Rosanna Road, Heidelberg

Road Safety Assessment
Information page

DATE: 07/03/2016

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QUALITY RECORD:

<table>
<thead>
<tr>
<th>Issue</th>
<th>Date</th>
<th>Description</th>
<th>Prepared By</th>
<th>Reviewed By</th>
<th>Approved By</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>14/03/2016</td>
<td>Draft Report</td>
<td>Jamie Robertson</td>
<td>Kenn Beer</td>
<td></td>
</tr>
</tbody>
</table>

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1. Executive Summary

Safe System Solutions Pty Ltd has been engaged by VicRoads Metropolitan North West Region to undertake an independent road safety assessment of the existing conditions on Rosanna Road between Banksia Street in Heidelberg and Lower Plenty Road in Rosanna.

A number of issues have been identified associated with the following areas that require further investigation and consideration:

a) Roadside Hazards  
b) Safety Barriers  
c) Road Geometry  
d) Street Lighting  
e) Public Transport  
f) Unsignalised Intersections

These are detailed in Table 7.

A variety of options exist for improving the safety of Rosanna Road. Safe System Solutions Pty Ltd has provided a series of recommendations for further consideration, including relocation and/or shielding of power poles, tree removal, restricting movements into and out of minor roads, investigation of high profile barrier kerb, speed limit reductions and signage and line marking.

These recommendations are detailed in Table 7.
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3. List of Abbreviations

DCA  Definition for Classifying Accidents
OI   Other Injury
SCATS Sydney Coordinated Adaptive Traffic System
SI   Serious Injury

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6. Assessment Process

a) Road Safety Assessment

A road safety assessment is a review of an existing road or road related area with the objective of assessing the road safety performance of the area. A road safety assessment is undertaken by an independent team with expertise in road safety, engineering and traffic management.

b) The Safety Assessment Team

The Safety Assessment Team consisted of:

Kenn Beer (BEng (Hons), MPIA)
Principal
Senior Road Safety Auditor
Safe System Solutions Pty Ltd

Jamie Robertson (BEng (Hons), BSc)
Road Safety Design Specialist
Senior Road Safety Auditor
Safe System Solutions Pty Ltd

Luke Britnell (BEng)
Road Safety Engineering Specialist
Road Safety Auditor
Safe System Solutions Pty Ltd
c) Site inspections and meetings

A list of site inspections and meetings associated with this Road Safety Assessment is provided in the table below:

**Table 1: Inspection and meetings**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Location</th>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE-REVIEW MEETING</td>
<td>VicRoads Sunshine</td>
<td>15/02/2016</td>
<td>1230</td>
</tr>
<tr>
<td>DAYTIME SITE INSPECTION</td>
<td>Rosanna Road</td>
<td>29/02/2016</td>
<td>1000 - 1500</td>
</tr>
<tr>
<td>AFTERNOON PEAK INSPECTION</td>
<td>Rosanna Road</td>
<td>08/03/2016</td>
<td>1700 – 1730</td>
</tr>
<tr>
<td>MORNING PEAK INSPECTION</td>
<td>Rosanna Road</td>
<td>09/03/2016</td>
<td>0815 – 0845</td>
</tr>
<tr>
<td>FINAL INSPECTION</td>
<td>Rosanna Road</td>
<td>10/03/2016</td>
<td>1630 - 1730</td>
</tr>
</tbody>
</table>

d) Assessment method

A review of the site has been completed and the details contained within any supporting documentation examined to identify issues that affect road user safety and other relevant issues. The assessors cannot guarantee that every issue that affects road user safety has been identified. Although the adoption of the assessment recommendations will improve the level of safety of the site it will not, however, eliminate all the road user safety risks.

e) Risk assessment

The potential road safety problems identified have been ranked as follows:

A risk rating has been determined based on the **likelihood** of a crash occurring as a result of the deficiency together with the potential **consequence** of that crash.

The risk ratings adopted are:

- **Intolerable**
- **High**
- **Medium**
- **Low**

Tables 2 to 4 below show the risk rating process.
### Table 2: Likelihood of a crash (Austroads, 2009)

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequent</td>
<td>Once or more per week</td>
</tr>
<tr>
<td>Probable</td>
<td>Once or more per year (but less than once a week)</td>
</tr>
<tr>
<td>Occasional</td>
<td>Once every five to ten years</td>
</tr>
<tr>
<td>Improbable</td>
<td>Less often than once every ten years</td>
</tr>
</tbody>
</table>

