NEW ENGLAND HIGHWAY
MAITLAND - HOSPITAL
ROUNDBOUT

Options assessment report:
Determination of preferred option
June 2013
SUMMARY

This paper outlines Roads and Maritime Services (RMS) processes and considerations for determining a preferred option for upgrading the roundabout on the New England Highway adjacent to Maitland Hospital.

The RMS preferred option for the Hospital Roundabout is estimated at $4.1M (in 2013 dollars) and involves:

- Construction of a left turn slip lane for traffic travelling eastbound on the Highway into High Street. This will separate left turning vehicles from the through traffic on the Highway, and assist traffic entering the roundabout from High Street in identifying gaps in oncoming traffic.
- Construction of a left turn slip lane for traffic travelling westbound on the Highway into Bungaree Street. This will separate left turning vehicles from the through traffic on the Highway, and assist traffic entering the roundabout from Bungaree and Johnson Streets in identifying gaps in oncoming traffic.
- Installation of traffic signals at Johnson Street (northern end). These signals would be linked to the existing traffic signals at John Street traffic signals and would effectively operate as one set of signals. The signals would provide an alternative exit for Johnson Street traffic during peak periods and would improve safety at this intersection for pedestrians.
- Removal of existing pedestrian mid block signals between John Street and the roundabout. Pedestrian facilities will be accommodated by the new traffic signals at Johnson Street (northern occurrence) approximately 60 metres away.
- A non-signalised crossing point will be established with a break in the existing median approx 100 metres west of the roundabout, with pedestrian fencing being installed on the northern and southern sides of the Highway on approach to the roundabout.
- Minor realignment of the northbound Highway approach to reduce approach speeds and provide an alignment that is consistent with current design standards
- Further removal of vegetation in the centre of the roundabout to improve visibility.

Key Issues

- In September 2011, the NSW Government confirmed $45 million for upgrades to improve safety and traffic efficiency at the Maitland roundabouts, through the Hunter Investment and Infrastructure Fund. The funding is provided for both the Hospital and Railway Roundabouts, and is based on an out-turn cost.
- Maitland CBD was by-passed in the 1980’s with construction of a five kilometre length of dual carriageway and three at-grade intersections that provide access at the southern, central and northern edges of the business district. The main access points are a roundabout adjacent to Maitland Railway Station that provides access to the city centre (the “Railway Station Roundabout”), and a roundabout at the northern edge of the business district adjacent to Maitland Hospital (the “Hospital Roundabout”).
- The Railway Station Roundabout has a higher order function than the Hospital Roundabout as it provides an intersection of two State Roads: the New England Highway and Cessnock Road. Cessnock Road links Maitland to Kurri Kurri and Cessnock and will be the link between Maitland and the Hunter Expressway. The Hospital Roundabout provides access to Maitland Hospital and the Maitland business district via a local road, and provides other local road connections to commercial, industrial and residential areas, and Telarah Railway Station.
- The New England Highway has a wider road reserve near the Railway Station Roundabout than near the Hospital Roundabout. Land adjacent to the Railway Station Roundabout is largely undeveloped, whereas the Hospital Roundabout has adjacent residential and commercial development, as well as a hospital car park.
There has been growing congestion at the two roundabouts over the past ten years, with large scale residential and commercial development in Maitland local government area, and increasing traffic travelling to mines in the Hunter Valley. The main traffic flow issues have been lengthy queuing eastbound on the New England Highway approach to the Railway Station Roundabout, and queuing on local road approaches to the Hospital Roundabout.

The Hunter Expressway is expected to be completed by the end of 2013 and will reduce traffic on the New England Highway at each of the roundabouts. For both roundabouts, traffic is forecast to approach existing levels over the next 15 – 20 years.

The local community has long expressed concerns about safety at the roundabouts, which both have five approaches and departures, and are not very large (having a radii of 24 metres); some approaches and departures are very close together and accessing the roundabouts under peak conditions can require acceptance of small gaps in the opposing traffic flows.

RMS displayed initial options for the roundabouts in February 2012 from a study undertaken in 2008, with traffic counts, forecasts and modelling updated for 2012. The options had an effective life of 10 to 20 years and included partial grade separation (Cessnock Road over the New England Highway), a link road option at the Railway Station Roundabout, 4 leg traffic signals at the Hospital roundabout, and a reduction to a 4 leg roundabout at the Hospital Roundabout.

RMS has since undertaken more detailed traffic and engineering investigations and has identified preferred options for both roundabouts.

The main objective of this project is to provide upgrades at the Railway and Hospital Roundabouts to improve safety and cater for future traffic growth. The $45M funding provided by the Hunter Infrastructure and Investment Fund has been provided specifically for improvements associated with the Hospital and Railway station roundabouts. Funding for road safety and traffic efficiency upgrades along the New England Highway outside the scope of this project will be considered as part of RMS’ wider network planning.

The focus of the planning for this project is on identifying options for the two roundabouts which maximise safety and traffic efficiency benefits.

The larger scale full grade separated options (similar to the New England Highway and Weakleys Drive interchange) suggested by the community in the consultation during 2012 were investigated and estimated at over $70 million for the Railway Station Roundabout, and around $100 million for the Hospital Roundabout. Full grade separation is not considered to be tenable or necessary at this time for the Hospital Roundabout.

Grade separation at the Hospital Roundabout would cost more than at the Railway Station roundabout as involves considerable property acquisition; the design requires a longer length overpass to deal with a long downhill grade from the roundabout to Trzecinski bridge; an overpass would be much more difficult to construct under live traffic and would require a longer time period due to the staging required and more constrained area in which to work. Maintaining connectivity to the surrounding residential and commercial areas would be complex particularly with the existing topography on the Bungaree Street side of the roundabout.
Design Changes between the Favoured and the Preferred Options

The main changes between the Favoured Options (Hospital Roundabout distributed February 2013) and the Preferred Option announced mid 2013 are:

- Additional pedestrian facilities to the west of the Hospital Roundabout (includes pedestrian refuge, connecting footpaths and fencing)
- A change to the design for the intersection at Mount Pleasant Street to improve pedestrian safety at the nearby crossing point
1. Purpose

This paper outlines Roads and Maritime Services (RMS) processes and considerations for determining a preferred option for upgrading the roundabout on the New England Highway adjacent to Maitland Hospital.

$45M was provided for the upgraded of the two five leg roundabouts, with approx $40M (based on 2012 costs) of this funding allocated for eastbound grade separation of the Railway station roundabout. The majority of the funding will be allocated to the Railway station roundabout for the following reasons:

- The Railway station has more consistent and extensive queues and delays than the Hospital Roundabout;
- The Railway Roundabout serves a higher order function as the intersection of two State roads (New England Highway and Cessnock Road) and will provide a crucial link to the Hunter Expressway from 2013 onwards;
- The Railway Roundabout experiences many conflicting turning movements during peak periods, while the Hospital Roundabout is predominantly through traffic on the New England Highway;
- Significant flood impact issues need to be accounted for at the Railway Roundabout.

2. Introduction

The New England Highway is part of the National Land Transport Network (formerly Auslink network) providing a north/south route between Hexham and the Queensland Border. It connects to the F3 Freeway at Beresfield and the Pacific Highway at Hexham. The primary functions of the route are transport of interstate and inter-regional freight, and regional and local connectivity.

As a commuter route, the New England Highway carries over 40,000 vehicles per day at East Maitland.

In response to a commitment by the State Government, RMS is preparing upgrades to the two existing five leg roundabouts on the New England Highway in Maitland. The roundabouts are contained in the Maitland City Council local government area, and are approximately 1.9 kilometres apart. Maps of the locations of the roundabouts are provided in figures 1 – 4 (Section 6 of this report).

Maitland was by-passed in the 1980’s with construction of a five kilometre length of dual carriageway and three at-grade intersections providing accesses at the southern, central and northern edges of the business district. The main access points are a roundabout adjacent to Maitland Railway Station that provides access to the city centre (the “Railway Station Roundabout”), and a roundabout at the northern edge of the business district adjacent to Maitland Hospital (the “Hospital Roundabout”). The southern access to the business district is a T-intersection controlled by traffic signals, which has less turning traffic than the two roundabouts and is subject to less queuing.

The roundabouts both have five approaches and departures and are located at the intersections of:

- New England Highway, Cessnock Road, Church Street, and Walker Street, Maitland (the Railway Station Roundabout);
- New England Highway, High Street, Bungaree Street, Johnston Street, Maitland (the Hospital Roundabout).

