak period) through the intersection reducing visibility for motorists negotiating the intersection and causing hesitancy in choosing gaps due to rolling queues. Site observations identified the close proximity of the retail access point immediately west of the intersection effects its operation. Furthermore, it was observed vehicles were having difficulty exiting the side roads in the peak periods due to the consistent flow of traffic along Shepherds Hill Road and the number of turning movements at the intersection.

Figure 7.1.15.3 Crash Diagram (2009 – 2013)

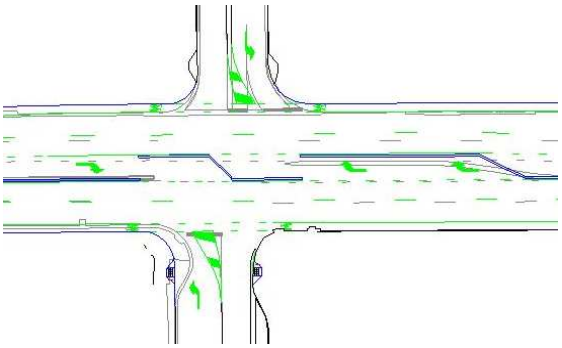


TREATMENTS

DPTI has investigated the following treatment options aimed to improve safety and operation of the junction:

a. Separate channelised left turn lane into Waite Street
b. Keep clear markings in front of Waite Street to provide gaps in queues back from PAC / Roundabout
c. Banning the right turn out and through movements from both side roads
d. Roundabout
e. Traffic Signals

A separate channelised left turn lane into Waite Street has been considered to address the right angle crashes at the junction as it would separate out left turning vehicles from the through traffic approaching the junction from the west. This would allow motorists on the side road to be able to see past the turning vehicles improving the visibility from Waite Street as well as assisting them to judge the behaviour and movements of eastbound traffic.



Banning the right turn out and through movements from the side roads was considered to address right angle crashes at the intersection as discussed in the 2006 RMP. This treatment would address nearly 70% of the total crashes at the intersection (including four of the five casualty crashes) by eliminating the vehicular turn movements that were associated with these crashes. This treatment would be considered effective however motorists would need to use alternative roads to access the local network. Melton Street is considered the most likely location for vehicles currently using Waite Street to be attracted to, with a proportion of locals already using Melton Street as an alternative to Waite Street to head west along Shepherds Hill Road. Gladstone Road is considered the most likely location for vehicles that currently turn right out from Brighton Parade to be attracted to, albeit this volume is currently very low. Accordingly to not just 'shift' a problem if this treatment was implemented a painted median treatment would be required at the Shepherds Hill Road intersection with Melton Street and Sherbourne Road to allow vehicles turning right out from Melton Street to do so as a two stage manoeuvre by storing in the middle of the road, reducing the potential for right angle crashes at the intersection. This treatment would not address the right turn crashes associated with vehicles turning right into Waite Street. This treatment would require minimal road works at the Shepherds Hill Road intersection with Brighton Parade and Waite Street. However significant road works and some land acquisition would be required at the Melton Street and Sherbourne Street intersection to accommodate the painted median attracting a high cost for implementation.

A roundabout has also been considered to primarily address the right angle/turn crashes at the intersection. The roundabout would provide greater priority for vehicle movements to and from the side roads and address just over 85% of the crashes at the intersection (including four of the five casualty crashes). The treatment would slow vehicle speeds through the intersection, simplify vehicle movements, provide pedestrian walk-throughs on approaches to the roundabout and reduce travel time delays for vehicles exiting the side roads. Shepherds Hill Road traffic would be required to give way introducing travel time delays which are not considered excessive. A roundabout at this intersection would create a slower road environment between this intersection and the Blackwood Roundabout providing a safer environment for pedestrian movements and acting as a Gateway into the Blackwood commercial precinct by indicating a change in road environment to drivers approaching from the west. The roundabout would also provide a safe alternative for commuter traffic currently using the Blackwood Roundabout or Gladstone Road to access residential dwellings south of Shepherds Hill Road. The close proximity of the PAC to the east of the intersection would impact the operation of the roundabout by causing queues back to the roundabout potentially blocking lanes, although queues from the roundabout and the PAC already extend through this intersection during weekday peak operational periods. The roundabout would require considerable road works and some land acquisition attracting a high cost for implementation.

Traffic signals were also investigated to improve safety at the intersection by controlling conflicting traffic movements as well as improving access to and from the side roads. The existing PAC to the east of this intersection would be retained to cater for existing pedestrian desire lines and connectivity between retail facilities either side of Shepherds Hill Road. Traffic signals would require east and westbound vehicles on Shepherds Hill Road to stop introducing travel time delays for main road traffic. Traffic signals would increase the speed at which vehicles can negotiate the intersection in comparison to a roundabout resulting in increased vehicle speeds on approaches to the intersection and through the pedestrian precinct. This treatment would include pedestrian crossing facilities improving the pedestrian access at the intersection. However preliminary traffic analysis indicates traffic signals will result in

additional delays and congestion along Shepherds Hill Road, with queues during the morning peak period extending from this intersection back to and through the Blackwood Roundabout. This treatment would require the removal of on-street parking along Brighton Parade, Waite Street and Shepherds Hill Road (west of the intersection). Traffic signals would require road widening and land acquisition.

RECOMMENDATION

Both restricting vehicle movements from the side roads as well as the roundabout are recommended as effective treatments addressing the predominant right angle crash type at the intersection. However, the roundabout is the preferred option as it provides a number of additional safety benefits for vehicles and pedestrians while maintaining a high level of access within the busy commercial precinct. Albeit, any treatment proposed at this intersection would need to be prioritised against all other state-wide projects for funding.

7.1.16 Shepherds Hill Road – Sherbourne Road / Melton Street

There were 11 reported crashes (6 PDO and 5 casualties) at this offset 4-way junction between the years 2009 and 2013, which has seen a 58% reduction (15 fewer crashes) since the 2006 RMP. The predominant crash type at this location is right angle (8 crashes), involving vehicles turning right from Melton Street.

All unsignalised intersections within the Adelaide Metropolitan area are ranked based on the number of casualty crashes that have occurred in the last five years. Accordingly, this intersection is ranked 167th. Table 7.1.16.1 below summarises the crash history at this location over the past five years.

Table 7.1.16.1- Summary of crashes at Shepherds Hill Road / Sherbourne Road / Melton Street Intersection

Crash Type	*PDO*	*Casualty*	*2009*	*2010*	*2011*	*2012*	*2013*	*Total*
Right Angle	5	3	1	1	2	4	-	**8**
Rear End	-	2	-	-	1	1	-	**2**
Hit Fixed Object	1	-	-	-	-	1	-	**1**
Total	**6**	**5**	**1**	**1**	**3**	**6**	**0**	**11**

Shepherds Hill Road at this location provides a generous cross section with two traffic lanes and a wide bicycle lane in each direction. There are no sheltered right turn lanes for vehicles turning right into either of the side roads. Sherbourne Road and Melton Street each provide a single traffic lane in each direction. There is a sweeping bend just west of the intersection along Shepherds Hill Road.

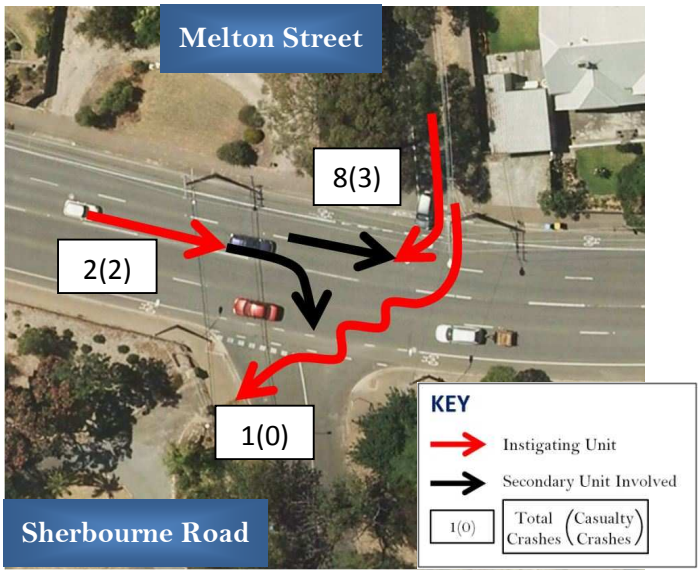
Figure 7.1.16.1 - Aerial Image of Intersection (2012)

Sherbourne Road provides access to residential properties, Wittunga Botanical Gardens and provides alternative access to Brighton Parade and Coromandel Parade. Melton Street provides access to residential properties, the commercial precinct within Blackwood as well as access to Gulfview Road and Main Road bypassing the Blackwood Roundabout. Vehicles also use Melton Street as an alternative route to access Shepherds Hill Road instead of using Waite Street. It is however recognised there is a degree of difficulty for vehicles turning right out of Melton Street similar to that experienced at Waite Street.

There are kerbside bus stops located on both sides of Shepherds Hill Road just east of the intersection. The bicycle lanes along Shepherds Hill Road were all upgraded in 2010 to have uniform 'times of operation' and new 'dashed' continuity line markings across the side road junctions to define the bicycle lanes and improve the safety for cyclists.

The speed limit 30 metre east of the intersection was reduced from 60kph to 50kph in 2007 as part of a corridor speed reduction which extends to Blackwood Roundabout.

Figure 7.1.16.2 - Crash Diagram (2009 – 2013)



Detailed analysis of the crash data indicates that 8 of the 11 crashes involved vehicles turning right out of Melton Street colliding with eastbound traffic. Seven of these crashes occurred on weekdays during either the morning or evening peak period, with the other three crashes occurring during the weekend. The rear end crashes were both casualty crashes that resulted when a vehicle travelling eastbound on Shepherds Hill Road collided with a stationary vehicle waiting to turn right into Sherbourne Road.

The 2006 RMP identified rear end crashes as one of the predominant crash types at this intersection. Upon review of the recent crash types at this location, right angle crashes are the more apparent crash type.

Factors that may have contributed to the crashes at this location include poor sight distance for vehicles exiting Melton Street due to the proximity of roadside infrastructure & vegetation.

Roadside parking outside of the bike lane operating times may also be restricting visibility. The open road environment on Shepherds Hill Road is also conducive to higher vehicular speeds, which makes judging safe gaps difficult for vehicles exiting Melton Street.

TREATMENTS

DPTI has investigated the following treatment options aimed to improve safety and operation of the junction:

a. Painted median treatment (similar to Main Road intersection with Miller Terrace and Stirling Road)
b. Removal of stobies and trimming of vegetation
c. Removal of on-street parking

A painted median treatment would be the most appropriate treatment to address the right angle crashes at this intersection. It would provide vehicles exiting right out of Melton Street an opportunity to perform a two stage manoeuvre by storing in the middle of the road reducing the potential for right angle crashes. It would also provide a sheltered area for vehicles to wait before turning right into the side roads, however the reduced speed limit to the east of the intersection appears to have improved the safety at the intersection for vehicles waiting to turn right into the side roads with no reported rear end crashes at the intersection involving vehicles waiting to turn right into Melton Street since the last RMP in 2006. This treatment would require considerable road works and some land acquisition attracting a high cost for implementation.

The removal of on-street parking along this section of Shepherds Hill Road would improve the visibility for vehicles exiting the side roads. This treatment would also improve the safety for vehicles waiting to turn right into the side roads by ensuring that the kerbside lane is always clear for traffic to move around a stationary vehicle in the central lane waiting to turn. The Department would need to work with council to address the parking provisions along Shepherds Hill Road.

The removal of stobie poles along the northern side of Shepherds Hill Road would improve the visibility for vehicles exiting Melton Street. Additionally property fence lines along the northern side of Shepherds Hill Road further obstruct motorist's view of oncoming traffic. Vegetation

contained within or on the boundaries of private properties need to be adequately trimmed and maintained to improve the visibility for vehicles exiting Melton Street.

RECOMMENDATION

It is recommended that a painted median treatment be implemented, similar to that already implemented at the Main Road intersection with Stirling Road and Miller Terrace. Additionally it is also recommended that on-street parking along Shepherds Hill Road at this location be removed as well as the stobie poles. DPTI would need to work with Council to review the parking provisions along this section of Main Road. This treatment would need to be prioritised against all other state-wide projects.

7.1.17 Shepherds Hill Road – Wilpena Street

There were 3 reported crashes (2 PDO and 1 casualty) along this section between 2009 and 2013, which has seen a 62% reduction in crashes (5 fewer crashes) since the 2006 RMP. The crash history does not indicate any particular trends in crash type.