### Table 3: Likely consequence of a crash (Austroads, 2009)

<table>
<thead>
<tr>
<th>Consequence</th>
<th>Description</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catastrophic</td>
<td>Likely multiple deaths</td>
<td>- High speed, multi-vehicle crash on a freeway&lt;br&gt;- Car runs into crowded bus stop&lt;br&gt;- Bus and petrol tanker collide&lt;br&gt;- Collapse of a bridge or tunnel</td>
</tr>
<tr>
<td>Serious</td>
<td>Likely deaths or serious injury</td>
<td>- High or medium speed vehicle/vehicle collision&lt;br&gt;- High or medium speed collision with a fixed roadside object&lt;br&gt;- Pedestrian or cyclists struck by a car</td>
</tr>
<tr>
<td>Minor</td>
<td>Likely minor injury</td>
<td>- Some low speed vehicle collisions&lt;br&gt;- Cyclist falls from bicycle at low speed&lt;br&gt;- Left-turn rear-end crash in a slip lane</td>
</tr>
<tr>
<td>Limited</td>
<td>Likely trivial injury or property damage only</td>
<td>- Some low speed vehicle collisions&lt;br&gt;- Pedestrian walks into object (no head injury)&lt;br&gt;- Car reverses into post</td>
</tr>
</tbody>
</table>

### Table 4: Resulting level of risk (Austroads, 2009)

<table>
<thead>
<tr>
<th>Consequence</th>
<th>Frequent</th>
<th>Probable</th>
<th>Occasional</th>
<th>Improbable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catastrophic</td>
<td>Intolerable</td>
<td>Intolerable</td>
<td>Intolerable</td>
<td>High</td>
</tr>
<tr>
<td>Serious</td>
<td>Intolerable</td>
<td>Intolerable</td>
<td>High</td>
<td>Medium</td>
</tr>
<tr>
<td>Minor</td>
<td>Intolerable</td>
<td>High</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Limited</td>
<td>High</td>
<td>Medium</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>
7. Background and Scope of Assessment

Rosanna Road (State Route 44) is a major urban arterial road carrying volumes of ~38,000 vehicles per day, with 1,800 or 4.7% commercial vehicles. Rosanna Road provides a link between the Metropolitan Ring Road (M80) and the Eastern Freeway (M3).

Rosanna Road consists of two traffic lanes in each direction with clearways operating between 6.30am to 9.30am Monday to Friday for southbound traffic and 3.30pm to 6.30pm Monday to Friday for northbound traffic. A 60km/h speed limit applies along the entire length.

The land use along Rosanna Road is predominately residential on both sides with the Warringal Shopping Centre and local retail shops on the western side between Darebin Street and Banksia Street, and Heidelberg Park on the eastern side between Brown Street and Burgundy Street.

As part of the North East Truck Curfew Trial, between 10pm and 6am, trucks over 4.5 tonnes gross weight are restricted from using Rosanna Road. This does not include vehicles such as buses, caravans, cranes, local service vehicles and concrete pumps. The trial started in August 2015 and will continue to September 2016.

This Assessment has been made of the existing conditions of Rosanna Road. This is not a strategic transport planning assessment of Rosanna Road and the surrounding transport network. As such, the Assessors have not commented on the function of the road or the surrounding roads. Rather, the Assessors have made commentary about the safety of the existing conditions of Rosanna Road and made recommendations on what could be done on Rosanna Road to improve road safety, not on surrounding roads.

Figure 1: Map of Assessment Location
For the purpose of this Assessment Rosanna Road has been divided into three sections, as described below.

Section 1: Yarra Street to Darebin Street

The southern end of Rosanna Road (Section 1) is primarily a commercial precinct, with various retail outlets including Woolworths, Warringal Shopping Centre (Coles, Aldi etc.), Toyota, Mitre 10, KFC and various other businesses.

Key characteristics of this section include:

- Major signalised intersections at Burgundy Street.
- High volumes of traffic turning to and from Rosanna Road at intersections and various car parking access points including Warringal Shopping Centre car park.
- Significant pedestrian activity, particularly between Banksia Street and Burgundy Street.
- Heidelberg Primary School which abuts the west side of Rosanna Rd, south of Darebin St.
- A narrow four lane cross section, with lane widths typically between 3.0 and 3.2m and a total carriageway width of approximately 12.34m (narrower than other sections of Rosanna Road).

![Figure 2: Rosanna Road Section 1](image-url)
Figure 3: Facing north along Rosanna Road from Yarra Street

Figure 4: Facing north along Rosanna Road from south of Villa Street
Section 2: Darebin Street to Station Road

This section is characterised by its:

- straight horizontal alignment
- narrow four lane cross section, with lane widths typically between 2.8 and 3.7m and a total carriageway width of approximately 13.23m (approximately 0.9m wider than Section 1)
- signalised intersection at Station Road and pedestrian operated signals north of St James Road
- frequent unsignalised intersections
- narrow nature strips with power poles on both sides of the road
- regular residential access on both sides of the road
- regular kerbside bus stops in both directions
- right turn restrictions at unsignalised intersections at peak times

Figure 5: Rosanna Road Section 2
Figure 6: Rosanna Road Section 2
Section 3: Station Road to Lower Plenty Road

This section is characterised by its:

- curvilinear horizontal alignment
- undulating vertical alignment
- narrow four lane cross section, with lane widths typically between 2.8 and 3.8m and a total carriageway width of 13.2 to 13.6m (comparable to Section 2)
- major signalised intersection at Lower Plenty Road and minor signalised intersection at Banyule Road
- frequent unsignalised intersections
- narrow nature strips with power poles on both sides of the road
- regular residential access on both sides of the road
- regular kerbside bus stops in both directions
- right turn restrictions at unsignalised intersections at peak times

![Figure 7: Rosanna Road Section 3](image-url)
Figure 8: Rosanna Road Section 3 at Lane Avenue

Figure 9: Rosanna Road Section 3 at Jones Cres
8. Crash Analysis

In the 5 year period to the end of June 2015 there were 75 casualty crashes on the section of Rosanna Road from Yarra Street to Lower Heidelberg Road inclusive, including 15 serious injury crashes and 60 other injury crashes. The heat maps below illustrate the locations of crashes on Rosanna Road and adjacent roads.
Crash data is summarised in crash diagrams included in Appendix A.

These diagrams show that most crashes are occurring at intersections along Rosanna Road, with the worst locations being the intersections of Rosanna Road and:

1. Lower Plenty Road: 15 crashes
2. Burgundy Street: 9 crashes
3. St James Road: 6 crashes
4. Yarra Street: 6 crashes
5. Darebin Street: 5 crashes
6. Banyule Road: 5 crashes

A number of clear crash trends are also evident, including:

- Rear end (DCA 130) and right turn against (DCA 121) crashes at signalised intersections
- Cross traffic crashes (DCA 110) at unsignalised intersections
- Rear end crashes and other crashes involving vehicles travelling in the same direction at mid-block locations on Rosanna Road

A significant number of crashes (26) occurred in dark or dusk conditions. Of particular concern is the number of crashes that have occurred at Lower Plenty Road (10 out of 15) and in the vicinity of Burgundy Street (5 out of 9) in poor light.
9. General comments

9.1 Road reserve & cross section

The Rosanna Road road reserve is approximately 20m wide, which generally provides for a footpath and nature strip on both sides and two traffic lanes in each direction.

Existing traffic lane widths range from approximately 2.6m to 3.8m and are generally in the range of 2.8m to 3.2m.

Minor, localised widening has occurred to accommodate 5-lane treatments (i.e. with central right turn lanes) at a number of intersections. At these locations traffic lanes are typically in the order of 2.8m wide.

Austroads recommends that the ‘standard’ traffic lane width of 3.5m be generally adopted in urban areas and provides the table below as guidance for practitioners.

**Table 5: Urban arterial lane widths (Austroads)**

<table>
<thead>
<tr>
<th>Element</th>
<th>Lane width (m)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>General traffic lane</td>
<td>3.3 – 3.5</td>
<td>General traffic lane widths to be used for all roads</td>
</tr>
<tr>
<td></td>
<td>3.0 – 3.3</td>
<td>For use on low speed roads with low truck volumes</td>
</tr>
<tr>
<td>Service road lane</td>
<td>3.4 – 5.5</td>
<td>Range of lane widths on service roads (refer to Section 4.11)</td>
</tr>
<tr>
<td>Wide kerbside lane</td>
<td>4.2</td>
<td>Locations where there are high truck volumes (additional width provided for trucks)</td>
</tr>
<tr>
<td></td>
<td>4.2 – 4.5</td>
<td>Locations where motorists and cyclists use the same lane (refer Section 4.8.11 and Commentary 7)</td>
</tr>
<tr>
<td>HOV lane</td>
<td>3.5 – 4.5</td>
<td>Bus lane (refer Section 4.9.2)</td>
</tr>
<tr>
<td></td>
<td>3.3</td>
<td>Tram/light rail vehicle lane (refer Section 4.9.3)</td>
</tr>
<tr>
<td>Minimum width between kerb and channel</td>
<td>5.0</td>
<td>Width of a single lane suitable for use in a left turn slip lane, or two lane, two way divided road with a raised median</td>
</tr>
<tr>
<td>(to provide for passing of broken down vehicles)</td>
<td>2 x 4.0 (8.0)</td>
<td>Width of two lanes that provide for two lines of traffic to (slowly) pass a broken down vehicle</td>
</tr>
</tbody>
</table>

It is noted that it is common practice to adopt lesser lane widths than those prescribed above, particularly at intersections. Regardless, the existing traffic lanes on Rosanna Road are particularly narrow at some locations which is likely to contribute to some types of vehicle conflicts.
9.2 Traffic volumes

Rosanna Road currently carries approximately 38,000 vehicles per day. Site observations and anecdotal evidence suggest that Rosanna Road is currently operating at or near its capacity.

The overall capacity of Rosanna Road is largely determined by the major signalised intersections at Banksia Street, Burgundy Street and Lower Plenty Road. Other factors which limit the capacity of Rosanna Road may include:

- Influence of parked vehicles
- Traffic turning at unsignalised intersections
- Coordination of traffic signals along Rosanna Road and intersecting routes

Information obtained from SCATS indicates that approximately 800 vehicles per hour per lane currently travel in the peak direction (i.e. southbound in the AM peak and northbound in the PM peak).