Before determining a solution for the two 5-leg roundabouts, it is important to understand the key issues and differences between the two roundabouts and the surrounding traffic and land use environments, as outlined in the following Table:
## Table 1: Key issues and differences between the Railway Station and Hospital Roundabouts

<table>
<thead>
<tr>
<th>Issue</th>
<th>Railway Station Roundabout</th>
<th>Hospital Roundabout</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function</td>
<td>This roundabout joins two State roads – New England Highway (east-west) and Cessnock Rd (north-south). Cessnock Rd will carry higher volumes of traffic from 2013 onwards as it will provide a link to Hunter Expressway. The roundabout also provides access to Maitland CBD via Church Street, and recreational areas via Walker Street. Church Street and Walker Street are both local roads.</td>
<td>This roundabout primarily carries north-south traffic on the New England Highway. It provides access to Maitland Hospital and CBD via High Street, as well as minor traffic flows to businesses and households via Johnson Street and Bungaree Street. High Street, Bungaree Street and Johnson Street are all local roads.</td>
</tr>
<tr>
<td>Land use / development</td>
<td>The Railway Roundabout is generally a green-field site. The land surrounding the roundabout is owned by Maitland Council and two private landowners. The main restrictions on this roundabout are: 1) the railway line north east of the roundabout 2) the rail overpass at Church Street 3) a pedestrian overbridge east of the roundabout 4) several houses and a veterinary business to the east of Walker St</td>
<td>The Hospital Roundabout is in a built up area. The land surrounding the roundabout is owned by several landowners. The main restrictions on this roundabout are large developments which make expansion of the intersection more difficult and costly, including: 1) Maitland Hospital 2) Hungry Jacks 3) Tyre Power 4) Bunnings 5) Heritage Motor Group</td>
</tr>
<tr>
<td>Environmental issues</td>
<td>The main environmental issue at this roundabout is flooding impacts. Previous floods have had a major impact on the road network surrounding the roundabout.</td>
<td>The Hospital Roundabout is in a built up and highly disturbed environment. The impacts of flooding at the roundabout are minimal. However, flooding does occur to the west / south of Heritage Motors (opposite Ledsam St)</td>
</tr>
<tr>
<td>Traffic Flows</td>
<td>Current (2010 / 2011): Highway 37,500 (Between the Roundabouts) Cessnock Rd 9,800 Church St 13,100 Walker St (Estimated) 2,000</td>
<td>Current (2010 / 2011): Highway 37,500 (Between the Roundabouts) High St 12,700 Bungaree St (Estimated) 8,700 Johnson St (Estimated) 1,800</td>
</tr>
<tr>
<td></td>
<td>Post HEX (2016): Highway (Est of RDB) 21,800 Highway (Wst of RDB) 21,800 Cessnock Rd 17,500 Church St (Estimated) 13,900 Walker St (Estimated) 2,000</td>
<td>Post HEX (2016): Highway (Nth of RDB) 22,200 Highway (Sth of RDB) 21,800 High St (Estimated) 12,800 Bungaree St (Estimated) 8,700 Johnson St (Estimated) 1,800</td>
</tr>
<tr>
<td>Key traffic issue</td>
<td>The key issue at the roundabout is congestion created for eastbound Highway traffic by the high number of conflicts between through traffic on the Highway and turning vehicles into Church St and Cessnock Rd.</td>
<td>The key issue at the roundabout is long delays on side streets caused by the fact that the Highway traffic is so dominant. There are insufficient gaps for side street traffic due to the fact that only 5% of total traffic turns right from the Highway into the side streets.</td>
</tr>
<tr>
<td>Traffic</td>
<td>AM: Highway – Average delay 177s</td>
<td>AM Peak: Highway – Average delay 23s</td>
</tr>
<tr>
<td>performance (Peak Hours)</td>
<td>Eastbound with a 550m queue</td>
<td>Southbound with a 180m queue</td>
</tr>
<tr>
<td>-------------------------</td>
<td>------------------------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>PM: Highway – Average delay 65s</td>
<td>PM Peak: High St – Average delay 34s</td>
<td>Eastbound with a 240m queue</td>
</tr>
<tr>
<td>Westbound with a 70m queue</td>
<td><strong>Safety</strong></td>
<td>Between 2006 and 2011 there were 28 crashes within a 50m radius of the roundabout. Of the 28 crashes 12 resulted in injuries. The main crash problems are cross traffic / turning vehicle crashes and vehicle loss of control crashes.</td>
</tr>
<tr>
<td>Between 2006 and 2011 there were 34 crashes within a 50m radius of the roundabout. Of the 34 crashes 13 resulted in injuries. The main crash problems are rear end crashes, followed by cross traffic / turning vehicle crashes and loss of control crashes.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. **Background**

In September 2011, the NSW Government allocated $45 million for upgrades to improve safety and traffic efficiency at the Maitland roundabouts, through the Hunter Investment and Infrastructure Fund.

The Railway Station Roundabout has a higher order function than the Hospital Roundabout as it provides an intersection of two State Roads (the New England Highway and Cessnock Road), as well as local road connections. Cessnock Road links Maitland to Kurri Kurri and Cessnock and will provide access between Maitland and the Hunter Expressway when the expressway is completed at the end of 2013.

The Railway Station roundabout also has important local road connections. Church Street provides direct access to Maitland Railway Station, the business district and the Belmore Bridge (which provides access to suburbs north of Maitland). There is large scale commercial and residential development planned in central Maitland and along Cessnock Road (at Gillieston Heights), with the former recently attracting $11 million in support from the Federal Government, and the latter well underway. Walker Street provides access to Maitland Park, which includes memorials, the town swimming pool, a large scale play centre, a cycle path, playing fields, and a nearby large veterinary service.

The Hospital Roundabout provides access to Maitland Hospital and the Maitland business district via High Street, and provides other local road connections to commercial (including Bunnings and Hungry Jacks), industrial and residential areas, and Telarah Railway Station.

The New England Highway has a wider road reserve near the Railway Station Roundabout than near the Hospital Roundabout. Land adjacent to the Railway Station Roundabout is largely undeveloped whereas the Hospital Roundabout has adjacent residential and commercial development, as well as a hospital car park.

The Railway Station Roundabout is within the Maitland flood mitigation scheme, and the Highway immediately to the west of the roundabout has been designed to serve as a spillway in the event of a major flood. It served this function in the 2007 flood event, when the Highway was closed for several days.

In response to the Government commitment, a community update was issued in February 2012 and a public meeting was held in March 2012, to advise the community of the findings of RMS earlier investigations into traffic flows and traffic projections, and seek feedback on preliminary options for each of the roundabouts.

Two preliminary options for each roundabout were displayed, which had been identified in a study undertaken in 2008, with traffic counts, forecasts and modelling updated for 2012. The options were based on preliminary flood investigations which had indicated that work near the Railway Station Roundabout would be very constrained, given the role of the Highway in the flood mitigation scheme. The options had an expected life of 10 to 20 years and included partial grade separation (Cessnock Road over the New England Highway) and a link road option at the Railway Station Roundabout, and signalisation or retaining the existing roundabout at the Hospital Roundabout.

A copy of the February 2012 community update showing the preliminary options is provided as Attachment A.
The community update was issued to approximately 26,000 residents and businesses. The pervasive view from the community meeting was that each roundabout should be grade separated with the Highway passing over the roundabouts (like the Weakleys Drive interchange). The community meeting was well reported in local media. A wide range of issues and alternative options were raised by the 52 submissions received from the community.

Since the community feedback closed in March 2012 RMS has:

- Progressed environmental and flood impact studies;
- Held further meetings with local businesses and residents surrounding the roundabouts, as well as Maitland City Council;
- Undertaken further traffic studies to verify future traffic predictions following the opening of the Hunter Expressway in 2013;
- Developed initial designs and cost estimates for several options raised by the community, including the fully grade separated options;
- Undertaken further traffic modelling;
- Undertaken utility and geotechnical investigations;
- Assessed the main options raised by the community against a range of criteria - particularly road safety, traffic efficiency, environmental and flooding impacts, community impacts and cost efficiency.

A favoured option for the Railway Station Roundabout was released in August 2012 and is available on the internet (www.rms.nsw.gov.au), while a favoured option for the Hospital Roundabout was presented to the community in February 2013. A public meeting was held in March 2013 to discuss the favoured option. This report presents the preferred option which is the option that is to be constructed.

4. Need for the project

Upgrading both of the roundabouts is a key Government commitment and is important for the future development of Maitland and its surrounds.

The Hunter Expressway (due for completion at the end of 2013) will remove a large amount of traffic from the New England Highway at both of the roundabouts. However, with expected development around Maitland, total traffic at the roundabouts is forecast to return to near current levels by 2026 - 2031.

4.1 Traffic Needs - Hospital Roundabout

The New England Highway near the roundabouts currently carries around 40,000 vehicles per day. Current peak hour flows on the Highway are around 1,500 to 1,700 vehicles per hour. There are 500 vehicles per hour exiting High Street in the afternoon peak, and combined there are 300-400 vehicles per hour entering the roundabout during peak periods from Bungaree Street / Johnson Street.

The worst queues at the roundabout relate to vehicles departing High Street in the afternoon peak hours, with queues generally in the order of 300m-400m long. Queues on the Highway are generally less than 150m long in peak periods, with the heavy traffic tending to progress at an acceptable pace through the roundabout.

The worst delays are fairly equally split across the three side roads (High Street, Bungaree Street and Johnson Street) with each leg experiencing average delays of around 1.5 minutes in peak periods. Average delays on the Highway are generally less than 30 seconds; however it is acknowledged that substantial queues do occur at times. Highway traffic typically takes priority at the roundabout, with side road traffic typically accepting small gaps to enter the roundabout.

Much of the queuing will be alleviated when the Hunter Expressway is completed at the end of 2013. This will provide greater opportunities for side road traffic to enter the roundabout. The traffic
patterns are expected to remain essentially the same with through traffic on the Highway (though less) as the dominant movement.

Projected traffic data and various measures of performance for three time steps (prior to completion of the expressway, in 2016 and in 2026) are shown in Table 2. The Table shows the performance of the existing layout in its current configuration for the three major legs (two Highway movements and High Street).

The future traffic projections in Table 2 are based on a network model managed by RMS for the Hunter. The model has been carefully developed over the past 10 years, with updates to reflect Bureau of Statistics data and land use planning documents. The model has been used to identify the need for, and demonstrate the impacts of, the Hunter Expressway.