All unsignalised intersections within the Adelaide Metropolitan area are ranked based on the number of casualty crashes that have occurred in the last five years. Accordingly, this location is ranked 1,175th. Table 7.1.17.1 below summarises the crash history at this location over the past five years.

Table 7.1.17.1 - Summary of crashes at Shepherds Hill Road/ Wilpena Street

Crash Type	PDO	Casualty	2009	2010	2011	2012	2013	Total
Rear Angle	2	-	1	-	-	-	1	**2**
Roll Over	-	1	-	-	-	-	1	**1**
Total	**2**	**1**	**1**	**0**	**0**	**0**	**2**	**3**

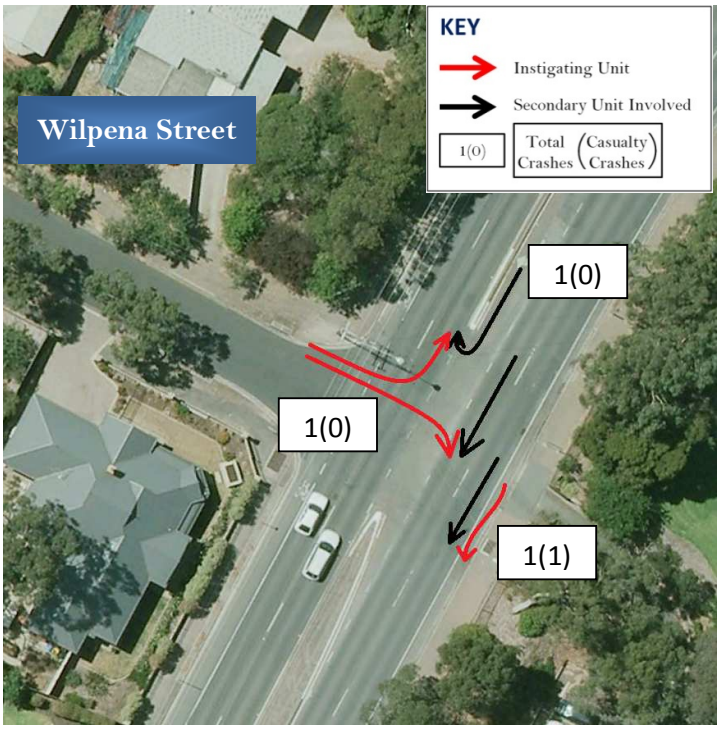
This junction is located south of Viaduct Road and north east of Parham Road. This section of Shepherds Hill Road provides two traffic lanes and a cyclist lane in each direction and is a divided road with separate channelized right turn lanes for vehicles turning right into Wilpena Street from Shepherds Hill Road.

Figure 7.1.17.1 - Aerial of Junction (2014)

Wilpena Street provides access to the residential network on the north western side of Shepherds Hill Road. To the north of the junction is a bend that reduces visibility of the eastern carriageway and there is a bus stop on either side of the road. Directly opposite the junction is the Wittunga Botanical Garden. Access to the parking facility for the Botanical Garden is directly opposite the junction.

The bicycle lanes along Shepherds Hill Road were all upgraded in 2010 to have uniform 'times of operation'.

Figure 7.1.18.2 - Crash Diagram (2009 – 2013)



Both of the PDO crashes involved turning movements from Wilpena Street onto Main Road and were caused by the turning vehicles failing to give way. The casualty crash involved a cyclist who fell from their bike.

TREATMENTS

There are no alterations proposed at this intersection.

RECOMMENDATION

On review of the crash data and the vision as seen in figure 4.2, it is recommended that this site continue to be monitored.

7.1.18 Shepherds Hill Road – Parham Road

There were 3 reported crashes (1 PDO and 2 casualties) at this T-Junction between the years 2009 and 2013, which is consistent with the 2006 RMP statistics. Two of the reported crashes at this location are right angle, involving vehicles turning right from Parham Road.

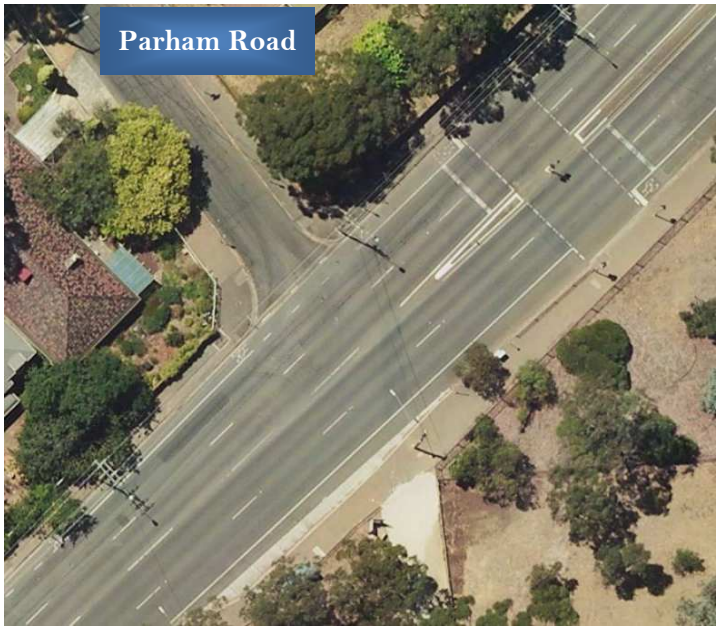
All unsignalised intersections within the Adelaide Metropolitan area are ranked based on the number of casualty crashes that have occurred in the last five years. Accordingly, this location is ranked 671st. Table 7.1.18.1 below summarises the crash history at this location over the past five years.

Table 7.1.18.1 - Summary of crashes at Shepherds Hill Road / Parham Road T Junction

Crash Type	PDO	Casualty	2009	2010	2011	2012	2013	Total
Right Angle	1	1	2	-	-	-	-	**2**
Rear End	-	1	2	-	-	-	1	**3**
Total	**1**	**2**	**2**	**0**	**0**	**0**	**1**	**3**

Shepherds Hill Road at this location provides a generous cross section with two traffic lanes in each direction as well as a narrow solid median north of Parham Road. There are no channelised right turn lanes for vehicles to wait while waiting to turning right into Parham Road. Shepherds Hill Road slopes towards the south-west with a sweeping bend north-east of the junction. Immediately north-east of the junction is a PAC. There are bicycle lanes in both directions along Shepherds Hill Road which terminate south-west of the junction. Parham Road provides a single traffic lane in each direction and requires traffic to give way.

Figure 7.1.18.1 Aerial Image of Junction (2012)



Parham Road provides access to residential properties, recreational facilities, educational facilities such as Eden Hills Primary School, Eden Hills train station, businesses and other community facilities. Blackwood Primary School and Blackwood High School are located just south of Parham Road and generate a substantial amount of vehicle and pedestrian activity at the junction during the school drop-off and pick-up periods. Parking restrictions are provided along both sides of Parham Road (8am to 9am and 3pm to 4pm) near the junction during the

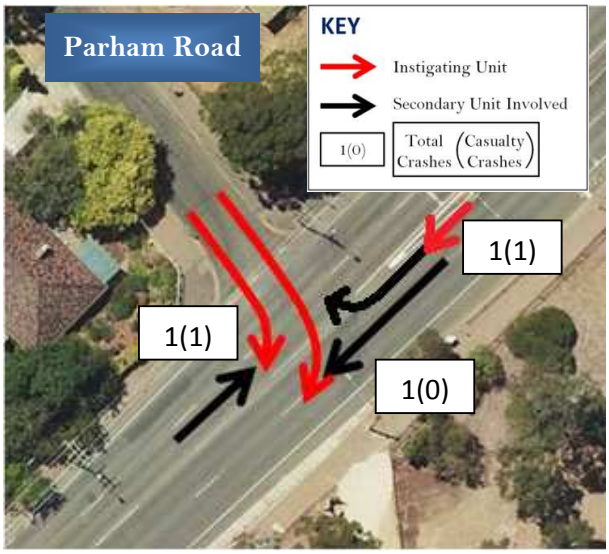
peak periods. The restrictions were introduced to eliminate parking at school drop-off and pick-up times to improve the operation and safety of the junction.

A bus stop is located opposite Parham Road on the south-east side of Shepherds Hill Road. The stop was indented in 2006 to safely allow traffic to pass the stationary bus in the kerbside lane. The bicycle lanes along Shepherds Hill Road were all upgraded in 2010 to have uniform 'times of operation' and new 'dashed' continuity line markings across the side road junctions to define the bicycle lanes and improve the safety for cyclists.

A review of the school car park circulation, operation and access was undertaken in early 2006 as part of the Departments 'Safe Routes to School' initiative. This report made recommendations, one of which was implemented in 2006 and involved changing the circulation of the car park and make the Shepherds Hill Road access for Blackwood Primary School, just south of Parham Road, in only. This requires all vehicles from Blackwood Primary School to exit via Seymour Street. The in only access has simplified how Parham Road junction operates and has reduced the number of turning vehicles across the junction.

Detailed analysis of the crash data indicates that factors contributing to crashes include poor visibility for vehicles exiting Parham Road, the high volume of traffic on Shepherds Hill Road, vehicle speeds often higher than the posted limit on Shepherds Hill Road and the vehicle and pedestrian movements generated by the nearby schools. Further analysis of the incident reports indicates that the poor visibility for vehicles exiting Parham Road is often further impacted by vehicles slowing to turn right or left into the side road. Sight distance for side road vehicles is obstructed by vegetation, property boundaries and roadside infrastructure. Visibility to the north is further impacted by the horizontal curve on Shepherds Hill Road, north of the junction, and the speed of vehicles along Shepherds Hill Road is often higher than the posted speed limit. The combination of the abovementioned factors makes judging gaps in traffic very difficult for vehicles trying to turn right from Parham Road. Albeit, there have been no crashes reported at this junction since 2009.

Figure 7.1.18.2 Crash Diagram (2009 – 2013)

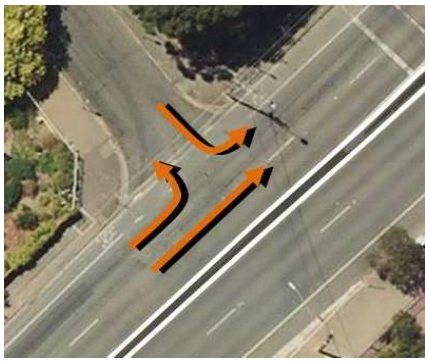


TREATMENTS

DPTI has investigated the following treatment options aimed to improve safety and operation of the junction:

a. Channelised right turn treatment
b. Banning the right turn into and out of Parham Road
c. Tree trimming or removal

A separate channelised right turn lane as illustrated in Figure 4.2 has been considered primarily to address the right angle crashes at the junction. This treatment would allow vehicles turning right out of Parham Road to perform a two stage manoeuvre by storing in the middle of the road reducing the potential for right angle crashes. The separate channelised right turn lane would also provide a sheltered area for vehicles to wait before turning right into Parham Road which would reduce the potential for rear end crashes on Shepherds Hill Road. This treatment would require road widening attracting a reasonably high cost for implementation.



Banning the right turn into and from Parham Road has been considered to address the right turn and right angle crashes by removing the vehicle movements associated with these crashes. This treatment would require vehicles to access the local road network via alternative roads with Wilpena Street the most likely location to attract the demand. Wilpena Street provides a safer alternative for vehicles currently turning right into Parham Road as there is a separated channelised right turn lane providing vehicles a safe area to store while waiting to turn right into the side road. It also provides a safer alternative for vehicles turning right from Parham Road as the channelised right turn treatment at the Wilpena Street junction allows vehicles turning right out from the side road to perform a two stage manoeuvre by storing in the middle of the road, reducing the potential for right angle crashes. This would require trimming of vegetation along the western side of Shepherds Hill Road at the Wilpena Street junction to ensure visibility from the side road is not impacted by vegetation. This would be a low cost treatment.

Trimming of vegetation that is overhanging from private property along the north-west side of Shepherds Hill Road is required to improve the visibility for vehicles exiting Parham Road. The removal of stobie poles along the north-west side of Shepherds Hill Road would also improve visibility for vehicles exiting the side road.

RECOMMENDATION

It is recommended that the site be monitored. Should the trend in crashes at the junction increase then the preferred treatment at the junction would be for the operation to be left in and left out access only. . Wilpena Street provides a safer alternative for access to the local road network. As part of this treatment tree trimming and removal where necessary of road side vegetation at the Shepherds Hill Road junction with Wilpena Street would be considered to ensure that visibility from the side road is not obstructed by any vegetation. Should the trend in crashes at the junction increase, this treatment would need to be prioritised against all other state-wide projects.