*Figure 12:* Rosanna Road at Darebin Street, PM Peak, Northbound
Table 6: Typical mid-block capacities for urban roads with interrupted flow (Austroads)

<table>
<thead>
<tr>
<th>Type of lane</th>
<th>One-way mid-block capacity (pc/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median or inner lane</td>
<td></td>
</tr>
<tr>
<td>Divided road</td>
<td>1000</td>
</tr>
<tr>
<td>Undivided road</td>
<td>900</td>
</tr>
<tr>
<td>Middle lane (of a 3 lane carriageway)</td>
<td></td>
</tr>
<tr>
<td>Divided road</td>
<td>900</td>
</tr>
<tr>
<td>Undivided road</td>
<td>1000</td>
</tr>
<tr>
<td>Kerb lane</td>
<td></td>
</tr>
<tr>
<td>Adjacent to parking lane</td>
<td>900</td>
</tr>
<tr>
<td>Occasional parked vehicles</td>
<td>600</td>
</tr>
<tr>
<td>Clearway conditions</td>
<td>900</td>
</tr>
</tbody>
</table>

As the traffic volumes on Rosanna Road are approaching capacity, and are expected to continue to grow, Austroads notes that peak period mid-block traffic volumes may increase to 1200 to 1400 pc/h/ln on any approach road when the following conditions exist or can be implemented:

- adequate flaring at major upstream intersections
- uninterrupted flow from a wider carriageway upstream of an intersection approach and flowing at capacity
- control or absence of crossing or entering traffic at minor intersections by major road priority controls
- control or absence of parking
- control or absence of right turns by banning turning at difficult intersections
- high volume flows of traffic from upstream intersections during more than one phase of a signal cycle
- good co-ordination of traffic signals along the route.

9.3 Signalised intersections

As indicated in Section 8 of this report, the highest number of crashes occur at signalised intersections. While signalising intersections improves the safety, it does not eliminate the possibility of crashes occurring. Additional features at signalised intersections may improve their safety performance, including fully controlled right turns (red arrows), signal mast arms and red light cameras.
9.4 Unsignalised intersections & property accesses

A significant proportion of crashes along Rosanna Road occur at unsignalised intersections and property access points. Due to the high traffic volumes on Rosanna Road, motorists can have difficulty choosing an appropriate gap in traffic whilst turning into or out of side streets or driveways.

Right turn bans are currently in place at a number of locations, including:
- Douglas Street, Brown Street – full time ban for southbound traffic
- Laane Avenue – PM peak ban for northbound traffic
- Leon Avenue, St James Road & Edgar Street – AM peak ban for southbound traffic

All other turning movements are permitted at these intersections.

9.5 Heavy vehicles

Rosanna Road is gazetted for use by B-Doubles. The maximum width of a B-Double is 2.5m (not including mirrors). Some isolated locations of Rosanna Road have lane widths of only 2.6m.

6 crashes in the last 5 years involved heavy vehicles.

9.6 Vulnerable road users

Pedestrian activity is concentrated at:
- The commercial precinct extending from Banksia Street to Darebin Street (including the Heidelberg Primary School)
- The traffic signals at Lower Plenty Road, Banyule Road, Station Road and north of St James Road

Rosanna Road is not part of the Principal Bicycle Network and is not a Bicycle Priority Route. No bicycle facilities currently exist and very few cyclists were observed using Rosanna Road.

In the last 5 years, crashes involving vulnerable road users included:
- 4 crashes involving a pedestrian
- 3 crashes involving a cyclist
- 6 crashes involving a motorcyclist
10. Assessment Findings and Recommendations

The findings and recommendations of the Road Safety Assessment can be found in Table 7 below.

|---|---|---|---|---|---|

Table 7: Assessment Findings

<table>
<thead>
<tr>
<th>Assessment Finding</th>
<th>Level of Risk</th>
<th>Recommendations</th>
<th>Effectiveness</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Roadside Hazards</td>
<td>High</td>
<td>Where feasible, consider relocating power poles to property boundaries. Note however that this is likely to adversely affect pedestrian movements along footpaths. There may also be major underground services that require relocation as part of this recommendation. There are significant costs associated with moving power poles.</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Consider removing power poles and undergrounding power lines. This solution would provide the best safety outcome however it is acknowledged that it may be difficult to achieve given the restricted width available and potential clearance issues with other services.</td>
<td>High</td>
<td>Very High</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Consider shielding power poles with safety barriers. Options include: - Guard fence - Concrete barriers (see section b below) - Raptor crash cushions (pictured) It is noted that in many cases there is inadequate width between the edge of road and poles to accommodate safety barriers or to accommodate barrier deflection.</td>
<td>Medium</td>
<td>Medium</td>
</tr>
</tbody>
</table>
## Assessment Finding