From the model, there is expected to be rapid land use and population growth in Maitland and surrounding areas over the next 20 years. This includes significant new land releases in the Maitland and Cessnock Local Government Areas, continued growth of mining in the Hunter Valley, and growth of economic development zones. Traffic volumes are predicted to approach existing levels on the New England Highway through Maitland by 2026 - 2031.

Table 2: Hospital Roundabout - Traffic Data and Measures

<table>
<thead>
<tr>
<th></th>
<th>Existing (2011) am / pm</th>
<th>2016 Post-HEX am / pm</th>
<th>2026 Post-HEX am / pm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Demand</td>
<td>3882 / 4622</td>
<td>3194 / 3459</td>
<td>3795 / 3950</td>
</tr>
<tr>
<td>Highway Southbound</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max Queue Length *</td>
<td>162 / 138</td>
<td>127 / 127</td>
<td>212 / 150</td>
</tr>
<tr>
<td>Highway Northbound</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max Queue Length *</td>
<td>112 / 70</td>
<td>45 / 53</td>
<td>73 / 130</td>
</tr>
<tr>
<td>High St Westbound</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max Queue Length *</td>
<td>99 / 231</td>
<td>64 / 59</td>
<td>72 / 77</td>
</tr>
<tr>
<td>Highway Southbound ^</td>
<td>30.6 / 35.2 km/h</td>
<td>35.2 / 37.7 km/h</td>
<td>29.5 / 36.0 km/h</td>
</tr>
<tr>
<td>Approach Speed (450m)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highway Northbound ^</td>
<td>69.2 / 69.9 km/h</td>
<td>74.3 / 73.5 km/h</td>
<td>73.5 / 72.0 km/h</td>
</tr>
<tr>
<td>Approach Speed (1.96km)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High St Westbound ^</td>
<td>38.6 / 30.0 km/h</td>
<td>42.2 / 38.6 km/h</td>
<td>40.3 / 34.2 km/h</td>
</tr>
<tr>
<td>Approach Speed (750m)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Network Approach Travel Time #</td>
<td>225 / 237</td>
<td>205 / 209</td>
<td>218 / 222</td>
</tr>
<tr>
<td>Average Delay at Roundabout (seconds) ~</td>
<td>16.1 / 23.3</td>
<td>9.9 / 10.0</td>
<td>21.3 / 19.6</td>
</tr>
<tr>
<td>Level Of Service &gt;</td>
<td>B / B</td>
<td>A / A</td>
<td>B / B</td>
</tr>
</tbody>
</table>

* 2016 and 2026 based on Paramics Maximum Queue Length in Metres. Existing based on average of 95th percentile queues observed during manual counts in August 2010 and August 2011.
^ Paramics Average Travel time on approach to the Hospital Roundabout

# Summed Paramics Average Travel Time data in seconds, on the 3 most significant road links approaching the Hospital Roundabout (the summed length of the links is 3.16km)

- Southbound on Highway from Pedestrian Crossing to High Street = 450m
- Northbound on Highway from Cessnock Road to High Street = 1.96km
- Westbound on High Street from 750m east of Highway to Hospital Roundabout

~ Sidra Intersection Average intersection Delay per vehicle in seconds

> Sidra Intersection Overall intersection Level of Service (based on average delay for all vehicle movements)
4.2 Safety Needs

The local community has long expressed concerns about safety at the roundabouts, which are not very large (having radii of 24 metres). Some approaches and departures are essentially very close together and accessing the roundabouts under peak conditions can require acceptance of small gaps in the opposing traffic flows, especially at Johnson Street where motorists have to give way to traffic within the roundabout from both the westbound highway traffic and Bungaree Street.

At the Hospital Roundabout itself, plus 50 metres either side, there were 34 crashes including 13 casualty crashes between 2006 and 2011. There were 11 cross traffic crashes, 5 loss of control crashes, 5 side swipe/lane change crashes, and 12 rear end crashes. 5 crashes occurred in the dark, 6 in the wet and 7 during peak periods. Attachment B provides a crash diagram for the roundabout.

Concerns have been raised by the community about the increasing traffic volumes, complexity of the 5 leg roundabouts and underlying causes of the crashes at the roundabouts. Some short term safety improvements were undertaken in 2012 to address crashes within the two 5 leg Maitland roundabouts including:

- Removal of vegetation at the Hospital Roundabout to assist with driver visibility;
- Resurfacing the westbound departure of the Railway station roundabout to improve loss of control in the wet crashes;
- Line marking and signposting improvements to improve delineation. The linemarking better guides motorists through the roundabout, and simplifies the roundabout;
- Installation of kerbside barrier in key locations around the roundabouts and between the roundabouts;
- Installation of median safety barrier on the highway to the east of Church Street
- Provided a “Keep clear” across intersection treatment at the northern end of Johnson Street to allow vehicles to exit Johnson Street.

Crash numbers and rates for the Hospital Roundabout are shown below in Table 3. The crash rate at the Hospital Roundabout of 10.8 casualty crashes per km per year is higher than the crash rate at the Railway Roundabout of 7.8 (casualty crashes per kilometre per year for 300m radius of the roundabout) and the New South Wales Network Class Average of 5.8 for roads similar in function to the New England Highway.

<table>
<thead>
<tr>
<th></th>
<th>New England Highway, 50m around Hospital Roundabout</th>
<th>Stereotypical crash rate for Class 5U, (2 lane each direction divided painted median)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crashes (2006 – 2011)</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td>Casualty Crashes</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Casualties</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Years</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>AADT (2010)</td>
<td>37,500</td>
<td></td>
</tr>
<tr>
<td>Crash rate per 100M VKT (all crashes)</td>
<td>207.0</td>
<td>30.5</td>
</tr>
<tr>
<td>Casualty crashes per km per year</td>
<td>10.8</td>
<td>5.8 (5U class road)</td>
</tr>
<tr>
<td>New England Highway, 50m around Hospital Roundabout</td>
<td>Stereotypical crash rate for Class 5U, (2 lane each direction divided painted median)</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Casualty crash rate per 100M VKT</td>
<td>79.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.9</td>
<td></td>
</tr>
</tbody>
</table>

AADT is the Annualised Average Daily Traffic flow  
VKT is Vehicle Kilometres Travelled (Product of the AADT and the length of roadway under consideration)

5. Project Objectives

The primary objectives of upgrading the Hospital Roundabout are to:

- Improve safety through reduced crash rates and reduced severity of crashes;
- Maximise traffic efficiency on the New England Highway (i.e. reduce overall delay and queuing);
- Improve access to the roundabout from local side streets;
- Maintain reasonable accessibility to adjacent communities and businesses;
- Provide infrastructure to cope with expected traffic growth over the next 15 years;
- Minimise the impact on the environment.
6. Context of the Project

Figure 1 - Project Location Plan – Street Map

Figure 2 - Project Location and Hunter Expressway
Figure 3 – Railway Station Roundabout – Street Map

Figure 4 - Hospital Roundabout – Street Map
7. **Process for Determining the Preferred Option**

7.1 **Overview of the Process**

In 2008, Roads and Traffic Authority (as it was known at the time) looked at a range of options for upgrading the Maitland Roundabouts. The study purpose was to closely examine traffic behaviour, congestion and safety issues at the two intersections, and identify potential improvements for the future. The study involved initial concept development and modelling of various options. The findings of the study fed into the broader Lower Hunter Transport Needs Study (LHTNS) which was jointly funded by the NSW and the Australian Governments.

Following the announcement by the NSW Government that $45M has been provided for upgrading the two roundabouts under the Hunter Infrastructure Investment Fund in 2011, RMS commenced further investigations and community consultation to develop preferred options.

RMS identified the following objectives for the project, from previous community concerns:

- Improve road safety;
- Improve traffic management;
- Provide long term infrastructure;
- Minimise community and business impacts;
- Minimise environmental impacts;
- Deliver within allocated funding ($45M).

The process for determining a preferred option involved technical and engineering investigations, as well as community consultation, and is outlined below.

**Step 1 – Community Feedback**

In March 2012, a community update was issued to approximately 26,000 dwellings showing two initial options for the Railway station roundabout and two initial options for the Hospital Roundabout. The community was asked for comments on the proposal.

A community meeting was held at Monte Pio on 21st March 2012 where further feedback was sought from the community. A total of 52 submissions were received from the community during the consultation period. However, there was a greater focus from the community on the Railway Roundabout with many submissions not making reference to the Hospital Roundabout.

A further meeting was held on 31st May at Monte Pio with local residents and business owners that surround the Hospital Roundabout.