7.1.19 Shepherds Hill Road – Seymour Street / Wade Street

There were 7 reported crashes (4 PDO and 3 casualties) at this intersection between 2009 and 2013, which has seen a 13% reduction in crashes (1 less crash) since the 2006 RMP. The predominant crash type at the intersection is right turn (4), involving vehicles turning right into Seymour Street.

All unsignalised intersections within the Adelaide Metropolitan area are ranked based on the number of casualty crashes that have occurred in the last five years. Accordingly, this location is ranked 401nd. Table 7.1.19.1 below summarises the crash history at this location over the past five years.

Table 7.1.19.1 - Summary of crashes at Shepherds Hill Road / Seymour Street / Wade Street Intersection

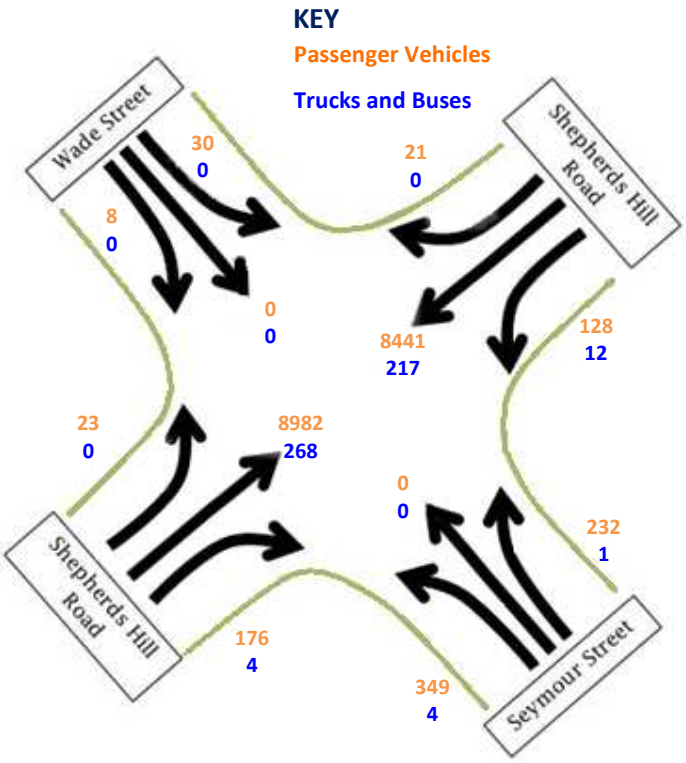
Crash Type	PDO	Casualty	2009	2010	2011	2012	2013	Total
Right Angle	1	-	1	-	-	-	-	**1**
Rear End	1	1	-	1	1	-	-	**2**
Right Turn	2	2	-	1	-	3	-	**4**
Total	**4**	**3**	**1**	**2**	**1**	**3**	**0**	**7**

This 4-way intersection provides two traffic lanes in each direction along Shepherds Hill Road, with a north-bound cyclist lane on Shepherds Hill Road terminating just south of the intersection. There is a narrow painted median on Shepherds Hill Road with raised pavement bars installed to further delineate the approaches to the intersection however there are no sheltered right turn lanes for vehicles turning right into the side roads. Shepherds Hill Road slopes downward travelling in a south-west direction and there is a sweeping bend north-east of the junction along Shepherds Hill Road. Seymour Street flares on approach to Shepherds Hill Road, providing separate left and right turn lanes; there is also some delineation for the left and right turn vehicles as they enter Seymour Street. Wade Street is a narrow side road providing one lane in each direction.

Figure 7.1. 19.1 - Aerial Image of the Intersection (2012)

The predominant traffic movements at the junction are through vehicles along Main Road. The majority of the turning movements at the junction occur during the before and after school drop-off and pick-up periods. Figure 7.1.19.2 summarises the traffic volumes surveyed over an 11 hour period.

Figure 7.1.19.2 - Turning Count Volume – 11 hours (2012)

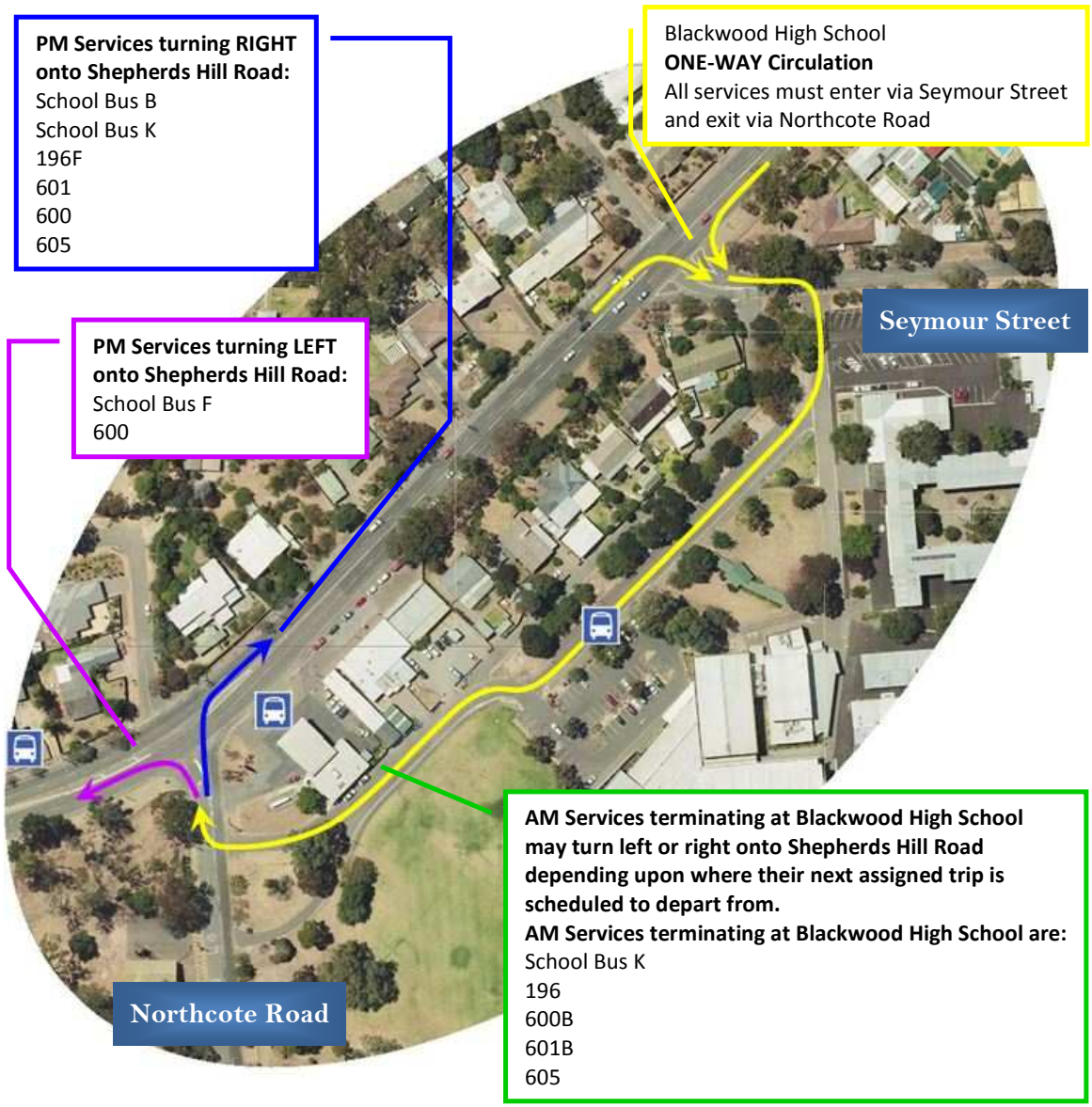


Wade Street provides access to a small number of residential properties. Seymour Street primarily functions as the access to Blackwood High School and comprises part of the car park and bus circulation route through the school. Accordingly, Seymour Street is predominantly used during school start and finish times which coincides with the peak turning movement volumes to and from the side road.

There are five buses in the morning and eight buses in the evening that all circulate through Blackwood High School via Seymour Street. There are also buses that service the bus stops located on Shepherds Hill Road in front of the school. The circulation route through the school is one way and requires all buses to enter via Seymour Street and exit via Northcote Road. The buses in the morning terminate at Blackwood High School and all turn left into the school via Seymour Street and exit via Northcote Road, whether they turn left or right out from Northcote Road depends on where their next assigned trip is scheduled to depart from. The buses in the evening again entre via Seymour Street with 6 turning right out and two turning left out at Northcote Road. Figure 7.1.19.3 illustrates the circulation of buses through Blackwood High School.

In addition to the buses that circulate through the high school, if buses are used for excursions by Blackwood Primary School, they enter via the access from Shepherds Hill Road, circulate through the primary school car park and then exit via Seymour Street.

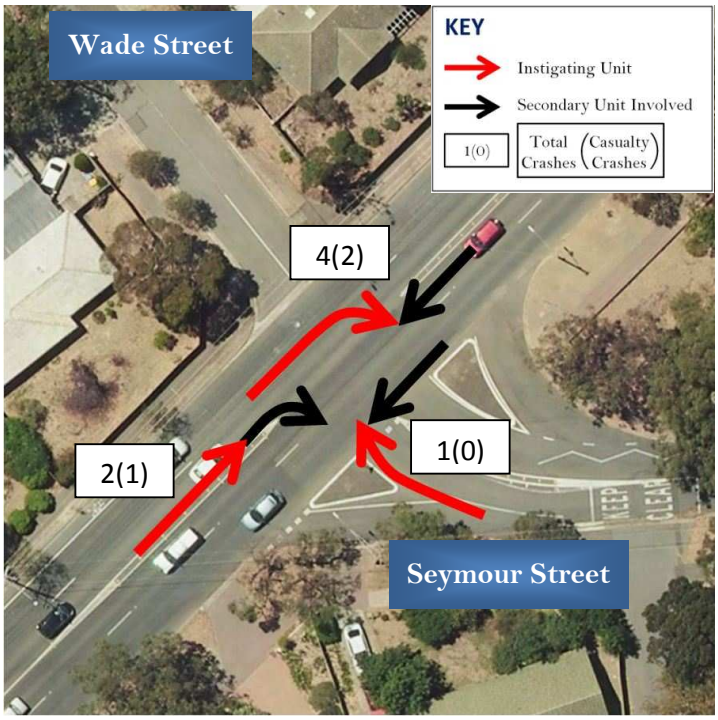
Figure 7.1.19.3 - Bus Circulating Routes through Blackwood High School



The bicycle lanes along Shepherds Hill Road were all upgraded in 2010 to have uniform 'times of operation' and new 'dashed' continuity line markings across the side road junctions to define the bicycle lanes and improve the safety for cyclists.

A review of the school car park circulation, before and after school pick-up and drop-off operations and access for school children was done in early 2006 as part of the Safe Routes To School initiative by the then Department for Transport Energy and Infrastructure. This report was provided to the schools and included recommendations on how to improve the safety for vehicles and vulnerable road users generated by the school. One of the recommendations in this review was to alter the circulation of the car park and make the Shepherds Hill Road access for Blackwood Primary School, just south of Parham Road, in only. This access was altered to in only operation in 2006. This requires all vehicles from Blackwood Primary School to exit via Seymour Street.

Figure 7.1.19.4 - Crash Diagram (2009 – 2013)



Detailed analysis of the crash data indicates that factors contributing to crashes include poor visibility to the north for vehicles exiting Seymour Street, the number of vehicles turning at the junction during the short peak periods before and after school and traffic turning into Seymour Street impeding through traffic on Shepherds Hill Road. All but one of the crashes reported at the intersection occurred during the weekday morning or evening peak period, with four of these during the before and after school drop-off and pick-up times in daylight hours (2 PDO, 2 casualty).

Seymour Street has been a community issue for a number of years. Long delays have been reported by the community on Seymour Street during the school peak periods.

Figure 7.1.19.5 - Shepherds Hill Road / Seymour Street

TREATMENTS

As discussed in the 2006 RMP the implementation of traffic signals at this location is not warranted based on either traffic demand or pedestrian crossing requirements. Therefore this option has not been further investigated.

DPTI has investigated the following treatment options aimed to improve safety and operation of the junction:

d. Painted median treatment

e. Channelised left turn treatment

f. Tree trimming or removal

A painted median at the intersection has been considered to address the right angle and rear end crashes at the junction. This treatment would allow vehicles turning right out from Seymour Street to perform a two stage manoeuvre by storing in the middle of the road reducing the potential for right angle crashes. The treatment would also provide a sheltered area for vehicles to wait before turning right into the side roads which would reduce the potential for rear end crashes on Shepherds Hill Road. This treatment would require a substantial amount of road works attracting a reasonably high cost for implementation.