<table>
<thead>
<tr>
<th>Level of Risk</th>
<th>Recommendations</th>
<th>Effectiveness</th>
<th>Cost</th>
</tr>
</thead>
</table>
| **... continued** | **Investigate the use of high profile barrier kerb** along the outer kerb on both sides of Rosanna Road between Darebin Street and Lower Plenty Road.  
It should be noted that additional measures may be required to ensure pedestrian safety is maintained.** | **Medium** | **Med/High** |
| **Consider removing isolated trees close to intersections that restrict sight distances.** | **Low** | **Low** |
| 1 |  |  |  |

### Assessment Finding

**b) Safety Barriers**

The northern-most section of the road contains lengths of guard fence on the eastern side of the road. Potential issues with the existing safety barriers include:

- Their application is limited to a small length (albeit the highest-risk locations)
- Many of the existing end treatments (terminals) are not designed to be struck end-on and are potential hazards to motorists that leave the road
- There is inadequate space between the guard rail and poles to allow for the deflection of the barrier when impacted
- The type of barrier (i.e. guard fence) is unlikely to contain larger vehicles

<table>
<thead>
<tr>
<th>Assessment Finding</th>
<th>Level of Risk</th>
<th>Recommendations</th>
<th>Effectiveness</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Safety Barriers</td>
<td>Medium</td>
<td>It is acknowledged that there is limited width available to provide safety barriers at many locations and that there are numerous other considerations such as sight distance. Investigate retrofitting existing barriers with accepted end treatments that can safely absorb end-on impacts (i.e. Gating Redirective Energy Absorbing Terminals). While traditionally not used in these environments, consider the use of barriers that provide a greater level of containment at high risk locations. An option to investigate is the use of concrete barrier systems, noting that end treatments are required at the start and end of the system.</td>
<td>High</td>
<td>Med/High</td>
</tr>
</tbody>
</table>

*Photo: urban high containment concrete barriers being painted by artists in Brooklyn, USA*
## c) Road Geometry

The existing lane widths and carriageway widths are less than desirable. Refer section 9.1 above.

<table>
<thead>
<tr>
<th>Assessment Finding</th>
<th>Level of Risk</th>
<th>Recommendations</th>
<th>Effectiveness</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>The existing lane widths and carriageway widths are less than desirable. Heavy vehicles were observed to occupy almost the entire traffic lane. This caused other vehicles to move into less desirable locations.</td>
<td>Low</td>
<td>Investigate widening the lanes where possible. It is acknowledged that there are significant width constraints. If widening the road is not feasible, consider reducing the speed limit.</td>
<td>Medium</td>
<td>High</td>
</tr>
</tbody>
</table>

A high number of rear end casualty crashes have been recorded on Rosanna Road, most in the vicinity of intersections. Presumably many more crashes of this type have occurred that have only resulted in property damage, and thus do not appear in the crash statistics.

Downhill grades and limited sight distance due to the horizontal and vertical alignment of the road are likely contributing factors.

| | Medium | Consider measures to reduce the incidence of rear end crashes, including: |
| | | - Reducing the speed limit |
| | | - Providing high skid resistant pavement (eg. calcine bauxite) at high risk locations such as downhill approaches to intersections |
| | | - Installing devices that provide advance warning of intersections |

| | Medium | Low/Med |
| | | | |

Downhill grades and limited sight distance due to the horizontal and vertical alignment of the road are likely contributing factors.
### d) Street Lighting

A significant proportion of crashes within the subject area occurred during poor light conditions. Inadequate street lighting may have been a contributing factor in these crashes. Night time crashes are particularly prevalent at the intersections at Lower Plenty Road and Burgundy Road.

It is noted that the majority of street lights along Rosanna Road are mounted on power distribution poles. At many locations, the presence of overhead power lines precludes the use of dedicated (and frangible) lighting poles and is quite restrictive in terms of the way the route is lit.

There are also a number of rigid lighting poles within the project area which are hazards to errant motorists.

<table>
<thead>
<tr>
<th>Assessment Finding</th>
<th>Level of Risk</th>
<th>Recommendations</th>
<th>Effectiveness</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>d) Street Lighting</strong></td>
<td>Low</td>
<td>Undertake a street lighting assessment to determine the adequacy of the existing lighting.</td>
<td>Medium</td>
<td>Med/High</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Consider upgrading lighting to meet current standards where necessary.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Consider replacing rigid lighting poles with frangible types where possible.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Assessment Finding

**e) Public Transport**

Kerbside bus stops are in place on both sides of Rosanna Road. The buses frequently stop which can cause other motorists to attempt to change lanes at undesirable times. 2 crashes in the last five years involved buses.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Kerbside bus stops</td>
<td>Low</td>
<td>Consider the installation of yellow box line-marking for all bus stop locations. It should be noted that many of the other recommendations throughout this report will improve the safety of buses and/or vehicles around buses.</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>
### f) Unsignalised Intersections

The vast majority of crashes at unsignalised intersections along Rosanna Road involve vehicles from adjacent directions (often right turn against type crashes) or vehicles travelling in the same direction (rear end crashes or similar).