Further details of the community feedback that was received is shown in Attachment C. The main issues identified during the initial feedback process were:
Table 4: Main issues raised in community feedback concerning the Hospital Roundabout

<table>
<thead>
<tr>
<th>Feedback from the broader community</th>
<th>Feedback from local businesses and residents</th>
</tr>
</thead>
<tbody>
<tr>
<td>- 7 people noting a desire for a flyover involving New England Highway going over the roundabout.</td>
<td>- Removal of vegetation at the roundabout has improved visibility and safety</td>
</tr>
<tr>
<td>- Polarised view on traffic signals at the Hospital Roundabout, with 12 people supporting traffic signals and 7 people noting opposition to further traffic signals</td>
<td>- Several issues noted in regard to Johnson Street and difficulties getting out of Johnson Street</td>
</tr>
<tr>
<td>- Many amendments to the existing roundabout were proposed - including additional slip lanes / ramps; redirection of traffic to other parts of the network, and opening up local road connections to the Highway.</td>
<td>- Concerns about proposal that links Johnson Street and Bungaree Street in relation to rat-running; queues extending beyond intersection; blocked access; insufficient storage space</td>
</tr>
<tr>
<td>- Support for low cost options involving additional right turn capacity out of High Street; and a left turn slip into High Street</td>
<td>- Consideration be given to making Johnson St one way, though noted this impacts on businesses</td>
</tr>
<tr>
<td>- At the first community meeting (involving the wider community) there was strong opposition to traffic signals replacing the roundabout</td>
<td>- Traffic signals should be relocated from mid block to Johnson Street (northern end) or Dwyer Street</td>
</tr>
<tr>
<td></td>
<td>- Slip lane into High St would be beneficial</td>
</tr>
<tr>
<td></td>
<td>- For the local residents and businesses next to the Hospital Roundabout there was stronger support for replacing the roundabout with traffic signals</td>
</tr>
</tbody>
</table>

Step 2 – Determination of main options to further investigate

The community options were individually assessed with consideration of technical merit and engineering feasibility and a decision was made by RMS as to whether they would progress to more detailed investigations. The main factors in determining whether an option would progress to more detailed investigation included whether the proposal:

- a) addresses the traffic and safety problems;
- b) has the potential to provide a long term solution;
- c) can be effectively constructed under traffic;
- d) has no obvious negative environmental issues;
- e) could be delivered within the allocated budget.

The options considered for further assessment are listed in Attachment D. Layouts / schematics are listed (in the same order) in Attachment G

Step 3 – Collection of additional information

Once the list of options had been revised down to a smaller set of more likely candidates, the following tasks were undertaken:
Table 5: Tasks undertaken following community consultation

<table>
<thead>
<tr>
<th>Task</th>
<th>Reason for work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional meetings were held with local residents and business surrounding the Hospital Roundabout, and Maitland City Council.</td>
<td>To obtain further feedback on local issues immediately surrounding the roundabout</td>
</tr>
<tr>
<td>Concept design of the community options</td>
<td>To look at the feasibility and design issues associated with each option. This includes looking at the footprint of the proposals (i.e. how much land is required, whether acquisition is necessary)</td>
</tr>
<tr>
<td>Collection of additional traffic data. In particular, collection of origin-destination data for an area between Branxton and Hexham.</td>
<td>To verify the assumptions about future traffic predictions following the opening of the Hunter Expressway in 2013.</td>
</tr>
<tr>
<td>Additional traffic modelling of the community options</td>
<td>To determine the future performance of the options in 2016 and 2026.</td>
</tr>
<tr>
<td>Cost estimates for community options</td>
<td>To determine the estimated cost of the proposals</td>
</tr>
<tr>
<td>Road Safety Audit</td>
<td>Used in conjunction with reported crash data to determine a prioritised list of short term safety works that could be undertaken.</td>
</tr>
<tr>
<td>Short term road safety works undertaken</td>
<td>Includes removal of some vegetation within the roundabout; installation of safety barrier at several locations; improvements to line marking and signage to better guide vehicles through the roundabout and reduce conflicts at key points.</td>
</tr>
</tbody>
</table>

Step 4 – Further Community Consultation

In February 2013 RMS distributed a favoured option which considered the input and investigations from the first round of community consultation and investigations. The community update was distributed to residents and businesses in the Maitland area in February 2013. This was supported by a further community meeting in March 2013 at the Monte Pio. Comments from this second round of community consultation were again considered in determining a final option. Details of the feedback received are shown in Attachment C.

Again, the community comments / options were individually assessed with consideration of technical merit and engineering feasibility and a decision was made by RMS as to whether they would progress to more detailed investigations.

The options considered for further assessment are listed in Attachment D. Layouts / schematics are listed (in the same order) in Attachment G.

Step 5 – Determination of Preferred Option

The options listed in Attachment D were further assessed against a range of criteria:

a) Safety benefits;
b) Traffic performance in 2016;
c) Traffic performance in 2026;
d) Cost estimate;
e) Environmental issues;
f) Property Acquisition;
g) Community Issues.

Detailed assessment of options is provided in Attachment D, with Layouts / schematics in Attachment G.

The options were compared against the criteria, with some options noted as having significant deficiencies against one or more of the criteria. For example, it was clear from community feedback that identifying a long term strategy for addressing congestion was important. Some options show low level performance in 2026 based on traffic projections and modelling, and therefore aren’t likely to provide a cost effective project for the future or meet the needs of the community.

The preferred option will improve traffic flow by:

- Construction of a left turn slip lane for traffic travelling eastbound into High Street. This will separate left turning vehicles from the through traffic on the Highway, and assist traffic entering the roundabout from High Street in identifying gaps in oncoming traffic.
- Construction of a left turn slip lane for traffic travelling westbound into Bungaree Street. This will separate left turning vehicles from the through traffic on the Highway, and assist traffic entering the roundabout from Bungaree and Johnson Streets in identifying gaps in oncoming traffic.
- Installation of traffic signals at Johnson Street (northern end). These signals would be linked to the existing traffic signals at John Street traffic signals and would effectively operate as one set of signals. It is not expected that any additional delay will be added to Highway traffic. These signals will provide a safer alternative exit for Johnson Street traffic during peak periods, and reduce delays for motorists exiting Johnson Street, and improve pedestrian safety at the intersection;
- Removal of existing pedestrian mid block signals between John Street and the roundabout.
- Installation of double right-turning lanes out of High Street (already completed)
- A non-signalised crossing point will be established with a break in the existing median approx 100 metres west of the roundabout.

The preferred option will improve safety by:

- Installation of traffic signals at Johnson Street (northern end) will provide a safer alternate exit for Johnson Street traffic, especially in peak periods;
- Construction of a left turn slip lane into High Street is expected to reduce the incidence of southbound rear-end collisions on approach to the roundabout, and simplify arrangements for traffic exiting from High Street;
- Construction of a left turn slip lane into Bungaree Street is expected to reduce the incidence of northbound rear-end collisions on approach to the roundabout, and simplify arrangements for traffic exiting from Bungaree Street;
- Removal of further vegetation in the middle of the roundabout is expected to improve sight for drivers at the roundabout.

The preferred option has the following advantages over other options:

- It has the greatest traffic flow benefit of the options within the allocated budget;
- It can be added to in future if necessary;
- Could be achieved within the budget allocation;
- It has a longer effective life than other options within the allocated budget;
- It can be built with less disruption to traffic and local businesses than other options.

8. Description of the Preferred Option – Hospital Roundabout

8.1 Preferred Option
The preferred option is shown in Attachment E.

The preferred option has the following components:

- Construction of a left turn slip lane for traffic travelling eastbound into High Street.
- Construction of a left turn slip lane for traffic travelling westbound into Bungaree Street.
- Installation of traffic signals at Johnson Street (northern end). These signals would be linked to the existing traffic signals at John Street traffic signals and would effectively operate as one set of signals.
- Removal of existing pedestrian mid block signals between John Street and the roundabout. Pedestrian facilities will be accommodated by the new traffic signals at Johnson Street (northern occurrence) approximately 60 metres away.
- A non-signalised crossing point will be established with a break in the existing median approx 100 metres west of the roundabout, with some pedestrian fencing.
- Minor realignment of the northbound Highway approach to reduce approach speeds and provide an alignment that is consistent with current design standards.
- Further removal of vegetation in the centre of the roundabout to improve driver visibility.

8.2 Key Issues and Statistics

a) Road Safety
The area of influence of the preferred option is 200m south of the Hospital Roundabout to the rail bridge overpass north of Johnson Street (northern end). This length of approx 800m has a casualty crash rate of 4.4 casualty crashes per kilometre per year (based on crash data between January 2006 and December 2011) which is lower than the NSW Network Class Average of 5.8 for roads with a similar function to the New England Highway. 70% of the injury crashes recorded over this length occurred at the roundabout. The remaining 30% involves 6 injury crashes spread over a length over a 6 year period.

Some minor safety works have already been undertaken at the roundabout. These include removal of vegetation in the roundabout, improved delineation (such as the spiral linemarking scheme within the roundabout) and installation of safety barrier in critical locations around the roundabout.

The preferred option will improve safety by:
- Installation of traffic signals at Johnson Street (northern end) will provide a safer alternate exit for Johnson Street traffic, especially in peak periods;
- Construction of a left turn slip lane into High Street is expected to reduce the incidence of southbound rear-end collisions on approach to the roundabout, and simplify arrangements for traffic exiting from High Street;
• Construction of a left turn slip lane into Bungaree Street is expected to reduce the incidence of northbound rear-end collisions on approach to the roundabout, and simplify arrangements for traffic exiting from Bungaree and Johnson Streets;
• Removal of further vegetation in the middle of the roundabout is expected to improve sight for drivers at the roundabout.

b) Traffic Data

Modeling of the future performance of various options has been undertaken both by GTA Consultants (NSW) P/L (Paramics network modelling) and in-house (SIDRA Intersection modelling).

Table 6 below shows outputs from Paramics microsimulation traffic modelling of a network which contains both the Hospital Roundabout and Railway Roundabout. The first case shows the current and future modelling under the existing conditions (i.e. this option relates to the case where no modifications are made to either of the roundabouts). The following four options all assume that the preferred option is installed at the Railway Roundabout, and compare the overall network performance for various alternative options at the Hospital Roundabout under current and future traffic demands.