A separate channelised left turn lane has been considered in order to address the right angle crashes at the junction as it would separate out left turning vehicles from the through traffic approaching the junction from the north. This would allow motorists on the side road to be able to see past the turning vehicles improving the visibility from Seymour Street as well as assisting motorists waiting on the side road to judge the behaviour and movements of traffic approaching from the south.

The removal of a few of the tree on the north-east corner of the junction would improve the visibility to the north for vehicles exiting Seymour Street.

RECOMMENDATION

It is recommended that the painted median treatment be implemented at the junction and the trees on the north-east corner of the junction be removed to improve the visibility for vehicles exiting Seymour Street. However, this treatment would need to be prioritised against all other state-wide projects.

7.1 Recommendation For Mid-block Sections

Mid-blocks that had six or more crashes (PDO and casualty) over a five year period (2009 - 2013) were further investigated. The following mid-blocks did not meet the criteria for investigation due to there being less than six crashes recorded during the five year period (2009-2013):

Main Road

- Sheoak Road/ Gloucester Avenue to Russell Street
- Russell Street to Elliott Avenue
- Elliot Avenue to Gooch Court
- Gooch Court to Penno Parade North
- Penno Parade North to Downer Avenue
- Downer Avenue to Monalta Drive
- Laffers Road to Byrne Street
- Byrne Street to Rosella Avenue
- Southern Avenue to McDonald Avenue
- McDonald Avenue to Burfield Street
- Burfield Street to Stirling Road / Miller Street
- Stirling Road / Miller Street to Colton Road
- Colton Road to Gulfview Road
- Gulfview Road to Chapman Street

Shepherds Hill Road

- Blackwood Roundabout to Gladstone Road
- Gladstone Road to Brighton Parade / Waite Street
- Brighton Parade / Waite Street to Woodleigh Road
- Woodleigh Road to Sherbourne Road / Melton Street
- Sherbourne Road / Melton Street to Viaduct Road
- Viaduct Road to Wilpena Street
- Wilpena Street to Parham Road
- Parham Road to Seymour Street / Wade Street

7.2.1 Main Road: Monalta Drive to Laffers Road

There were 9 reported crashes (4 PDO and 5 casualty) along this section between 2009 and 2013, which has seen an increase in the number of reported crashes since the 2006 RMP (4 additional crashes). The predominant crash type along this section is rear end (4 crashes). Note there was a fatal crash reported at the Monalta Drive junction in May 2013.

Table 7.2.1.1 - Summary of crashes for Main Road: Monalta Drive to Laffers Road

Crash Type	PDO	Casualty	2009	2010	2011	2012	2013	Total
Rear End	3	1	-	2	2	-	-	**4**
Right Angle	-	1	-	1	-	-	-	**1**
Hit Parked Vehicle	1	-	-	1	-	-	-	**1**
Roll Over	-	1	1	-	-	-	-	**1**
Head On	-	2	-	-	1	-	1	**2**
Total	**4**	**5**	**1**	**4**	**3**	**0**	**1**	**9**

This section of Main Road is located within Section 2 of the study corridor. The mid-block consists of a sweeping bend, providing one traffic lane in each direction and a PAC half way between the side roads. There is indented kerbside parking with parking restrictions during the school peaks; No Parking 8am-9am and 3pm-4pm School Days. There are set back footpaths along both sides of Main Road with the western footpath less visible to motorists due to dense roadside vegetation and the footpath being at a lower level than the road.

Belair Primary School is located to the east of Main Road, and residential property accesses line the western side of Main Road.

There are bus stops on both sides of Main Road within this mid-block, located just north of Laffers Road.

Visibility of the traffic signals at the PAC on Main Road, as well as signage on the approaches, has been assessed and is in accordance with DPTI Operational Guidelines.

Figure 7.2.1.1 - Aerial Image of Mid-block (2012)

Detailed analysis of the crash data indicates that factors contributing to crashes include the congested traffic conditions during the school peaks, parking vehicles impeding through traffic on Main Road, limited visibility around the sweeping bend and poor visibility of pedestrians and cyclists travelling along the western footpath as illustrated in Figure 7.2.1.1 below. Most of the crashes reported along this mid-block occurred during daylight hours, either the morning or afternoon school peak periods. Both of the head on collisions were reported to be DUI crashes that occurred at night.

Figure 7.2.1.2 - Image of western footpath along Main Road between Monalta Drive and Laffers Road

RECOMMENDATION

It is recommended that trimming and possibly removal of roadside vegetation be undertaken to improve visibility for all road users and a painted median treatment be implemented along this section of Main Road, as per the vision in Section 4. The implementation of a painted median would require the removal of kerbside parking and road widening. While the recent fatality at the Monalta Drive junction is not directly associated with the operation of this mid-block section the recommended treatment would improve the safety at the Monalta Drive junction by providing a sheltered right turn lane for vehicles to store while they are waiting to turn right into Monalta Drive. This treatment would need to be prioritised against all other state-wide projects for funding.

7.2.2 Main Road: Rosella Avenue to Southern Avenue

There were 7 reported crashes (5 PDO and 2 casualty) along this section between 2009 and 2013, which has seen an increase in the number of reported crashes since the 2006 RMP (3 additional crashes). The predominant crash type along this section is rear end (5 crashes).

Table 7.2.2.1 - Summary of crashes for Main Road: Rosella Avenue to Southern Avenue

Crash Type	PDO	Casualty	2009	2010	2011	2012	2013	Total
Rear End	3	2	-	2	1	-	2	**5**
Side Swipe	-	-	-	-	-	-	-	**0**
Hit Fixed Object	1	-	1	-	-	-	-	**1**
Head On	1	-	-	-	-	1	-	**1**
Total	**5**	**2**	**1**	**2**	**1**	**1**	**2**	**7**

Main Road from Rosella Avenue to the Glenalta railway level crossing is contained within Section 2 of the study corridor, while south of the level crossing to Southern Avenue is contained within Section 3 of the study corridor. The mid-block consists of a single traffic lane in each direction with a level crossing located in between back to back bends in the road. There is a solid narrow median north of the level crossing with yellow box markings to prevent motorists queuing over the track. Right turns into Rosella Avenue are not permitted. There are footpaths along both sides of Main Road, with the western footpath set back and at a lower level than the road. Pedestrian fencing surrounds the level crossing to guide pedestrian movements at the railway line. The Glenalta railway crossing services both passenger and freight trains.

Figure 7.2.2.1 - Aerial Image of Mid-block (2012)

There is no access to or from Main Road along this section.

Guard fence lines the western side of Main Road from Southern Avenue to the level crossing and similarly a short section of guard fence lines the eastern side between the level crossing and Rosella Avenue. Hazard boards and advanced warning signage is provided on both approaches to the level crossing to warn and advise motorists they are approaching a level crossing and guide motorists through the bends in the road.

The Glenalta railway station is located to the east of Main Road as well as a parking facility for patrons accessing the train.

The lighting along this mid-block was upgraded in 2008 to current arterial road standard.

Main Road junction with Rosella Avenue was upgraded in 2005. The upgrade included removal of a short right turn bay that traversed the railway level crossing, banning the right turn into Rosella Avenue and implementing a solid median to reinforce access restrictions from the railway level crossing to Glengarry Access Lane, north of Rosella Avenue.

The traffic advisory signage on both approaches to the railway level crossing has been assessed and is in accordance with Australian Standards and DPTI Operational Guidelines.

Detailed analysis of the crash data indicates that factors contributing to crashes include queuing and delay on Main Road from the railway level crossing and limited visibility around the back to back bends in the road. Just over two thirds of the crashes reported along this mid-block occurred when the railway level crossing was operating during either the morning or evening weekday peak period, predominantly on the southern approach to the level crossing. Both of the hit fixed object crashes occurred late at night, with one of these reported to be a DUI crash.

Site observations indicate that the Glenalta level crossing can cause significant delays for traffic along Main Road.

RECOMMENDATION

Given there has only been two casualty crashes reported in the past five years it is recommended that this mid-block section continue to be monitored.

7.2.3 Main Road: Chapman Street to Edward Street / Carr Street

There were 7 reported crashes (4 PDO and 3 casualty) along this section between 2009 and 2013, which has seen an increase in the number of reported crashes (2 additional crashes) since the 2006 RMP. There is no predominant crash type along this section of Main Road.

Table 7.2.3.1- Summary of crashes for Main Road: Chapman Street to Edward Street / Carr Street

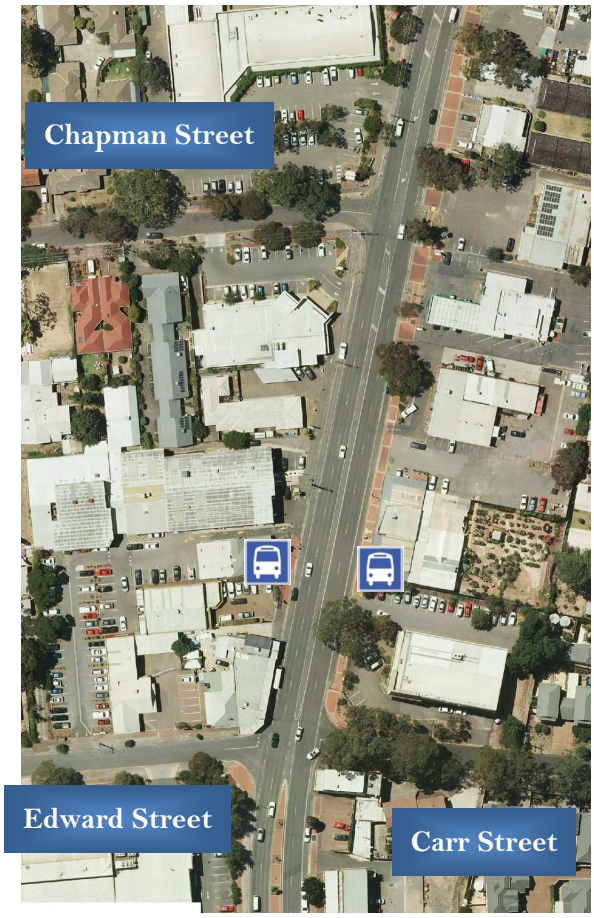
Crash Type	PDO	Casualty	2009	2010	2011	2012	2013	Total
Side Swipe	1	-	-	1	-	-	-	**1**
Right Turn	2	-	1	-	1	-	-	**2**
Rear End	-	2	-	-	-	1	1	**2**
Right Angle	1	1	-	-	-	2	-	**2**
Total	**4**	**3**	**1**	**1**	**1**	**3**	**1**	**7**

This section of Main Road is located within Section 4 of the study corridor. The mid-block provides two traffic lanes in each direction, merging into one lane in each direction just south of Chapman Street, and a painted median. There is indented kerbside parking along the both sides of Main Road with time limit restrictions imposed along parts of the section. Bus stops are located on both sides of Main Road within this mid-block section. There are footpaths provided along both sides of Main Road.

This mid-block is located within the commercial precinct of Blackwood. Businesses and commercial facilities abut both sides of Main Road. There are numerous accesses along both sides of Main Road, providing access to off-street parking. There are no movement restrictions at any of the access points along this mid-block section of Main Road.

The speed limit along this section of Main Road was reduced from 60kph to 50kph in 2007 as part of a corridor speed reduction initiative between Burfield Street (50 metres south of) and Blackwood Roundabout.

Figure 7.2.3.1 - Aerial Image of Mid-block (2012)



Detailed analysis of the crash data indicates that factors contributing to crashes include the traffic and pedestrian movements generated by the surrounding land use, the conflict between slow moving and turning traffic and high volumes of through traffic as well as vehicles parking along Main Road. All of the reported crashes were associated with turning movements to and from private accesses along Main Road. Further analysis of incident reports indicate that all but one of the reported crashes occurred just south of Chapman Street, within 60m of the junction, with most of these associated with accessing private property to the east of Main Road. The one PDO crash that occurred further south of Chapman Street was the result of a vehicle fault.

There is also community concern about the difficulty pedestrians experience when crossing Main Road. A contributing factor is pedestrians find it difficult to judge gaps in traffic flow due to the conflict between slow moving and turning traffic and high volumes of through traffic as well as vehicles parking along Main Road. Due to the level of conflict associated with turning movements along this mid-block section pedestrians feel they need to cross Main Road in one movement due to no formal waiting space in the centre of the road preventing vehicles traversing the painted median.