Many of these are associated with vehicles turning right into side streets that do not have auxiliary right turn lanes. Right turn bans are in place at some of these intersections but not others. Vehicles waiting to turn right are at increased risk of rear end collisions and also cause disruption to traffic which may have other negative safety impacts.

Other crashes involve vehicles turning out of side streets, particularly to the right. Trees, power poles and other roadside objects impede sight lines from side roads at a number of locations.

<table>
<thead>
<tr>
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<th>Effectiveness</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consider implementing additional right turn bans at unsignalised intersections.</td>
<td>High</td>
<td>Consider implementing additional right turn bans at unsignalised intersections without right turn lanes.</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Consider implementing left-in-left-out restrictions at minor intersections.</td>
<td>High</td>
<td>Consider implementing left-in-left-out restrictions at minor intersections.</td>
<td>High</td>
<td>Low/Med</td>
</tr>
<tr>
<td>Consider truncating minor streets, such as at Berrima Road.</td>
<td>High</td>
<td>Consider truncating minor streets, such as at Berrima Road.</td>
<td>High</td>
<td>Low/Med</td>
</tr>
<tr>
<td>Consider upgrading some of the no right turn signs to electronic signs.</td>
<td>Medium</td>
<td>Consider upgrading some of the no right turn signs to electronic signs.</td>
<td>Medium</td>
<td>Low/Med</td>
</tr>
<tr>
<td>As per finding a) consider trimming or removing trees to improve sight lines from side roads.</td>
<td>Low</td>
<td>As per finding a) consider trimming or removing trees to improve sight lines from side roads.</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>
### Section Recommendations

<table>
<thead>
<tr>
<th>Assessment Finding</th>
<th>Level of Risk</th>
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<th>Effectiveness</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>g) Section 1: Banksia Street to Darebin Street</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>There is a high concentration of crashes within this section (26 in approx. 550m). This is primarily attributed to the high volumes of turning traffic and congestion associated with the intersections and commercial access points within this section.</td>
<td>Medium</td>
<td>Consider a reduction in the posted speed limit within this section for the reasons outlined. Consideration could be given to the installation of a 40km/h strip shopping centre linking into a remote school speed zone.</td>
<td>High/Med</td>
<td>Low/Med</td>
</tr>
<tr>
<td>Significant pedestrian movement occurs within this section, particularly between Banksia Street and Burgundy Street. Heidelberg Primary School, which abuts the west side of Rosanna Road, south of Darebin Street, also generates. This section has a narrow cross section for a four lane road (and narrower than other sections of Rosanna Road), with lane widths typically between 3.0 and 3.2m and a total carriageway width of approximately 12.34m.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<p>| Yarra Street intersection | High | Consider restricting movements at this location to reduce conflict points. (as an immediate treatment, refresh the ‘keep clear’ markings) | High | Low/Med |
| There were 6 crashes (2SI and 4OI), at this intersection, including 4 cross traffic crashes. There is a trend of cross traffic crashes involving vehicles exiting Yarra Street and colliding with through traffic on Rosanna Road on both approaches. The Assessors viewed this intersection at many different times of the day and believe this intersection poses a high risk for motorists. It should be noted that the keep clear line-marking at this location are faded. | | | | |
| | | | | |</p>
<table>
<thead>
<tr>
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<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Villa Street intersection</td>
<td>Medium</td>
<td>Consider restricting the turning movements at this intersection.</td>
<td>Med/High</td>
<td>Med/Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Note: the proposed speed limit reduction on Rosanna Road at this location will improve safety)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Like the Yarra Street intersection, the high number of conflict points and high cognitive load on a driver makes exiting or entering this street challenging. As it is only a T-intersection the risk is less than that of Yarra Street.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burgundy Street intersection</td>
<td>High</td>
<td>Consider the implementation of fully controlled right turns on the northern and southern approach.</td>
<td>High</td>
<td>Med/Low</td>
</tr>
<tr>
<td>This signalised intersection has 9 crashes (1SI &amp; 8OI), including 4 right turn against crashes.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trees on the northern approach make the signals somewhat inconspicuous.</td>
<td></td>
<td></td>
<td>Med/High</td>
<td>Medium</td>
</tr>
<tr>
<td>There is significant vertical deflection when crossing Burgundy Street because of the camber of Burgundy Street.</td>
<td></td>
<td>Consider formalising the existing vertical deflection in the form of a raised intersection. This may involve painting the existing deflection, advanced warning signs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Darebin Street intersection</td>
<td>High</td>
<td>Consider implementing a fully controlled right turn on the northern approach.</td>
<td>High</td>
<td>Med/Low</td>
</tr>
<tr>
<td>In the past five years there were 10 crashes (2SI and 8OI), with 4 crashes involving lane change on the northern approach, 3 right turn against crashes on the northern approach and 2 rear-end crashes on the northern approach.</td>
<td></td>
<td>(Note: the implementation of the remote school speed zone recommended above will improve the safety at this intersection)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### h) Section 2: Darebin Street to Station Road

This section is characterised by the straight horizontal alignment, four lane cross section, narrow nature strips with power poles on both sides of the road, and regular residential access on both sides of the road.