The results show very similar performance for the different options at the Hospital roundabout. The major driver for improvements to the overall network performance is the reduction in conflicts between the eastbound Highway traffic and right turning vehicles at the Railway Roundabout. Adopting the preferred option at the Railway Roundabout reduces average delay for the network in the AM peaks by over one minute.

Of all the options modelled, the preferred option produced the best results in terms of travel times and overall average delays within the network.

It is worth noting that the 4-leg roundabout option (listed in the bottom of Table 6 below) does perform well at the major Highway (Hospital) roundabout. However, this option requires a second smaller roundabout that links Johnson Street and Bungaree Street to the Highway. The combination of the two roundabouts in very close proximity produced unacceptable results due to capacity problems in the short road link between the two roundabouts. The operational difficulties in controlling flows on this short link mean that intermittent queuing and blockage of either (or both) of the roundabouts is entirely possible. As a consequence of the intermittent overflow of traffic at this second roundabout, and the safety / traffic implications this creates for the main roundabout, this option is not favoured.

The Layouts / schematics for these Paramics microsimulation Network options are provided in Attachment H.
<table>
<thead>
<tr>
<th>Option at Hospital Roundabout</th>
<th>Network condition</th>
<th>Measure</th>
<th>2013 (pre-HEX)</th>
<th>2016 (post HEX)</th>
<th>2026 (post HEX)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>AM</td>
<td>PM</td>
<td>AM</td>
<td>PM</td>
</tr>
<tr>
<td>Existing roundabout</td>
<td>Assumes existing layout at both Hospital and Railway Roundabout</td>
<td>Travel Time</td>
<td>228</td>
<td>254</td>
<td>205</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stops</td>
<td>16910</td>
<td>17442</td>
<td>9057</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VHT</td>
<td>527</td>
<td>448</td>
<td>265</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Average Delay</td>
<td>165</td>
<td>84</td>
<td>43</td>
</tr>
<tr>
<td>Preferred Option</td>
<td>Assumes flyover for eastbound traffic is installed at Railway Roundabout</td>
<td>Travel Time</td>
<td>220</td>
<td>201</td>
<td>196</td>
</tr>
<tr>
<td>Johnson St One-way exit</td>
<td></td>
<td>Stops</td>
<td>13138</td>
<td>15762</td>
<td>8640</td>
</tr>
<tr>
<td>Slip Road into High St Signals at John St rebuilt to incorporate Johnson St</td>
<td>VHT</td>
<td>394</td>
<td>453</td>
<td>245</td>
<td>291</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Average Delay</td>
<td>68</td>
<td>81</td>
<td>40</td>
</tr>
<tr>
<td>Traffic Signals</td>
<td>Assumes flyover for eastbound traffic is installed at Railway Roundabout</td>
<td>Travel Time</td>
<td>310</td>
<td>335</td>
<td>278</td>
</tr>
<tr>
<td>4 leg traffic signals with the Johnson St leg re-aligned to connect with Bungaree St. New roundabout at the Bunnings access point</td>
<td>Stops</td>
<td>11695</td>
<td>16038</td>
<td>7921</td>
<td>10653</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VHT</td>
<td>408</td>
<td>482</td>
<td>269</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Average Delay</td>
<td>84</td>
<td>112</td>
<td>51</td>
</tr>
<tr>
<td>Traffic Signals</td>
<td>Assumes flyover for eastbound traffic is installed at Railway Roundabout</td>
<td>Travel Time</td>
<td>307</td>
<td>327</td>
<td>276</td>
</tr>
<tr>
<td>4 leg traffic signals with a new link road connecting Johnson / Bungaree Sts at a new roundabout and a road linking to the signals</td>
<td>Stops</td>
<td>11064</td>
<td>15361</td>
<td>7875</td>
<td>10278</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VHT</td>
<td>406</td>
<td>467</td>
<td>268</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Average Delay</td>
<td>84</td>
<td>103</td>
<td>51</td>
</tr>
<tr>
<td>Roundabout</td>
<td>Assumes flyover for eastbound traffic is installed at Railway Roundabout</td>
<td>Travel Time</td>
<td>302</td>
<td>279</td>
<td>206</td>
</tr>
<tr>
<td>4-leg Roundabout with a new link road connecting Johnson / Bungaree Sts at a new roundabout and a road linking to the 4-leg roundabout</td>
<td>Stops</td>
<td>14480</td>
<td>16007</td>
<td>7418</td>
<td>9272</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VHT</td>
<td>421</td>
<td>440</td>
<td>251</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Average Delay</td>
<td>89</td>
<td>82</td>
<td>33</td>
</tr>
</tbody>
</table>

“Travel time” is the sum of the average travel time for vehicles on each road link that approaches the roundabout, for peak hours
“Stops” is the number of vehicles stops within the modelled network, within the peak hour
“VHT” is Vehicle Hours Travelled, which is the total hours of travel within the network during the peak hour
c) **Alignment and Grading**

The Hospital Roundabout was designed and constructed in the 1980's, and the existing eastbound and westbound approach geometry on the New England Highway results in an approach speed at the entry to the roundabout of approximately 50 km/hr. Current design guidelines require deflection on the approach to a roundabout to reduce approach speeds.

The alignment on the southbound approach to the roundabout is consistent with the current design standards. The northbound approach is a single entry curve that is suitable for lower speed environments (70km/hr and below).

The option of grade separation requires in excess of $50M for a one lane, two way option and $100M for a two lane, two way option. There is a downhill grade when travelling south from the roundabout that varies between -1% and -4%. This downhill grade continues for more than 500 metres. This poses design and cost issues as any structure would be chasing the downhill grade for a considerable distance, unless significant funding is invested to lift the road surface above its current level.

Johnson Street is the lowest traffic volume leg of the roundabout, with less than 100 vehicles per hour currently departing the roundabout in peak periods. Access to Johnson Street is important for businesses operating in this street. There is limited scope to improve the departure from Johnson Street because of the close proximity of this leg to Bungaree Street and the southbound approach on the Highway and the existing radius of the roundabout. RMS have considered an option which involved removal of the entrance from Johnson Street onto the roundabout, and instead required vehicles to enter the highway via the proposed traffic signals at the northern end of Johnson Street. However, this proposal posed issues with having one way into Johnson Street at the southern end while two-way traffic would operate at the northern end of the street. A U-turn arrangement or roundabout would be required on Johnson Street to make this proposal work. This is not considered feasible given the limited width within Johnson Street.

d) **Environment**

Removal of some vegetation / trees is required to provide the left slip lane into High Street and Bungaree Street. An aboriginal heritage inspection has been completed and no issues have been identified. A review of environmental factors is currently underway with no significant issues raised to date.

Noise impact will require assessment and the need, if any, for mitigation is yet to be determined.

e) **Community**

During consultation there was a more diverse sentiment for the Hospital Roundabout than the Railway Roundabout, with support shown for grade separation (i.e. overpasses), as well as alternative options such as intersection traffic signals, and options involving modifications to the existing roundabout (such as reduction in the number of legs and provision of slip lanes).

The option of an overpass of the Highway over the roundabout is not feasible within the context of the expected future traffic and the costs that would be involved, and a good traffic outcome is achievable in 2026 without requiring grade separation.
Acquisition

The preferred option requires an area of Council owned property to be acquired on the northern side of the New England Highway (north of High Street). A small area of land may need to be acquired on the southern corner to accommodate the Bungaree Street slip lane and associated widening. Acquisitions will be determined as part of the concept development phase.

f) Current Estimate

Based on the design and construction of the preferred option the project’s strategic estimate is:

<table>
<thead>
<tr>
<th>Table 7: Strategic estimate for the Hospital Roundabout (Preferred Option)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Items</strong></td>
</tr>
<tr>
<td>Project Development</td>
</tr>
<tr>
<td>Design</td>
</tr>
<tr>
<td>Property acquisition</td>
</tr>
<tr>
<td>Utility Adjustment</td>
</tr>
<tr>
<td>Construction</td>
</tr>
<tr>
<td>Handover</td>
</tr>
<tr>
<td>Sub Total</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
</tr>
</tbody>
</table>

9. Recommendation

The RMS preferred option for the Hospital Roundabout is estimated at **$4.1M (in 2013 dollars)** and involves:

- Construction of a left turn slip lane for traffic travelling eastbound into High Street.
- Construction of a left turn slip lane for traffic travelling westbound into Bungaree Street.
- Installation of traffic signals at Johnson Street (northern end). These signals would be linked to the existing traffic signals at John Street traffic signals and would effectively operate as one set of signals.
- Removal of existing pedestrian mid block signals between John Street and the roundabout. Pedestrian facilities will be accommodated by the new traffic signals at Johnson Street (northern occurrence) approximately 60 metres away.
- A non-signalised crossing point will be established with a break in the existing median approx 100 metres west of the roundabout, with some pedestrian fencing.
- Minor realignment of the northbound Highway approach to reduce approach speeds and provide an alignment that is consistent with current design standards
- Further removal of vegetation in the centre of the roundabout to improve driver visibility.

Briefing paper prepared by:

Road Safety and Traffic Management Section
Roads and Maritime Services (Hunter Region)
Attachment A

Community Updates
- February 2012 Showing Preliminary Options
- March 2013 Showing Favoured Option
- June 2013 Showing Preferred Option
Roundabout Improvements on the New England Highway at Maitland

Roads and Maritime Services (RMS) is planning to undertake initial safety improvements and build larger scale upgrades for safety and traffic flow improvements at the roundabouts on the New England Highway at Maitland. This community update contains information on these upcoming works which RMS would like to discuss with the community over the next few weeks.