RECOMMENDATION

A pedestrian refuge, north of Edward Street was installed in 2014. The refuge aims to improve pedestrian safety at this location. Additionally it is recommended that the median along this mid-block section be widened to be consistent with the mid-block sections to the north and south of this location. This treatment would need to be prioritised against all other state-wide projects for funding.

7.2.4 Main Road: Edward Street / Carr Street to Young Street

There were 6 reported crashes (5 PDO and 1 casualty) along this section between 2009 and 2013, which has seen no increase or decrease in the number of reported crashes since the 2006 RMP. There is no predominant crash type along this section of Main Road.

Table 7.2.4.1- Summary of crashes for Main Road: Edward Street / Carr Street to Young Street

Crash Type	PDO	Casualty	2009	2010	2011	2012	2012	Total
Side Swipe	1	-	1	-	-	-	-	**1**
Hit Fixed Object	1	1	-	1	1	-	-	**2**
Hit Parked Vehicle	2	-	2	-	-	-	-	**2**
Head On	1	-	-	-	-	1	-	**1**
Total	**5**	**1**	**3**	**1**	**1**	**1**	**0**	**6**

This section of Main Road is located within Section 4 of the study corridor. The mid-block consists of a sweeping bend, providing two traffic lanes in each direction with a solid median and a pedestrian refuge area. There is indented kerbside parking along the eastern side of Main Road with time limit restrictions; one hour parking at all times. There are footpaths provided along both sides of Main Road.

This mid-block is located within the commercial precinct of Blackwood. Retail facilities abut both sides of Main Road. There are numerous accesses along the eastern side of Main Road, providing access to off-street parking. There are two access points to a large volume of off-street parking to the west of Main Road, with the southern access entry only and the northern access exit only. All of the accesses along this mid-block operate as left in and left out only due to the solid median.

The speed limit along this section of Main Road was reduced from 60kph to 50kph in 2007 as part of a corridor speed reduction initiative between Burfield Street (50 metres south of) and Blackwood Roundabout.

Figure 7.2.4.1 - Aerial Image of Mid-block (2012)

Detailed analysis of the crash data indicates that factors contributing to crashes include the traffic and pedestrian movements generated by the surrounding land use, the conflict between slow moving and turning traffic and high volumes of through traffic, poor visibility around the sweeping bend, poorly designed accesses to off-street car parking and vehicles parking along the eastern side of Main Road. All of the reported crashes, except one of the hit fixed object crashes, occurred during weekday business hours. The other hit fixed object crash reported along this mid-block occurred late at night. Further analysis of incident reports indicate that all of the side swipe crashes were associated with southbound and northbound vehicles changing lane.

RECOMMENDATION

It is recommended that the provision of kerbside parking along the eastern side of Main Road be reviewed so that kerbside parking only be permitted where vehicles un-parking from the kerb have adequate visibility of southbound traffic along Main Road. . DPTI would need to work with Council to review the parking provisions along this section of Main Road. This treatment would need to be prioritised against all other state-wide projects for funding.

Given the level of pedestrian activity along this mid-block section it is recommended that the pedestrian refuge be upgraded to comply with Disability Discrimination Act (DDA) requirements.

7.2.5 Main Road: Young Street to Blackwood Roundabout

There were 10 reported crashes (7 PDO and 3 casualty) along this section between 2009 and 2013, which has seen a significant decrease in the number of reported crashes (20 fewer crashes) since the 2006 RMP. There is no predominant crash type along this section of Main Road.

Table 7.2.5.1 - Summary of crashes for Main Road: Young Street to Blackwood Roundabout

Crash Type	PDO	Casualty	2009	2010	2011	2012	2013	Total
Side Swipe	3	1	1	1	-	2	-	**4**
Right Angle	1	1	-	1	-	-	1	**2**
Hit Parked Vehicle	2	-	-	-	1	1	-	**2**
Right Turn	1	-	-	-	-	-	1	**1**
Rear End	-	1	-	-	-	-	1	**1**
Total	**7**	**3**	**1**	**2**	**1**	**3**	**3**	**10**

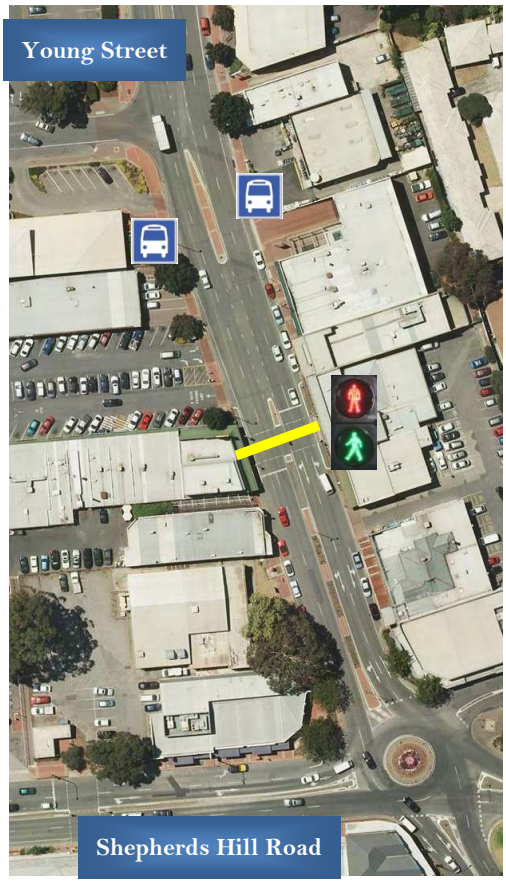
This section of Main Road is located within Section 4 of the study corridor. The mid-block consists of a sweeping bend, providing two traffic lanes in each direction with a section of solid median just south of Young Street and north of the Roundabout. There is a PAC located half way between the Roundabout and Young Street. There is indented kerbside parking along both sides of Main Road with time limit restrictions that vary along the mid-block. There are footpaths provided along both sides of Main Road.

This mid-block is located within the commercial precinct of Blackwood. Retail facilities abut both sides of Main Road. There are numerous accesses along both sides of Main Road, providing access to off-street parking.

There are bus stops on both sides of Main Road within this mid-block, located just south of Young Street.

The speed limit along this section of Main Road was reduced from 60kph to 50kph in 2007 as part of a corridor speed reduction initiative between Burfield Street (50 metres south of) and Blackwood Roundabout.

Figure 7.2.5.1 - Aerial Image of Mid-block (2012)



It is noted that recent alterations have been made to the internal circulation of the Foodland car park. The current operation and pavement marking at the access to Main Road, shown in Figure 7.2.5.2, no longer provides clear priority for vehicles entering the car park from Main Road.

Review of the mid-block crash statistics reveal a reduction in crashes since the speed limit along Main Road was reduced in 2007. Detailed analysis of the crash data indicates that factors contributing to crashes include the high level of traffic and pedestrian movements generated by the surrounding land use, the conflict between slow moving and turning traffic and high volumes of through traffic, vehicles parking near the Blackwood Roundabout, the number of vehicular conflict points along the road and poorly designed accesses to off-street car parking and the interaction between the Blackwood Roundabout and vehicle movements along the mid-block. Most of the crashes reported along this mid-block occurred during business hours. Further analysis of incident reports indicate that all of the right angle crashes involved vehicles turning right out from the Foodland access colliding with northbound vehicles on Main Road. All of the other crashes reported along this mid-block occur between the PAC and the Blackwood Roundabout.

Site observations indicate that during business hours queuing and delay for the left turn into the Foodland car park occasionally extends back to the Blackwood Roundabout. This was observed to then have a follow on effect impacting the vehicles turning right into or out of the car park. The queue would block the access preventing vehicles from turning right into the car par and resulted in vehicles exiting the car park being unable to see northbound through traffic travelling in the right hand lane along Main Road.

Figure 7.2.5.2 – Foodland car park access located on the western side of Main Road (2012)

RECOMMENDATION

It is recommended that the solid median be extended to be continuous between the Blackwood Roundabout and Young Street requiring all accesses along this section of Main Road to operate as left in and left out only, reducing the number of conflicting vehicle movements occurring along this mid-block section.

It is also recommended that on-street parking along both sides of Main Road between the Roundabout and the PAC be removed to improve the safety for all road users by reducing the number of conflicting vehicular movements along the mid-block. This treatment would also improve motorist's visibility of pedestrians (particularly children), eliminate conflict between parking vehicles and cyclists and allow for wider footpaths along Main Road improving the character of the area as a pedestrian precinct. DPTI would need to work with Council to review the parking provisions along this section of Main Road.

In addition to this it is recommended that the circulation and access to the Foodland car park be reviewed to ensure the operation of the Main Road access points are safe by reducing the sites internal vehicular conflict points. DPTI would need to work with Council to review the operation of the car park access points to and from Main Road.

These treatments would need to be prioritised against all other state-wide projects for funding.

7.2 Other Traffic Management / Community Concerns

Consultation with the community remains an important aspect of RMP's.

Where applicable the concerns raised by the Blackwood Action Group (BAG), the Blackwood / Belair and District Community Association (BBDCA) and the Mitcham Council have been incorporated into the recommendations for the individual intersections and mid-blocks (see Sections 7.1 to 7.2).

Below are some of the additional issues raised by the community that have broad implications for the road network in the study area and are not able to be addressed within the proposed intersection, junction or mid-block treatments.

No.	Concerns	Action
1	• Blackwood Roundabout during peak periods is heavily congested.	DPTI has reviewed the operation of the Blackwood roundabout and has found that there are limited options to reduce congestion at this location. Larger scale planning work is required to identify an appropriate solution.
2	• Concern regarding the Belair Triangle and the interaction between the three roads that intersect with Main Road.	Major changes to the layout of the junctions at this location are difficult due to the limited sight distances and the existing geometry of the road. Accordingly, major changes at this location are outside the scope of this document. Notwithstanding this, The RMP does consider the need to maximise sight distance at these junctions and the potential to rationalise movements at particular junctions to improve road safety.
3	• Lack of bicycle facilities along the full length of Main Road.	The RMP anticipates the provision of bike lanes along the full length of Main Road. The design of the facilities will need to consider the constraints posed by the Pinera Overway Bridge.
4	• Speed limit signs along length of Main Road are not visible due to vegetation etc – Potential to paint the speed limit on road pavement to reinforce speed zone.	DPTI does not currently support the widespread use of painted pavement speed zone messages. DPTI will review the number and location of speed zone signs and remove vegetation where needed to ensure speed signs are clearly visible.

No.	Concerns	Action
5	• Concern that the increase in frequency and length of freight trains will increase delay at Blackwood and Glenalta level crossings. Removal of freight trains from the Adelaide Hills line requested.	DPTI acknowledges that freight train operations impact on the efficiency of the road network at this location. However, the removal of freight trains from the Adelaide Hills line does not form part of the scope of this document.
6	• Concern that full implementation of the previous road management plan has not occurred.	Implementation of treatments and improvements to the road network are dependent on available funding. The treatments and improvements identified in the RMP are prioritised and funding allocated according to those treatments that provide the greatest road safety benefits. Some of the recommendations made in the RMP will be carried out as part of the ongoing maintenance of the roads.

8. TREATMENT SUMMARY

A number of traffic management and road maintenance improvements have been recommended in this report. It should be noted that whilst the RMP proposes a number of recommended improvements, 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 and the State as a whole. Recommendations made in Section 7 of the RMP are summarised in the following tables.

8.1 INTERSECTION/ JUNCTION TREATMENTS

The table below summarises the key intersection and junction recommendations made in Section 7 of the RMP.

INTERSECTION	SUMMARY OF RECOMMENDATIONS
Sheoak Road/ Gloucester Avenue	Channelised right turn treatment
Russell Street	Roundabout
Downer Avenue	Implement channelised right turn treatment at Penno Parade, ban right turn movements to and from Downer Avenue and provide a pedestrian refuge between Penno Parade and Downer Avenue.
Monalta Drive	Implement channelised right turn treatment
Laffers Road	Monitor
Byrne Street	Channelised right turn treatment and work with Council to address the level issues on Byrne Street to allow for smoother and safer access to and from the side road.
Stirling Road/ Miller Terrace	Monitor
View Road	Trim / remove roadside vegetation and underground powerlines to remove stobie poles
Colton Road	Monitor
Chapman Street	Monitor

INTERSECTION	SUMMARY OF RECOMMENDATIONS
Carr Street / Edward Street	Widen median and implement solid median. A pedestrian refuge, north of the intersection, was installed in 2014.
Young Street	Channelised left turn treatment and trim / remove roadside vegetation
Blackwood Roundabout	Alter the geometry to enlarge and improve the layout of the roundabout
Gladstone Road	Trim / remove roadside vegetation to the east of the junction and monitor
Waite Street / Brighton Parade	Roundabout
Sherbourne Road / Melton Street	Painted median treatment (similar to that already implemented at the Main Road intersection with Stirling Road and Miller Terrace), removal of on-street parking and underground powerlines to remove stobie poles
Wilpena Street	Monitor
Parham Road	Monitor
Seymour Street / Wade Street	Painted median treatment and removal of trees on the north-east corner

Based on the investigations, findings and recommendations reported in the current RMP, DPTI considers the following locations to be of high priority. As such planning work, detailed concept development and design will be undertaken for the treatments recommended in Section 7 and the projects will be submitted for funding and assessed on a state-wide basis.