- **Right turn restrictions during peak hours at unsignalised intersections.**
- **Sight distance is restricted at some intersections due to trees and power poles.**
- **The continuous length of power poles reduces conspicuity of side roads.**
- **There are regular bus stops within the left lane in both directions.**

The cross section south of Reid Street: 3.7m | 3.02m | 2.81m | 3.7m. Total 13.23m

<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Medium</strong></td>
<td></td>
<td>As identified in the general section above, consider:</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>As above</strong></td>
<td></td>
<td>- Electronic flashing no right turn signs at unsignalised intersections (given that these are only triggered during peak periods).</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>As above</strong></td>
<td></td>
<td>- Improving intersection sight distance through three removal</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>As above</strong></td>
<td></td>
<td>- Restricting turning movements where possible</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### St James Road intersection

At this intersection there were 6 crashes (1SI and 5 OI), with 2 rear end crashes and 2 right out crashes.

- **There are some sight distance issues at this intersection due to the poles from the signals and power poles from the eastern approach.**

<table>
<thead>
<tr>
<th>Assessment Finding</th>
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<th>Recommendations</th>
<th>Effectiveness</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Medium</strong></td>
<td></td>
<td>Consider the relocation of the pedestrian operated signals (pictured left) to the intersection and creating a fully signalised intersection.</td>
<td>Med/High</td>
<td>High</td>
</tr>
<tr>
<td>Assessment Finding</td>
<td>Level of Risk</td>
<td>Recommendations</td>
<td>Effectiveness</td>
<td>Cost</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>---------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>---------------</td>
<td>------</td>
</tr>
<tr>
<td>Station Road intersection</td>
<td>Low</td>
<td>General treatments above will improve the safety of this intersection.</td>
<td>As above</td>
<td>As above</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unsignalised intersections</td>
<td>High</td>
<td>As identified in the general section above, consider:</td>
<td>As above</td>
<td>As above</td>
</tr>
<tr>
<td>Brown St: 3 crashes (3OI), 2 rear end and 1 right turn against.</td>
<td></td>
<td>Electronic flashing no right turn signs at unsignalised intersections (given that these are only triggered during peak periods).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Edgar St: 4 crashes (3SI and 1OI), 2 being run off road crashes into power poles.</td>
<td></td>
<td>Improve intersection sight distance through three removal</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Restrict movements where possible</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Assessment Finding

### i) Section 3: Station Road to Lower Plenty Road

The cross section of this section is:

- North of Arden Cres: 3.41m | 3.17m | 2.97m | 3.8m. Total 13.28m
- North of Jones Cres: 3.21m | 2.78m | 1.89m median | 2.9m | 2.84m Total 13.61m

There is a relatively tight curve south of Lower Plenty Road with a radius of approximately 200m. Lane widths at this location are less than 3m, consistent with other parts of Rosanna Road. At this radius, Austroads recommends that lane widths be widened by an additional 0.45m to accommodate the increased swept paths of B-Doubles.

The narrow lane widths at this curve contribute to the likelihood of crashes due to vehicles (especially longer vehicles) encroaching into adjacent lanes.

<table>
<thead>
<tr>
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<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium</td>
<td>A variety of possible treatments have been identified in the sections a – f above.</td>
<td>As above</td>
<td>As above</td>
</tr>
</tbody>
</table>

### Banyule Road intersection

There have been 5 crashes (1SI & 4OI), including 4 rear end crashes at this intersection. The mast arm on both approaches to this intersection provides adequate warning of the intersection.

The lanterns at this intersection are not LED.

<table>
<thead>
<tr>
<th>Level of Risk</th>
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<th>Effectiveness</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Consider replacing the existing signal lanterns with LED.</td>
<td>Low</td>
<td>Low/Med</td>
</tr>
</tbody>
</table>
Lower Plenty Road intersection

The intersection of Lower Plenty Road and Rosanna Road is not a conventional T-intersection. Rosanna Road intersects at a low angle. Because of the geometry, vehicles entering Lower Plenty Road must navigate the superelevation of this irregular intersection.

In the last five years there have been 15 crashes (2SI and 13OI), with 14 involving vehicles from the southern approach. 5 crashes involved vehicles running the red light from the southern approach and 6 crashes involved vehicles from the southern approach losing control once they have entered the intersection.