RMS does not have preferred options for the larger scale upgrades but has undertaken traffic and initial design investigations and is seeking community input on options at the sites by 30 March 2012.

You are invited to a meeting on Wednesday, 21 March 2012 to learn more about the initial proposed improvements and contribute your ideas on the larger scale upgrade options.

The meeting is being held at Monte Pio, corner New England Highway and Dwyer Street, Maitland 6.30pm.

Initial safety improvements

RMS previously installed a wire rope safety barrier between the two roundabouts at Maitland. In 2010 and this has helped prevent further head on crashes in this area, RMS will undertake further work to improve safety, which includes:

• Removing vegetation on the Hospital roundabout.
• Installing roadside safety barriers.
• Installing improved safety signs for motorists.
• Resurfacing of westbound exit at Church Street roundabout.

Involving the community and stakeholders

RMS is developing larger scale upgrades for improving safety and traffic flow at these two roundabouts.

Overleaf are two initial options for each roundabout.

The initial options for the Hospital roundabout would involve either new traffic lights or modifying the existing roundabout. Both options would involve consolidating Bunganee Street and Johnson Street into one approach to reduce the complexity of the roundabout.
Hospital Roundabout
Two options we are currently considering for community discussion

**FOUR LEG ROUNDBOAT OPTION**

- Consolidate Johnson Street and Bungaree Street
- Hungry Jacks
- Bunnings
- High Street
- The Maitland Hospital
- Johnston Reserve
- Mount Pleasant Street
- Telarah Railway Station

- Add left turn slip lane to High Street
- Retain existing roundabout

**FOUR LEG TRAFFIC LIGHT OPTION**

- Consolidate Johnson Street and Bungaree Street
- Hungry Jacks
- Bunnings
- High Street
- The Maitland Hospital
- Johnston Reserve
- Mount Pleasant Street
- Telarah Railway Station

- Replace roundabout with 4 leg traffic lights
The initial options for the Railway Station roundabout would involve grade separation of traffic travelling between Cessnock Road and Church Street or a new link road from Cessnock Road to the New England Highway to take some traffic out of the existing intersection. Both options would involve a new connecting road for traffic accessing Walker Street.

The design of the upgrades will need to take account of expected future traffic patterns, especially with the impact of the Hunter Expressway, environmental issues, the flood mitigation scheme in the local area and stay within $45 million allocated.

**Project objectives**

The objectives of this project are to provide initial safety improvements and larger scale upgrades at the roundabouts to improve safety and cater for future traffic growth. The upgrades must be designed to not significantly impact on flooding in the area.

We are interested in your thoughts on these options and/or any other suggestions you have. Please send written comments to the project manager by 30 March 2012.

You are invited to attend a meeting on Wednesday, 21 March 2012 at Monte Plo to learn more about the project and contribute your ideas. Arrival at 6pm for a 6.30pm start.

Please contact us if you plan to attend for catering and room set up purposes on 02 4924 0240 or email Sharon.Pam@rms.nsw.gov.au.

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Send your comments to
Adam Thomas
Roads and Maritime Services, Locked Bag 30 Newcastle NSW 2300
T 02 4924 0611 (during business hours) | E Adam.Thomas@rms.nsw.gov.au
www.rms.nsw.gov.au

February 2012
RMS 12.033
Roundabout improvements at the Hospital Roundabout at Maitland

Roads and Maritime Services (RMS) has developed a favoured option for the Hospital Roundabout at Maitland. RMS is seeking community feedback on this favoured option by 27 March 2013.

Background

The NSW Government through the Hunter Infrastructure and Investment Fund has provided $45 million for upgrades to the two five leg Maitland roundabouts at Church Street (near Maitland Railway Station) and High Street (near Maitland Hospital).

The majority of the $45M will be allocated to the Railway Station Roundabout which is a higher priority intersection for the following reasons:

- The Railway Station Roundabout has more consistent and extensive queues and delays than the Hospital Roundabout.
- The Railway Station Roundabout serves a higher order function as the intersection of two State roads (New England Highway and Cessnock Road) and will provide a crucial link to the Hunter Expressway from 2013 onwards.

- The Railway Station Roundabout experiences many conflicting turning movements during peak periods, which leads to delays on the highway. The Hospital Roundabout is dominated by through traffic on the New England Highway, which is expected to be significantly reduced when the Hunter Expressway is completed at the end of this year.

- The favoured option for the Hospital Roundabout involves improvements to the existing roundabout and new traffic lights at the Johnson Street and New England Highway intersection.
Hospital Roundabout

In February 2012 RMS released two proposals for the Hospital Roundabout for public comment. The two options presented were a 4 leg roundabout and 4 leg traffic signals. Both options involved consolidation of Johnson Street and Bungaree Street legs, to reduce the complexity of the roundabout and improve safety. A meeting was also held in May 2012 with local residents and businesses to discuss these proposals.

An options assessment report containing information on the options considered for the Hospital Roundabout is available for your information on the RMS website www.rms.nsw.gov.au.

Following an assessment of the public feedback for the Hospital Roundabout, RMS has developed a favoured option to improve safety and traffic flow at the Hospital Roundabout. Overbroe is the favoured option which involves the following:

- Installation of traffic signals at Johnson Street (northern end). These signals would be linked to the existing traffic signals at John Street traffic signals and would effectively operate as one set of signals. The signals would provide an alternative and safer exit onto the New England Highway for Johnson Street traffic, especially during traffic peaks.
- Removal of existing pedestrian mid block signals (not shown) between John Street and the roundabout. Pedestrians will be able to cross at the Johnson Street signals approximately 60 metres away.
- Construction of a left turn slip lane for traffic travelling eastbound into High Street. This will separate left turning vehicles from the through traffic on the highway, and assist traffic entering onto the roundabout from High Street in identifying gaps in oncoming traffic.
- Construction of a left turn slip lane for traffic travelling westbound into Bungaree Street. This will separate left turning vehicles from the through traffic on the highway, and assist entering onto the roundabout from Bungaree Street in identifying gaps in oncoming traffic.

A concept drawing of the favoured option is shown on the following page.

Railway Station Roundabout

A favoured option for the Railway Station Roundabout was distributed for public comment in August/September 2012. Following a review of submissions, RMS is finalising a preferred option for the Railway Station Roundabout, which is expected to be released in April 2013.

Further Information

Please contact Adam Thomas on 02 4924 0511 for any further information about the favoured option, or email your comments to Adam.Thomas@rms.nsw.gov.au by 27 March 2013.

RMS officers will be available at Monte Pio at Maitland on Wednesday, 13 March 2013 between 4pm and 7pm to discuss the proposal.

Please contact us if you plan to attend for catering and room set-up purposes on 02 4924 0240 or email Sharon.Parr@rms.nsw.gov.au. Thank you.
Favoured option
The favoured option we are currently considering for the Hospital Roundabout at Maitland for community discussion.
Project objectives

The main objective of this project is to provide upgrades at the Railway and Hospital roundabouts to improve safety and cater for future traffic growth.

The $46M funding provided by the Hunter Infrastructure and Investment Fund has been provided specifically for improvements associated with the Hospital and Railway Station Roundabouts.

The focus of the planning for this project is on identifying options for the two roundabouts which maximise safety and traffic efficiency benefits within the funding allocated. The $46M provided covers both the Railway Station and Hospital Roundabouts.

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Send your comments to:
Adam Thomas
Roads and Maritime Services, Locked Bag 30 Newcastle NSW 2300
T 02 4924 0611 (during business hours) | E Adam.Thomas@rms.nsw.gov.au
www.rms.nsw.gov.au

February 2013
RMS 13.175
Roundabout upgrades on the New England Highway at Maitland

Roads and Maritime Services (RMS) is planning upgrades to improve safety and traffic flow at the roundabouts on the New England Highway at Maitland. This community update contains information on RMS preferred options for the roundabouts next to Maitland Railway Station and Maitland Hospital.

Background

The NSW Government through the Hunter Infrastructure and Investment Fund has provided $45 million for upgrades to the two five leg roundabouts on the New England Highway at Church Street (near Maitland Railway Station) and High Street (near Maitland Hospital). The purpose of the upgrades is to improve safety and traffic flow, while catering for future traffic growth.

The majority of the $45 million funding will be allocated to the Railway Station roundabout, which has more consistent and extensive queues and delays than the Hospital roundabout.

The Railway Station roundabout also serves a higher order function as the intersection of two State roads (New England Highway and Cessnock Road) and will provide a crucial link to the Hunter Expressway from 2013 onwards.

Process to identify the preferred options

In March 2012 RMS presented proposals for the two roundabouts to the community for comment. A total of 52 responses were received along with feedback from meetings with local businesses and land owners. RMS considered this feedback and carried out further investigations to develop favoured options for both roundabouts.

In August 2012 RMS released a favoured option for the Railway Station roundabout for community comment. A public meeting was held and 27 responses were received.

In February 2013 a favoured option for the Hospital roundabout was released for community comment. A public meeting was held in March and 17 responses were received.
HOSPITAL ROUNDABOUT
Preferred option
RMS has undertaken further investigations since the release of the favoured options to assess issues raised by the community.

The investigations involved collecting additional traffic data, additional traffic modelling, further survey and design, and assessment of the cost and feasibility of additional options.

During this time RMS also implemented safety improvements in the area including removal of vegetation at the Hospital roundabout, installing safety barriers, improved linemarking and signposting, and resurfacing the westbound exit at the Railway Station roundabout.