- Main Road / Russell Street
- Main Road / Downer Avenue
- Blackwood Roundabout
- Shepherds Hill Road / Brighton Parade / Waite Street
- Shepherds Hill Road / Melton Street / Sherbourne Road

Any recommended tree trimming will be considered as part of ongoing maintenance and operations of the road network.

8.2 Mid-block Treatments

The table below summarises the key mid-block recommendations made in Section 7 of the RMP.

ROAD SECTION	
Main Road: **Monalta Drive to Laffers Road**	Painted median treatment, including a right turn lane at Monalta Drive and trim / remove some roadside vegetation
Main Road: **Rosella Avenue to Southern Avenue** **(Glenalta level crossing)**	Monitor
Main Road: **Chapman Street to Edward Street / Carr Street**	Widen median.
Main Road: **Edward Street / Carr Street to Young Street**	Review / removal of kerbside parking along the eastern side of Main Road and upgrade pedestrian refuge to comply with DDA requirements
Main Road: **Young Street to Blackwood Roundabout**	Extend solid median to be continuous between the Blackwood Roundabout and Young Street, remove kerbside parking along both sides of Main Road between the Roundabout and the PAC and work with Council to review the Foodland car park circulation and operation of the access on Main Road

Based on the investigations, findings and recommendations reported in the current RMP, DPTI considers the following mid-block sections to be of high priority. As such planning work, detailed concept development and design will be undertaken for the treatments recommended in Section 7 and the projects will be submitted for funding and assessed on a state-wide basis.

- Main Road: Monalta Drive to Laffers Road

Any recommended tree trimming will be considered as part of ongoing maintenance and operations of the road network.

9. CONCLUSION

This Road Management Plan has made a number of recommendations to primarily address the safety issues that have been identified along the study corridor, while also considering operational issues at these locations.

All of the proposed recommendations are conceptual only, and will therefore require further development and consultation with the City of Mitcham and the community prior to any proposed implementation. The design of specific treatments will aim at consistency with and target the longer-term functional outcomes outlined in this Road Management Plan.

Importantly, funding commitments for the initiatives detailed in this plan are subject to normal budgetary processes and priorities.

APPENDIX A – INTERSECTION CRASH DATA

Section	Intersection	Crash Type	PDO $300+	Casualty	2009	2010	2011	2012	2013	Total
1	Main Road – Sheoak Road/Gloucester Avenue	Right Angle	5	1	1	-	2	1	2	6
		Rear End	1	-	-	-	-	1	-	1
		Total	**6**	**1**	**1**	**0**	**2**	**2**	**0**	**7**
1	Main Road – Russell Street	Right Angle	2	6	-	3	2	2	1	8
		Rear End	2	1	-	--	-	1	2	3
		Right Turn	4	5	1	2	-	2	4	9
		Total	**8**	**12**	**1**	**5**	**2**	**5**	**7**	**20**
2	Main Road – Penno Parade North	Rear End	1	-	-	-	-	-	1	1
		Total	**1**	**-**	**0**	**0**	**0**	**0**	**1**	**1**
2	Main Road – Downer Avenue	Right Angle	1	5	1	2	2	-	1	6
		Rear End	3	1	-	3	-	1	-	4
		Side Swipe	-	1	-	-	1	-	-	1
		Total	**4**	**7**	**1**	**5**	**3**	**1**	**1**	**11**
2	Main Road – Monalta Drive	Rear End	2	1	1	-	1	-	1	3
		Total	**2**	**1**	**1**	**0**	**1**	**0**	**1**	**3**
2	Main Road – Laffers Road	Rear End	1	-	1	-	-	-	-	1
		Right Angle	-	-	-	-	-	-	-	0
		Right Turn	-	2	-	1	-	-	1	2
		Total	**1**	**2**	**1**	**1**	**0**	**0**	**1**	**3**
2	Main Road – Byrne Street	Right Angle	1	-	1	-	-	-	-	1
		Rear End	2	1	1	1	-	-	1	3
		Right Turn	2	-	1	-	-	1	-	2
		Total	**5**	**1**	**3**	**1**	**0**	**1**	**1**	**6**
3	Main Road – McDonald Avenue	Side Swipe	1	-	-	-	-	1	-	1
		Total	**1**	**0**	**0**	**0**	**0**	**1**	**0**	**1**
3	Main Road – Burfield Street	Rear End	1	-	-	1	-	-	-	1
		Total	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**1**
3	Main Road – Stirling Road / Miller Terrace	Right Angle	1	1	1	1	-	-	-	2
		Total	**1**	**1**	**1**	**1**	**0**	**0**	**0**	**2**
3	Main Road – View Road	Right Angle	1	1	-	1	-	1	-	2
		Total	**1**	**1**	**0**	**1**	**0**	**1**	**0**	**2**
3	Main Road – Colton Road	Rear End	-	1	-	1	-	-	-	1
		Right Angle	1	-	-	-	-	-	1	1
		Total	**1**	**1**	**0**	**1**	**0**	**0**	**1**	**2**
3	Main Road – Gulfview Road	Rear End	-	1	-	-	1	-	-	1
		Total	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**1**
3	Main Road – Chapman Street	Right Angle	1	-	-	1	-	-	-	1
		Side Swipe	1	-	1	-	-	-	-	1
		Total	**2**	**0**	**1**	**1**	**0**	**0**	**0**	**2**

Section	Intersection	Crash Type	PDO $300+	Casualty	2009	2010	2011	2012	2013	Total
4	Main Road – Edward St / Carr St	Rear End	1	-	-	-	1	-	-	1
		Right Angle	1	1	-	1	-	1	-	2
		Total	**2**	**1**	**0**	**1**	**1**	**1**	**0**	**3**
4	Main Road – Young Street	Right Angle	2	3	2	-	1	1	1	5
		Side Swipe	1	-	-	-	1	-	-	1
		Total	**3**	**3**	**2**	**0**	**2**	**1**	**1**	**6**
4	Blackwood Roundabout	Right Angle	24	4	7	6	6	8	1	28
		Hit Fixed Object	1	-	-	1	-	-	-	1
		Rear End	9	1	1	4	3	1	1	10
		Side Swipe	8	1	3	1	1	3	1	9
		Total	**42**	**6**	**11**	**12**	**10**	**12**	**3**	**48**
5	Shepherds Hill Road – Gladstone Road	Right Angle	1	-	1	-	-	-	-	1
		Hit Fixed Object	1	-	1	-	-	-	-	1
		Head On	1	-	-	-	1	-	-	1
		Rear End	3	1	-	2	-	2	-	4
		Right Turn	-	2	-	2	-	-	-	2
		Total	**6**	**3**	**2**	**4**	**1**	**2**	**0**	**9**
5	Shepherds Hill Road – Brighton Parade / Waite Street	Right Angle	19	5	4	10	3	3	4	24
		Right Turn	4	1	-	1	1	2	1	5
		Hit Pedestrian	-	1	-	1	-	-	-	1
		Hit Fixed Object	-	1	-	-	-	-	1	1
		Total	**23**	**8**	**4**	**12**	**4**	**5**	**6**	**31**
5	Shepherds Hill Road – Woodleigh Road	Rear End	1	-	-	-	1	-	-	1
		Total	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**1**
5	Shepherds Hill Road – Sherbourne Road	Rear End	-	2	-	-	1	1		2
		Total	**0**	**2**	**0**	**0**	**1**	**1**		**2**
5	Shepherds Hill Road – Melton Street	Right Angle	5	3	1	1	2	4	-	8
		Hit Fixed Object	1	-	-	-	-	1	-	1
		Rear End	-	2	-	-	1	1	-	2
		Total	**6**	**5**	**1**	**1**	**3**	**6**	**0**	**9**
5	Shepherds Hill Road – Viaducts Road	Rear End	1	-	-	-	-	-	1	1
		Total	**1**	**0**	**1**	**0**	**0**	**0**	**1**	**1**
5	Shepherds Hill Road – Wilpena Street	Right Angle	2	-	1	-	-	-	1	2
		Roll Over	-	1	-	-	-	-	1	1
		Total	**2**	**1**	**1**	**0**	**0**	**0**	**2**	**3**
5	Shepherds Hill Road – Parham Road	Right Angle	1	1	2	-	-	-	-	2
		Rear End	-	1	-	-	-	-	1	1
		Total	**1**	**2**	**2**	**0**	**0**	**0**	**1**	**3**
5	Shepherds Hill Road – Seymour Street / Wade Street	Right Angle	1	-	1	-	-	-	-	1
		Right Turn	2	2	-	1	-	3	-	4
		Rear End	1	1	-	1	1	-	-	2
		Total	**4**	**3**	**1**	**2**	**1**	**3**	**0**	**7**

APPENDIX B – MID-BLOCK CRASH DATA

Section	Intersection	Crash Type	PDO $300+	Casualty	2009	2010	2011	2012	2013	Total
1	Main Road: Sheoak Road/ Gloucester Avenue to Russell Street	Right Angle	1	-	-	-	1	-	-	1
		Roll Over	-	1	-	-	1	-	-	1
		Total	**1**	**1**	**0**	**0**	**2**	**0**	**0**	**2**
2	Main Road: Penno Parade North to Downer Avenue	Side Swipe	1	-	-	-	1	-	-	1
		Rear End	-	1	-	-	-	-	1	1
		Total	**1**	**1**	**0**	**0**	**1**	**0**	**1**	**2**
2	Main Road: Downer Avenue to Monalta Drive	Hit Fixed Object	2	-	1	-	1	-	-	2
		Rear End	1	-	-	1	-	-	-	1
		Total	**3**	**0**	**1**	**1**	**1**	**0**		**3**
2	Main Road: Monalta Drive to Laffers Road	Head On	-	2	-	-	1	-	1	2
		Rear End	3	1	-	2	2	-	-	4
		Right Angle	-	1	-	1	-	-	-	1
		Roll Over	-	1	1	-	-	-	-	1
		Hit Parked Vehicle	1	-	-	1	-	-	-	1
		Total	**4**	**5**	**1**	**4**	**3**	**0**	**1**	**9**
2	Main Road: Laffers Road to Byrne Street	Rear End	1	-	1	-	-	-	-	1
		Hit Fixed Object	1	-	-	-	-	-	1	1
		Total	**2**	**0**	**1**	**0**	**0**	**0**	**1**	**2**
2	Main Road: Byrne Street to Rosella Avenue	Hit Fixed Object	2	-	1	-	-	1	-	2
		Side Swipe	-	1	-	1	-	-	-	1
		Total	**2**	**1**	**1**	**1**	**0**	**1**	**0**	**3**
2	Main Road: Rosella Avenue to Southern Avenue	Hit Fixed Object	1	-	1	-	-	-	-	1
		Head On	1	-	-	-	-	1	-	1
		Rear End	3	2	-	2	1	-	2	5
		Total	**5**	**2**	**1**	**2**	**1**	**1**	**2**	**7**
2	Main Road: Southern Avenue to McDonald Avenue	Right Angle	1	-	-	1	-	-	-	1
		Rear End	2	-	1	-	1	-	-	2
		Side Swipe	1	-	-	-	1	-	-	1
		Total	**4**	**0**	**1**	**1**	**2**	**0**	**0**	**4**
3	Main Road: McDonald Avenue to Burfield Street	Rear End	1	-	-	-	1	-	-	1
		Total	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**1**
3	Main Road: Stirling Road to View Road	Right Angle	1	-	-	-	1	-	-	1
		Total	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**1**
3	Main Road: Colton Road to Gulfview Road	Right Angle	3	-	2	-	-	1	-	3
		Side Swipe	1	-	-	-	1	-	-	1
		Head On	-	1	-	-	1	-	-	1
		Total	**4**	**1**	**2**	**0**	**2**	**1**	**0**	**5**