The Assessors believe there are 2 main factors contributing to the crashes at this intersection:

1. The alignment of the intersection and the need for a majority of vehicles to make a turn (in both directions). Vehicles taking the right turn from the southern approach at high speed would most likely be the cause of the run off road crashes.

2. The conspicuity of the intersection from the southern approach. The curves on the approach to the intersection reduce sight lines to the intersection, and furthermore there is no mast arm on this approach. There is also limited warning signage as you approach the intersection (refer sequence of photos below) and the speed advisory signage is located immediately at the intersection.

The Assessors recommend investigation of a variety of options for this intersection, including:

- Installation of mast arms
- Improve approach warning signage (could be electronic)
- Dynamic speed warning signage (slow down, too fast)
The following sequence of signs is observed when approaching Lower Plenty Road from the south:

- Curve warning sign with 35km/h advisory speed
- List type advance direction sign
- Intersection direction signs with SLOW TO 35km/h supplementary panels

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>Below: Lower Plenty Road showing evidence of loss of control crashes</td>
<td></td>
<td>• Installation of a safety platform on the southern approach to reduce speeds to address all crash types.</td>
<td>High</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Installation of safety barrier on the northern departure to the intersection.</td>
<td>Medium</td>
<td>Low/Med</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Modification of the alignment of the intersection to increase the entry angle.</td>
<td>High</td>
<td>High</td>
</tr>
</tbody>
</table>
11. Conclusion

This Road Safety Assessment has been conducted in accordance with best practice road safety assessment principles. The site has been inspected and the supporting documentation has been examined. The findings and recommendations are provided for consideration by the client and any other interested parties.

Assessors:

Kenn Beer (BEng, MPIA)
Senior Road Safety Auditor
Principal
Safe System Solutions Pty Ltd

Jamie Robertson (BEng, BSc)
Senior Road Safety Auditor
Road Safety Design Specialist
Safe System Solutions Pty Ltd
Appendix A: Crash Diagrams
ROCS DETAILS
31 S*-N* 121 21/09/12 Tue Day 5:38:00 PM Dry Other injury
32 S*-W* 130 30/05/13 Thu Dark 5:30:00 PM Wet Other injury
33 S*-S* 130 03/06/10 Thu Day 6:45:00 AM Wet Other injury
34 S*-E* 130 16/06/12 Mon Day 1:00:00 PM Dry Other injury
35 S*-S* 130 14/07/10 Wed Day 9:10:00 AM Unk. Other injury
36 S*-S* 130 08/04/11 Fri Day 1:30:00 PM Dry Other injury
37 E*-N* 113 14/08/11 Tue Day 12:30:00 PM Dry Serious injury
38 N*-N* 171 30/12/12 Sun Day 11:55:00 AM Dry Serious injury
39 N*- 171 23/09/11 Tue Day 3:00:00 PM Dry Serious injury
40 N*-N* 130 19/10/14 Sun Dark 1:00:00 AM Dry Other injury
41 S*- 171 21/11/13 Thu Day 12:20:00 PM Dry Other injury
42 E*-N* 113 26/11/12 Mon Day 1:30:00 PM Unk. Other injury
43 E*-N* 113 30/03/13 Sat Dark 7:25:00 PM Dry Other injury
44 N*-N* 130 16/04/13 Tue Dark 6:35:00 PM Dry Other injury
45 S*-N* 120 21/09/14 Sun Day 1:00:00 PM Serious injury
Road Safety Assessment - Rosanna Road

69 N° 108 26/10/10 Tue Day 11:25:00 AM Dry Serious injury
61 SW° N° 113 20/04/11 Wed Dark 2:30:00 AM Dry Serious injury
62 SW° 100 20/10/11 Thu Day 7:45:00 AM Dry Other injury
63 N°- 171 20/11/11 Sat Day 7:32:00 AM Wet Other injury
64 NE°- 171 29/11/11 Sat Day 5:00:00 PM Wet Other injury
65 N°- 171 27/02/12 Mon Dark 10:10:00 PM Wet Other injury
66 NE°- NE° 130 20/06/12 Wed Day 10:25:00 AM Dry Other injury
67 N°- SW° 113 10/02/13 Sun Dark 12:01:00 AM Wet Other injury
68 SW°- N° 113 31/08/13 Sat Dark 10:52:00 PM Dry Other injury
69 SW°- SW° 130 27/11/13 Wed Dusk 8:20:00 AM Dry Other injury
70 SW°- N° 113 19/01/14 Sun Dusk 7:49:00 PM Dry Other injury
71 N°- 171 10/05/14 Sat Dusk 4:10:00 PM Wet Other injury
72 NW°- 171 01/06/14 Sun Dark 6:50:00 PM Wet Other injury
73 SW°- 174 20/07/14 Sun Day 1:30:00 PM Dry Serious injury
74 N°- 170 30/09/14 Sun Dark 8:30:00 PM Wet Other injury
75 SW°- N° 115 23/01/15 Fri Dark 11:45:00 PM Dry Other injury