**Determining the preferred options**

The primary objectives in determining the preferred roundabout options were to:

- Consider comments and suggestions raised by the public
- Reduce crash rates and severity of crashes
- Improve traffic performance
- Cater for future traffic growth
- Minimise environmental and flooding impacts
- Maintain accessibility to adjacent residential and commercial areas

Reports providing the detailed options assessments for the two roundabouts are available on the RMS website at [www.rms.nsw.gov.au](http://www.rms.nsw.gov.au)

**Railway Station roundabout**

The Railway Station roundabout preferred option retains the existing roundabout and involves:

- Constructing an eastbound overpass
- Constructing a left slip lane from Cassmock Road onto the New England Highway
- Removing the roundabout entry from Walker Street
- Providing a U-turn bay on Cassmock Road for access to the roundabout from Walker Street
- Realigning the westbound New England Highway approach and departure to the roundabout.

A drawing of the preferred option is provided in this update.

The main changes to the design since the favoured option was released in August 2012 include:

- A left slip lane from Cassmock Road onto the New England Highway for improved vehicle capacity
- Increased bridge length on the overpass to better suit geotechnical findings
- Changes to the entry of the overpass to give greater priority to the overpass traffic
- Minor realignment of the overpass to improve sight lines
- Minor realignment of the westbound lanes adjacent to Maitland Park to allow connection of the overpass to the eastbound highway
- A guard fence between the realigned westbound traffic lanes and Maitland Park
- The U-turn bay on Cassmock Road has been moved 30 metres south to extend the length of the right turn bay
- Reducing the eastbound departure from the roundabout to one lane to simplify traffic arrangements
- Improved provisions for cyclists

**Hospital roundabout**

The Hospital roundabout preferred option retains the existing roundabout and involves:

- Installation of traffic signals at the northern end of Johnson Street
- Removal of the mid-block pedestrian signals 60 metres to the east of Johnson Street
- Construction of left turn slip lanes into High Street and Bungaree Street
- Removal of vegetation in the roundabout
- Provision of pedestrian paths, fencing and a crossing point through the median to the west of the roundabout.

A drawing of the preferred option is provided in this update.

The main design changes since the favoured option was released in February 2013 include:

- Additional pedestrian facilities to the west of the Hospital roundabout, including a pedestrian refuge, connecting footpaths and fencing
- A change to the design for the intersection at Mount Pleasant Street to improve pedestrian safety at the nearby crossing point.
Next steps

Construction on the two roundabouts will start in August 2013. Initial work will focus on the Cessnock Road side of the Railway Station, followed by the slip lanes and pedestrian work at the Hospital roundabout, and the new traffic signals at Johnson Street. These works are expected to be completed in mid 2014.

Construction of the eastbound overpass at the Railway Station roundabout will start in late 2014 and is expected to be completed by late 2015. Extensive detailed design work is required before the overpass construction can commence. The tender process for the detailed design of the overpass is expected to commence in July 2013.

For more information

Visit: www.rms.nsw.gov.au

The project website is regularly updated and contains copies of the reports undertaken on the project and community consultation.

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For more information

Please contact the Project Manager, Adam Thomas
Roads and Maritime Services, Locked Bag 2030 Newcastle NSW 2300
T 02 4924 0611 (during business hours) | E Adam.Thomas@rms.nsw.gov.au
www.rms.nsw.gov.au

June 2013
RMS 13.328
Attachment B

Crash Diagram for the Hospital Roundabout
SITE: NEW ENGLAND HIGHWAY AND HIGH STREET / BUNGAREE STREET, MAITLAND

PERIOD START: MAR QUARTER 2006  PERIOD ENDS: JUN QUARTER 2011  TOTAL YEARS: 5.00
PRELIM. DATA STARTS: SEP QUARTER 2011  PRELIM. DATA ENDS: MAR QUARTER 2012

KEY

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<thead>
<tr>
<th>SYMBOL</th>
<th>DESCRIPTION</th>
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<tr>
<td>T</td>
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<tr>
<td>I</td>
<td>INJURY CRASH</td>
</tr>
<tr>
<td>F</td>
<td>FATAL CRASH</td>
</tr>
<tr>
<td>W</td>
<td>WET/ICY SURFACE</td>
</tr>
<tr>
<td>D</td>
<td>DARKNESS</td>
</tr>
<tr>
<td>E.G.:</td>
<td>T=1 = 1 TOWAWAY CRASH</td>
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</table>

<table>
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<th>DESCRIPTION</th>
<th>No.</th>
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<td>CROSS TRAFFIC</td>
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<tr>
<td>104</td>
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<td>RIGHT THRU FROM RIGHT</td>
<td>1</td>
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<td>301</td>
<td></td>
<td>REAR END</td>
<td>12</td>
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<td></td>
<td>LANE SIDE SWIPE</td>
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</tr>
<tr>
<td>306</td>
<td></td>
<td>LANE CHANGE RIGHT</td>
<td>1</td>
</tr>
<tr>
<td>308</td>
<td></td>
<td>RIGHT TURN SIDE SWIPE</td>
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<td>700</td>
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<td>OFF PATH ON STRAIGHT - OTHER</td>
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<td></td>
<td>LEFT OFF OR RIGHT</td>
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<tr>
<td>704</td>
<td></td>
<td>RIGHT OFF CARRIAGEWAY INTO OBJECT</td>
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<tr>
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<td>1</td>
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TOTALS:
21 TOWAWAY
13 INJURY
5 FATAL
6 WET/ICY SURFACE
5 DARKNESS

NOTE: FOR FURTHER DETAILS REGARDING INDIVIDUAL CRASHES - REFER TO CRASH PROFILE
Attachment C

Community Feedback
<table>
<thead>
<tr>
<th>Comment</th>
<th>Number of times raised</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prefer flyover of roundabout(s) with NEH overpass/underpass</td>
<td>7 specifically related to Hospital Roundabout</td>
</tr>
<tr>
<td>Prefer traffic lights or signalised roundabout at Hospital Roundabout</td>
<td>12</td>
</tr>
<tr>
<td>Opposed to traffic lights</td>
<td>7</td>
</tr>
<tr>
<td>Add on/off ramps or more slip lanes to proposals</td>
<td>9</td>
</tr>
<tr>
<td>Options presented are waste of money / need better funded options / need options which account for longer term traffic / options don't address problem</td>
<td>7</td>
</tr>
<tr>
<td>Delay any work until HEX opens to see the impact of HEX on Maitland</td>
<td>3</td>
</tr>
<tr>
<td>Prefer 4 leg Hospital Roundabout</td>
<td>3</td>
</tr>
<tr>
<td>Need a local inner city bypass</td>
<td>4</td>
</tr>
<tr>
<td>Remove vegetation from roundabout</td>
<td>4</td>
</tr>
<tr>
<td>Concerns about linking up Johnson St and Bungaree St</td>
<td>2</td>
</tr>
<tr>
<td>Double right turn from High St needed</td>
<td>4</td>
</tr>
<tr>
<td>Various one-off alternative proposals to alleviate congestion. Examples include:</td>
<td></td>
</tr>
<tr>
<td>- Signalise traffic entering from High St or build a slip lane for westbound traffic on New England Highway.</td>
<td></td>
</tr>
<tr>
<td>- Build new link from end of Telarah St to New England Highway and construct new signalised intersection or roundabout at intersection with Highway.</td>
<td></td>
</tr>
<tr>
<td>- Extend High St up to Mount Pleasant St placing a set of traffic lights that stops Highway southbound traffic and a merging lane to turn into oncoming traffic.</td>
<td></td>
</tr>
<tr>
<td>- Open up the section of Old High St from Mount Pleasant St to High St to remove the turning traffic from the roundabout</td>
<td></td>
</tr>
<tr>
<td>- Reopen Regent Street and Stream Street</td>
<td></td>
</tr>
<tr>
<td>- Get the local traffic off the Highway by using Alexandra Avenue and Waterworks Road – need to build a new road from Waterworks Road to the Hospital on the fringe of the flood channel and join the Long Bridge / High Street.</td>
<td></td>
</tr>
<tr>
<td>- The pedestrian walk way under the Highway (joins Ledsam Street at Long Bridge) should be reopened</td>
<td></td>
</tr>
<tr>
<td>- Install traffic signals similar to Turton Road and Griffith Road intersection near the football stadium</td>
<td></td>
</tr>
</tbody>
</table>
SUMMARY – COMMUNITY FEEDBACK FROM MEETING WITH LOCAL BUSINESSES AND RESIDENTS (31st MAY 2012)

• Removal of vegetation at the roundabout has improved visibility and safety

• Several issues noted in regard to Johnson Street
  o Limited width in the street
  o Parking difficult and getting worse with increased volumes for rail station and businesses
  o 2 properties earmarked for further development
  o Need to maintain access to businesses
  o Difficult to exit Johnson Street as have to give way to right (Bungaree Street, northbound Highway traffic and right turning vehicles from High Street)
  o Southbound movement out of Johnson Street is very difficult

• Several concerns about any proposal that links Johnson Street and Bungaree Street
  o Concerns about rat-running / additional traffic on Johnson St
  o Large trucks can’t get in /out
  o Queues extend beyond intersection / blocked access / insufficient storage space

• Several possible options suggested
  o Consideration to making Johnson Street one way, though noted this impacts on businesses (eg mechanics doing brake tests)
  o Traffic signals should be relocated from mid block to Johnson Street (northern end) or Dwyer Street
  o Slip lane into High Street would be beneficial