Section	Intersection	Crash Type	PDO $300+	Casualty	2009	2010	2011	2012	2013	Total
3	Main Road: Gulfview Road to Chapman Street	Rear End	-	1	-	-	-	-	1	1
		Right Angle	-	1	1	-	-	-	-	1
		Hit Fixed Object	1	-	-	-	-	1	-	1
		Hit Parked Vehicle	1	-	-	1	-	-	-	1
		Total	**2**	**2**	**1**	**1**	**0**	**1**	**1**	**4**
4	Main Road: Chapman Street to Edward Street	Side Swipe	1	-	-	1	-	-	-	1
		Right Turn	2	-	1	-	1	-	-	2
		Rear End	-	2	-	-	-	1	1	2
		Right Angle	1	1	-	-	-	2	-	2
		Total	**4**	**3**	**1**	**1**	**1**	**3**	**1**	**7**
4	Main Road: Edward Street to Young Street	Side Swipe	1	-	1	-	-	-	-	1
		Hit Fixed Object	1	1	-	1	1	-	-	2
		Head On	1	-	-	-	-	1	-	1
		Hit Parked Vehicle	2	-	2	-	-	-	-	2
		Total	**5**	**1**	**3**	**1**	**1**	**1**	**0**	**6**
4	Main Road: Young Street to Blackwood Roundabout	Side Swipe	3	1	1	1	-	2	-	4
		Hit Parked Vehicle	2	-	-	-	1	1	-	2
		Right Angle	1	1	-	1	-	-	1	2
		Right Turn	1	-	-	-	-	-	1	1
		Rear End	-	1	-	-	-	-	1	1
		Total	**7**	**3**	**1**	**2**	**1**	**3**	**3**	**10**
5	Shepherds Hill Road: Blackwood Roundabout to Gladstone Road	Right Angle	1	-	-	-	-	-	1	1
		Rear End	2	-	1	-	1	-	-	2
		Total	**3**	**0**	**1**	**0**	**1**	**0**	**1**	**3**
5	Shepherds Hill Road: Brighton Parade to Woodleigh Road	Rear End	1	1	-	2	-	-	-	2
		Right Angle	3	-	1	1	1	-	-	3
		Total	**4**	**1**	**1**	**3**	**1**	**0**	**0**	**5**
5	Shepherds Hill Road: Woodleigh Road to Sherbourne Road/ Melton Street	Right Angle	-	1	-	1	-	-	-	1
		Rear End	1	-	1	-	-	-	-	1
		Side Swipe	-	1	-	-	1	-	-	1
		Hit Parked Vehicle	1	-	-	1	-	-	-	1
		Total	**2**	**2**	**1**	**2**	**1**	**0**	**0**	**4**
5	Shepherds Hill Road: Sherbourne Road/ Melton Street to Viaduct Road	Hit Fixed Object	1	-	-	1	-	-	-	1
		Total	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**1**
5	Shepherds Hill Road: Viaduct Road to Wilpena Street	Hit Fixed Object	1	-	1	-	-	-	-	1
		Total	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**1**
5	Shepherds Hill Road: Wilpena Street to Parham Road	Hit Fixed Object	1	1	-	2	-	-	-	2
		Rear End	-	1	-	-	1	-	-	1
		Total	**1**	**2**	**0**	**2**	**1**	**0**	**0**	**3**
5	Shepherds Hill Road: Parham Road to Seymour Street	Rear End	1	-	-	-	-	1	-	1
		Side Swipe	1	-	-	1	-	-	-	1
		Total	**2**	**0**	**0**	**1**	**0**	**1**	**0**	**2**

APPENDIX C – COUNCIL FEEDBACK

Council Comment / Feedback	DPTI Response
Public transport needs to be addressed - emphasis on cars rather than the movement of people, consideration might be given to a public transport interchange, which could include a reasonable amount of car parking provided for both public transport users and shopping centre patrons.	A public transport interchange facility needs to provide opportunities for transfer between train and buses and bus-bus. The current public transport interchange located at Blackwood station addresses this need. The Blackwood shopping centre is too far from neighbouring stations to be a viable Park and Ride facility for public transport users.
The general shopping" central" area around the roundabout (Main Rd, Shepherds Hill Rd, Coromandel Rd). There is far too much traffic dominating what is meant to be the community centre of the Hills. The emphasis always seems to be on "improving the traffic flow" which only encourages more through traffic and makes the traffic more dominating. I would like to see some diversion of traffic around the centre, which would assist through traffic move better and give some space back to the community	All investigations and recommendations made in the RMP consider all road users (motorists, pedestrians, cyclists, buses). There are currently no plans within the draft ITLUP for major upgrading of Main Road or Shepherds Hill Road. Any minor upgrades would need to be carefully managed to ensure that traffic is not encouraged through the Blackwood area from suburbs further to the south, and undermining the completed duplicated Southern Expressway.
Increase off street parking in Blackwood shopping precinct	Supported. This needs to be further supported by Council and enforced during the approvals of development applications
Proposal from the Road Management Plan (RMP) need to be connected and considered in reference with the 30-year plan.	Recommendations made in the RMP consider any strategic plans published by the State and the Department (30 Year Plan, Towards Zero, Functional Hierarchy, draft ITLUP)
If traffic flows have not increased along main road in the last 7 years, then some associated dynamics have changed elsewhere which have negatively impacted on traffic flow through main road. This sort of impact on the area needs considering and modelling, with associated timeline and budgetary planning	Noted. The RMP considers the crash history and operation of the corridor from Belair Road to Seymour Street. Delays to vehicles along the corridor are currently attributed to factors such as school drop off and pickup movements, level crossing closures and the intersection of major arterial roads at the Blackwood roundabout. Any issues on the wider network are identified as part of continuous monitoring of the operation.

Council Comment / Feedback	DPTI Response
Increasing traffic from Craigburn Farm and beyond will continue to put pressure on the existing streets. Consideration should be given to planning a future by-pass road linking this area to Shepherd's Hill Road via Northcote Road.	At this stage DPTI considers an alternative exit to Shepherds Hill Road from, or bypass of, the Craigburn Farm area to be a local access issue for Council to consider. DPTI does not therefore currently have any plans for such projects.
Consideration should be given to making some streets one way to manage traffic flows in a circular route around the Blackwood District Centre.	A scheme for this was considered as part of the investigations undertaken for the RMP. This is not the preferred treatment. Findings from this investigation are reported in the RMP in Section 7.1.13.
Cars parking in suburban streets adjoining train stations are creating increasing congestion in their vicinity, and a potential hazard in the case of an emergency. Consideration should be given to a new train station with 'park and ride' facilities at Bellevue Heights as has been proposed for some time	The option of a large Park and Ride on the former Mitcham Council waste site at Belle Vue Heights was discussed with Council staff approximately 12 months ago. It was agreed that the first step was to seek advice if the site could be used as a Park and Ride facility. Council staff agreed to undertake a preliminary investigation into the feasibility of such a proposal. DPTI will continue to work with Council.
Consideration should be given to reducing the speed limit around the Blackwood District Centre, including in the main roads, to 40kph.	DPTI would need to work with Council to review the speed limit through this area. Section 5.5 of the RMP discusses speed limits along the corridor.
Consideration must be given in any new road management plan for better and safer pedestrian and bicycle movements on and across the major roads.	All investigations and recommendations made in the RMP consider all road users (motorists, pedestrians, cyclists).
Slip lanes for traffic at key 'turn right' intersections such as Main Rd/East Terrace T junction, Main Road/Byrne Rd intersection,	Main Rd / East Tce - not within scope of RMP Main Rd / Byrne St - sheltered right turn lane is recommended in the RMP
Upper Sturt/Rankeys Hill Road intersection	Outside the scope of the RMP.
Seymour Rd/Shepherds Hill Rd intersection at key school drop off/pick up times. – part time traffic signals e.g. like those at the Blythewood Rd intersection	Traffic signals are not warranted at this location based on either traffic demand or pedestrian crossing requirements.
Right turn lane with lights and left slip lane from Young Street in to Main Road.	Traffic signals are not warranted at this location based on traffic demand and count data from 2014.

Council Comment / Feedback	DPTI Response
Waite Street/Shepherd Hill Road – roundabout	This has been recommended in the RMP in Section 7.1.15.
There are many streets where right turns into Main Road and Shepherd's Hill road are particularly difficult, especially at peak times. Consideration should be given to restricting some right turns.	Noted. Reducing the number of conflicting movements at intersections along the corridor was considered. However reducing access at one location requires consideration of alternative access locations and any potential impacts at the alternative access locations.
Recommended roundabout option for Waite St/ Shepherd Hill Rd/ Brighton Pde – concerns with distance between the Blackwood roundabout / the pedestrian actuated lights and the new proposed roundabout. If the roundabout provides better efficiency in traffic movements at this intersection, it will have the impact of increasing traffic flows in the local residential roads rather than keeping the though traffic on the arterial road route. Compounds exiting cut through traffic issue for Council.	Preliminary traffic analysis indicates that the operation of the roundabout should not negatively impact throughput along Shepherds Hill Rd. The proximity of the PAC will be further investigated as part of more detailed investigations and design. The implementation of the roundabout is to facilitate safe access to routes that motorists already use. Brighton Pde provides access to/from Coromandel train station (as well as childcare centre, school and Blackwood R.S.L) and Waite St provides access to a large amount of off-street parking at the rear of the commercial precinct.
The proposed relocation of the Blackwood roundabout would affect the Soldiers Memorial site and therefore would be adverse to the Community wishes. Possible political issue	Diagram in RMP is indicative only. DPTI will work with Council on any impacts associated with any recommended treatments.
Possible options recommended for the Laffers Rd / Main Rd intersection would create greater traffic flows along Laffers Rd and therefore would possibly require a road widening / upgrade of Laffers Road to cater for the additional traffic flows.	Recommendation is to monitor this location. Should signals be implemented at this location traffic volumes turning at this junction would be reviewed after traffic flows/patterns have settled. DPTI would need to work with Council after the review of traffic volumes post implementation has occurred.
Craigburn Farm development and the potential impacts on the surrounding road network	The resultant impacts of the Council approved development on the arterial road network will be monitored over time.
Increase in "cut through" traffic within residential road network/ and local amenity because of the potential road works on the arterial road network.	Noted. Any roadworks undertaken on the arterial road network and the associated impacts are assessed and approved by DPTI. DPTI aims to limit the impacts to road users during roadworks, particularly during the peak hours.

Council Comment / Feedback	DPTI Response
Railway crossings Freight transport through the Hills and its impact on the local road network and community amenity	See commentary in Section 7.2 of the RMP for response.
Impact on school related traffic flows.	The RMP proposes recommendations within the vicinity of Belair Schools, Blackwood High School and Primary School. The proposals would improve safety for access to and from the schools and reduce congestion along the arterial road.
Issues with accessibility during dangerous bushfire conditions.	The Department of Planning, Transport and Infrastructures (DPTI) supports, in principle, the Country Fire Service's (CFS) bushfire guide policy titled "Prepare, Act, Survive" and its corresponding leave early approach. Residents are advised to be aware of the various escape routes from their homes prior to an emergency situation occurring. This enables them to make informed decisions to leave or evacuate, with the knowledge that they are leaving by the safest route possible; not via roads that may have become blocked by other evacuees, emergency services or a fire. Messages from the CFS regarding potential evacuations and safety are relayed through a variety of media formats, including news and social media, to lessen the impact of traffic congestion at the time of the event. It is the role of the South Australian Police to maintain law and order and to protect life and property. This specifically includes traffic and crowd control.
Blackwood Roundabout Parking bays outside Post Office removed and lanes reconfigured to allow dedicated left hand turn plus 2 lanes to take traffic to Hawthorndene and Coromandel Parade	This has been recommended in the RMP in Section 7.1.13. DPTI would need to work with Council to review kerbside parking within the commercial precinct.
Blackwood Roundabout At the top of Shepherds Hill Road. Traffic lights added to operate during rush hours similar system to those operating at the Belair/Blythewood Rd roundabout	Roundabout metering has been considered as part of the investigations for the RMP. This is not the preferred treatment, however further modelling is required. Findings of the investigation have been reported in the RMP in Section 7.1.13.

Council Comment / Feedback	DPTI Response
Blackwood Roundabout Intersection between BankSA & Uniting Church is dangerous for pedestrians	This has been considered in the treatment recommended in the RMP in Section 7.1.13.
Blackwood Roundabout Replaced with traffic lights or overpass or diversion roads.	Traffic lights were considered as part of the investigations for the RMP. This is not the preferred treatment. Findings of the investigation have been reported in the RMP in Section 7.1.13. Grad separation and diversion roads are considered major upgrades/treatments and hence are outside of the scope of the RMP and would need to be considered in a larger planning investigation. There are currently no plans within the draft ITLUP for major upgrading of Main Road or Shepherds Hill Road. Any minor upgrades would need to be carefully managed to ensure that traffic is not encouraged through the Blackwood area from suburbs further to the south, and undermining the soon to be completed duplicated Southern Expressway.
Blackwood Roundabout I would like to see station road become one way (roundabout exit only) and some sort of traffic light system like the one at the bottom of Old Belair Road at peak times.	Station Rd one-way - this has been recommended in the RMP. Roundabout metering - this was considered as part of the investigations for the RMP. This is not the preferred treatment. Findings of the investigation have been reported in the RMP in Section 7.1.13.
Blackwood Roundabout Education blitz on using indicators both entering and exiting a roundabout ; traffic lights	Traffic lights were considered as part of the investigations for the RMP. The preferred treatment is a roundabout. Findings of the investigation have been reported in the RMP in Section 7.1.13. Education blitz - Thank you for your feedback. DPTI have released a road rules refresher pocket guide which can be found at http://mylicence.sa.gov.au/road-rules/road-rules-pocket-guide

Council Comment / Feedback	DPTI Response
Blackwood Roundabout The Blackwood roundabout needs serious redesign or a reconfiguration of surrounding streets. Note that according to the RAA it is now the worst roundabout in Adelaide, following the recent redevelopment of the Britannia roundabout.	Noted. Reconfiguration/redesign of the geometry to improve the layout is the recommended treatment in the RMP. For more information see Section 7.1.13. This location is reported as a high priority for further detailed planning and design. There are currently no plans within the draft ITLUP for major upgrading of Main Road or Shepherds Hill Road. Any minor upgrades would need to be carefully managed to ensure that traffic is not encouraged through the Blackwood area from suburbs further to the south, and undermining the soon to be completed duplicated Southern Expressway.
Brighton Pde / Shepherds Hill Rd Intersection Brighton Parade & Shepherds Hill Rd - traffic lights for peak hours only or left turn only all the time	Traffic lights were considered as part of the investigations for the RMP. The preferred treatment is a roundabout. Findings of the investigation have been reported in the RMP in Section 7.1.15.
Waite St / Shepherd Hill Rd Coming out onto Waite St to turn right into Shepherds Hill Rd impossible- traffic lights	Traffic lights were considered as part of the investigations for the RMP. The preferred treatment is a roundabout as outlined in the RMP in Section 7.1.15.
Main Road / Laffers Road Access issue relating to the traffic congestion and volumes using this intersection	Noted
Issue with U- turns along Main Rd at its intersection with Edward Street and Carr Street	Noted. Recommendation in the RMP considers this by providing a sheltered area for vehicles to store out of the path of through traffic on Main Rd.
Access issues with both entrances to Foodland car park off Main Rd and Gladstone Rd	Noted. Both of these locations have been included in the RMP. Foodland access - Section 7.2.5 recommends DPTI work with Council to review the configuration of the car park Gladstone Rd - Section 7.1.14 recommends to improve the access by increasing light lines for vehicles exiting Gladstone Rd.

Council Comment / Feedback	DPTI Response
Recommendation that illuminated 50kph signs be introduced on Main road and Shepherd's Hill Road to provide better visibility and notification of the speed limit changes in this area. It is noted that tree growth often partially obscures the existing signs.	This type of treatment is currently being trialled on Goodwood Rd. On completion of the trial period a review will need to be undertaken to assess whether it is a feasible and appropriate treatment at other similar locations across the arterial road network

APPENDIX D – SUMMARY OF COMMUNITY FEEDBACK

Location	Comments	DPTI Response
Section 1 Main Road and Gloucester Ave	Drivers feel that this junction is difficult to turn right from Gloucester Ave onto Main Road. The location of the bus stop is problematic in relation to the operation of the junction. The 'S' movement from Belair Road onto Main Road and then onto Gloucester Ave causes problems as there is no refuge area for drivers to store while waiting to turn. Ban the right turn out of Gloucester and have left turn only at Sheoak Road at the junction. The visibility of the PAC is restricted due to the curves in Main Road. Additional through lanes are required.	The RMP recommends a channelised right turn treatment at this location. DPTI would consider indenting Stop 23 (north side) as part of the detailed design of right turn treatment. . Banning the right turn out from Gloucester Avenue is not considered appropriate because of the importance of this movement and the access it provides for the community. Similarly the s-movement from Sheoak Road to Gloucester is significant in terms of traffic volume and banning of this movement would transfer a significant amount of traffic to the Russell St junction and restrict accessibility in the area. In accordance with Australian Standards yellow advance warning signs on both approaches to the PAC are installed. Additional through lanes would require significant road widening and property acquisition and this is considered to be outside the scope of the RMP.
Section 1 Main Road and Russell Street	Ban Right turns out of Russell Street. Change the priority of the junction such that main road traffic gives way heading southbound. Lower the speed limit along this section of Main Road, there is an issue with speeding drivers. Removing the PAC and install traffic lights at the junction with pedestrian facilities. There are delays when turning right out	The RMP recommends a roundabout at this location. Banning the right turn out would restrict access and impact on the bus route and bus stops near Gloucester Ave potentially reducing public transport accessibility in the area. All right turn drivers would need to use an alternative such as Sheoak Road in order to head north on Main Road. From a safe systems approach this treatment would only partially address current the issues at the junction. Changing the priority at the junction has been considered however it would introduce significant travel time delays and queues on Main Road (north) and as such it is not the recommended treatment.

		Speed limits are set in accordance with Australian Standards AS 1742.4 Speed Controls. Speed limits are determined based on a number of factors however, the primary determination for the speed limit on a road is the function of the road and its role within the overall network. Under the Australian Standards, 60km/h speed limits are used for roads which function as urban traffic carrying routes such as DPTI arterial roads and local council collector routes which act as key access roads linking arterial roads and suburbs. Main Road / Belair Road is an urban traffic route and carries a high volume of traffic and as such is subject to a 60km/h speed limit. The RMP favours a roundabout over traffic signals as the roundabout is considered to provide a greater improvement in terms of road safety. A roundabout would also reduce delay for vehicles exiting Russell Street.
Section 2	Section 2 is narrow and needs road widening and there are no bike lanes.	Road widening would involve significant road construction and is considered a long term treatment and beyond the scope of the RMP. Due to the proximity of the Pinera Overway Bridge and the available road width, road widening to allow for bike lanes (or a channelised right turn treatment) is not considered feasible and beyond the scope of the RMP.
Section 2 Main Road and Penno Parade North	Ban Right turns into Penno Parade North as they hold up traffic on Main Road	The RMP recommends a channelised right turn treatment at Penno Parade North in order to provide a sheltered lane for drivers to turn without impacting on through traffic on Main Road.
Section 2 main Road and Downer Ave	A peak time movement restriction at the junction is suggested rather than a permanent ban, or trailing a no right turn out only and allowing the right turn in. Banning the right turn out may direct some drivers to turn left and u-turn in order to travel south on Main Road.	Following crash analysis at this site as part of the RMP, approximately 55% of the recorded crashes occurred on a weekend, outside of peak times. As such a peak time movement ban would not be supported as it would not be treating the junction holistically.

	It is highlighted that the bike lane ends at this location and that a cycling option enhancement should be explored.	From a safe systems approach the recommendation in the RMP reduces conflict points and there are recorded crashes associated with both movements. With the banning of the right turn into Downer Ave and upgrade at Penno Parade, a safer alternative would be provided, acknowledging that locals may need to take a longer route. The RMP does consider the treatment at Downer Ave and Penno Parade could be applied in a staged approach. No u-turn signage would be considered to discourage unsafe manoeuvres as a result of the access changes. Due to the proximity of the Pinera Overway Bridge and the available road width, road widening to allow for bike lanes (or a channelised right turn treatment) is not considered feasible and beyond the scope of the RMP.
Section 2 Main Road and Monalta Drive	A roundabout is suggested for this location. There are safety concerns for drivers who turn right into Monalta drive. Ban the right turn into Monalta Drive.	The RMP recommends a channelised right turn treatment at this junction as it would require a smaller footprint to construct than a roundabout and will directly benefit the crash types recorded at the site. Providing a sheltered area for right turning traffic allows for this movement without impact on through traffic.
Section 2 Main Road and Laffers Road	It is difficult to turn right out from Laffers Road. A roundabout or traffic signals are suggested as treatments, noting that a roundabout may improve access for Laffers Road traffic but not necessarily benefit traffic on Main Road.	The RMP notes that the Installation of traffic signals at this location is the preferred treatment and would provide a greater priority to vehicle movements to and from Laffers Road.
Section 2 Main Road and Byrne Street	Ban Right turns here as they hold up traffic on Main Road.	The RMP recommends a channelised right turn treatment at Penno Parade North in order to provide a sheltered lane for drivers to turn without impacting on through traffic on Main Road.
Section 4 main Road and Chapman Street	Between Edward St and Carr St and Chapman St there is a lack of pedestrian crossing facilities.	A pedestrian refuge was installed on main Road between Edward / Carr Street and Chapman Street to improve pedestrian access in 2014.

Section 4 Main Road and Edward Street / Carr Street	Improve storage for right turns. Install a roundabout. No right turn from Carr Street into Main Road. U-turning movements are considered problematic and should be banned.	The RMP recommends widening of the median to improve right turn access. The RMP also considers options in terms of restricting movements. A roundabout would require significant roadworks to construct and given the crash statistics at this location would be difficult to justify at this time. A u-turn ban at the intersection would be considered following further design work, currently there are no recorded crashes involving u-tuning movements.
Section 4 Main Road and Young Street	No right turn out of Young Street suggested	The RMP recommends a channelised left turn be installed. A right turn ban was considered however it would reduce access in the area, potentially increasing u-turning movements to the north.
Blackwood Roundabout	Traffic signal roundabout metering should be installed for the morning and afternoon peak periods on Shepherds Hill Road and Main Road approaches to the roundabout. The diameter of the roundabout needs to be enlarged to provide greater warning of turning traffic within the roundabout. An egg or oval shaped roundabout design is suggested The relocation of the war memorial is considered unacceptable by some members of the community. Others have suggested shifting it to the centre of the roundabout. . Install traffic signals instead of a roundabout. Lower the speed limit in the vicinity of the roundabout	Roundabout metering was investigated as part of the RMP, traffic modelling indicates that the installation of part time traffic signals to alter traffic priorities and control traffic flows entering the roundabout would not have any significant overall operational or safety benefits due to the traffic flows on the busier approaches. Further modelling is required to assess the impact on the afternoon peak period. It should be noted that the concept for the roundabout has not been finalised and the project itself is unfunded and needs to be prioritised against other state-wide projects. Concerns relating to the location of the monument are acknowledged and its location will be considered and further consultation will occur with the further development of the concept. Traffic signals were investigated as part of the RMP and are not considered the most appropriate treatment as the signals do not provide any significant improvement to the operation of the intersection.

		DPTI would need to work with Council to review the speed limit through this area.
Section 5 Main Road and Gladstone Road	Suggest traffic signals at this location. Suggest adding a small section of median on Gladstone to separate the entry and exit movements.	Given the traffic volumes at this site, the warrant for the installation of traffic signals is not justified at this time. The addition of a small section of median on Gladstone road would be considered as part of the further development of the concept options at this location.
Section 5 Shepherds Hill Road and Brighton Pde / Waite Street	Roundabout proposal may increase traffic on Brighton Parade. Suggest install traffic signals. The RMP does not tie in with the treatments suggested in The Blackwood South Traffic Management Plan by the City of Mitcham.	The recommendation for a roundabout has been identified at concept level and further design work, consultation with council and traffic modelling would be required to implement this proposal. Traffic signals were investigated as part of the RMP and preliminary traffic analysis indicates that this treatment will result in additional delays and congestion. The draft Blackwood South Traffic Management review proposes traffic control devices within Blackwood south focusing on peak hour cut through movements and speeds on local streets. The Shepherds Hill Road / Brighton Parade and Waite Street intersection is included within the study area and is under the care and control of DPTI as it includes Shepherds Hill Road. Council's report also acknowledges that potential upgrades outlined as part of the first edition of this RMP are not the focus of council's review. The recommendations from the RMP are currently unfunded proposals and further consultation and design would be required should any project receive funding in the future.
Section 5	Extend the current 50 km/h zones and implement a street tree management plan.	Shepherds Hill Road, from the Blackwood Roundabout to Sherbourne Road was reduced to 50 to align with the CBD of Blackwood. The RMP does not recommend any further changes to the extents of the current lengths of 50km/h speed zone at this time. DPTI further advises that a street tree management plan and the amenity and attractiveness of Shepherds Hill and Main Road are issues outside the scope of the RMP. The RMP's purpose is to improve traffic efficiency and safety.