• RMS should ensure large vehicles (b-doubles, semis) accessing Bungaree Street and Johnson Street are catered for

• Short term improvements raised
  o Move hold line for southbound approach to the roundabout back as vehicles approaching too quickly and the current stop line location impacts on ability for side streets to safely enter the roundabout
  o Provide a “Don’t queue across intersection” treatment at the northern end of Johnson Street to allow vehicles to exit Johnson Street
### SUMMARY – COMMUNITY FEEDBACK ON FAVOURED OPTION (17 submissions) – FEBRUARY / MARCH 2013 CONSULTATION

4 of the submissions stated they were happy with the proposal as displayed. Below is a table showing some of the suggestions for modifications, and the response.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Include an exit slip lane from High Street turning left onto the New England Highway</td>
<td>The concept of an exit slip lane from High St was considered in the initial options for this project. While there would be some benefits in having a slip lane from High Street, this was not shown on the proposal because the left turn volumes out of High Street are small and construction of the slip lane has several key design issues. It would encroach on the nearby car park and would have fairly large level differences along the length of the slip lane. Overall this would not be a cost effective project. RMS recently reinstated the double right turn out of High St to improve traffic flow on this leg of the roundabout. This right turn out of High Street is the dominant movement from this approach.</td>
</tr>
<tr>
<td>Concerns about pedestrian facilities, parking, signage, location of bus stops and road layout / direction of travel for Johnson Street and Bungaree Street.</td>
<td>Local road issues and infrastructure issues that were referred to Maitland City Council for consideration.</td>
</tr>
<tr>
<td>Why not allow two right turn lanes out of Bungaree Street. This would allow the inside lane to turn right into High Street.</td>
<td>There is a conflict between the left lane going to High Street (from Bungaree Street) and the straight through movement westbound in the right lane on the highway. There is also a conflict between the right lane westbound turning right to High Street. The right turn arrangements were reduced to one lane following a crash history. To further improve safety the intent is to reduce the entry to High Street to one lane. There are issues if two right turn lanes are permitted out of Bungaree St if there is only one entry lane to High Street. It would be very difficult to prevent one lane from trying to enter High Street if there was a double right marked out of Bungaree Street.</td>
</tr>
<tr>
<td>From Bungaree Street there should be one right turn only and one left and through to High Street</td>
<td>Two lanes from Bungaree Street was considered but is not feasible as there are conflicts which can not be safely managed. The same conflicts listed above exist for this situation. There are also issues with westbound highway vehicles wanting to go straight or right into High Street conflicting with the kerbside lane out of Bungaree Street being able to go into High Street or head east on the Highway. This section was previously reduced to one right turn lane due to poor crash history.</td>
</tr>
<tr>
<td>Question the need / benefit of the northbound slip lane into Bungaree St. This may provide a disbenefit for motorists exiting Johnson St and Bungaree St.</td>
<td>The left slip lane does cater for a large number of vehicles that turn left during peak periods (over 200 per hour in the afternoon peak), and gets these vehicles out of queued traffic. It also simplifies arrangements for vehicles exiting Bungaree Street as they have greater certainty of what the westbound vehicles are doing.</td>
</tr>
<tr>
<td>Suggested alterations to the proposed arrangements at Johnson Street (northern end) such as:</td>
<td>The signals proposed at Johnson Street northern end are intended to provide a safe alternative exit for Johnson Street traffic in peak periods. Currently, Johnson Street traffic experiences long delays in trying to access the roundabout in peak periods, with motorists often accepting small gaps in traffic.</td>
</tr>
<tr>
<td>---</td>
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</tr>
<tr>
<td>- relocate the pedestrian crossings</td>
<td>The layout proposed aims to maximise the available storage space between John Street and Johnson Street. Building a right turn lane into John Street impacts on storage space for opposing right turn lanes. Motorists heading north can turn right at the next intersection (Walter Street) in order to access areas such as Queen Street and the northern side of John Street. The proposal provides a right turn into Johnson Street (north) as this is more efficient than right turning vehicles needing to go around the roundabout.</td>
</tr>
<tr>
<td>- provide right turn bays into both Johnson Street and John Street</td>
<td>The pedestrian facilities are shown on the outer extremities of the combined signals (John Street / Johnson Street) in order to maximise storage for vehicles between the two sets of signals and to accommodate the signal posts in the preferred locations. Pedestrians will be able to cross the highway at both sets of signals.</td>
</tr>
<tr>
<td>- re-allocate the right turn into John Street rather than Johnson Street</td>
<td>Consider signalising the roundabout during peak periods to get a more balanced traffic flow. This has worked well at other intersections such as Bridges Road/Northcott Drive/Carnley Avenue in Kotara.</td>
</tr>
<tr>
<td></td>
<td>RMS did investigate this option. Signalising a roundabout has worked well in peak periods to counteract queues forming because a movement becomes dominant and influences the other roundabout legs. In the case of the hospital roundabout the traffic distribution is more complex with the 5th leg resulting in more possible movements. Traffic modelling results show that signalising the roundabout won’t perform well into the future. This is partly because all legs of the roundabout are currently well utilised, whereas signalising the roundabout creates a situation where some parts of the roundabout become less efficient and parallel movements are not well catered for. Halting the highway traffic will provide opportunities for side streets, but it does mean stopping the majority of roundabout traffic which results in a higher overall delay for the roundabout compared to the existing roundabout arrangement.</td>
</tr>
<tr>
<td></td>
<td>The performance of the Hospital Roundabout is expected to improve with the reduced highway traffic following the opening of the Hunter Expressway. This will provide benefits to side streets such as Bungaree Street with more frequent gaps.</td>
</tr>
<tr>
<td>The layout of the slip lane into High Street should run alongside the hospital car park rather than alongside the highway.</td>
<td>The proposed alignment is expected to work effectively. Having an alignment through the car park will potentially impact on hospital parking in the future if the car park is ever expanded. There are also concerns about having a high angle entry which will result in higher entry speeds. This poses safety issues as the start of the left slip lane occurs at the Mt Pleasant Street intersection, and so motorists exiting Mt Pleasant Street would need to cross over the slip lane. Ultimately, RMS is keen to find an improved solution which maintains reasonable access to both the car park and Mt</td>
</tr>
<tr>
<td><strong>Request for a third lane on the roundabout from Bungaree Street to Hungry Jacks (similar to Jesmond roundabout)</strong></td>
<td>The third lane arrangement works well at Jesmond because there is no intersection that it crosses, however the third lane at Bungaree Street would impact on the Johnson Street departure.</td>
</tr>
<tr>
<td><strong>Consider a left slip lane out of the hospital car park onto the highway (eastbound) – currently drivers come out of the car park and need to queue to turn left.</strong></td>
<td>A left slip lane out of the hospital is something that would need to be worked through in conjunction with the operator of the car park, as it impacts on payment arrangements for the car park. Given the low left turn volumes from High Street, this is not expected to make a substantial impact to the performance of the roundabout.</td>
</tr>
<tr>
<td><strong>Questions regarding the impact on traffic flow by installing traffic signals at Johnson Street (northern end)</strong></td>
<td>The new set of signals proposed at Johnson Street (northern end) is intended to be coordinated with the John Street signals and set up as one consolidated set of signals. A similar arrangement occurs on Croudace Street near Pride Ave / Mitchell Ave, New Lambton. The offset intersection operates as one set of signals. Given the low volumes from both John Street and Johnson Street intersections, these coordinated signals are not expected to have a major impact on highway traffic. The reason for proposing the extension of the John Street signals incorporating the northern end of Johnson Street is to provide a safe alternative exit for Johnson Street traffic in peak periods. Currently, Johnson Street traffic experiences long delays in trying to access the roundabout in peak periods, with motorists often accepting small gaps in traffic.</td>
</tr>
<tr>
<td><strong>RMS should be looking at bigger solutions like flyovers and/or an inner city bypass</strong></td>
<td>The $45M that has been allocated by the Hunter Infrastructure and Investment Fund was provided specifically for safety and traffic improvements to the Hospital and Railway station roundabouts. The option of having an overpass in both directions at each roundabout was considered (both as 1 lane and 2 lane options). Of the options modelled with estimated costs within the $45M funding allocated, the options proposed provided the greatest expected traffic benefit based on traffic modelling. Providing an overpass in each direction at the Hospital Roundabout was estimated at approx $100M. Traffic modelling shows marginal benefits to the network by providing an overpass at the Hospital Roundabout. The Hunter Expressway is due to open in 2013. Following completion of the Expressway, traffic volumes on the New England Highway are expected to decrease significantly. The Expressway will be a 40km section of dual carriageway freeway between F3 freeway near Seahampton and New England Highway at Branxton and is expected to divert a significant amount of traffic away from Maitland, particularly heavy vehicles travelling between the Lower Hunter and Newcastle, Lake Macquarie, Central Coast and Sydney.</td>
</tr>
<tr>
<td>Rather than a west-bound slip lane at the roundabout, why not extend Ledsam street (left in, left out at highway) and provide access to Bungaree Street with an upgraded intersection on Ledsam Street at Bungaree Street.</td>
<td></td>
</tr>
<tr>
<td>While there are some benefits to this option the main concern is that this area is flood prone. The works would require extensive pavement formation and drainage works, and would not be as cost beneficial as the left slip into Bungaree Street which essentially performs the same function of getting left turning vehicles out of the main queue of traffic.</td>
<td></td>
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Attachment D

Assessment of Preferred and Alternative Options
<table>
<thead>
<tr>
<th>Option</th>
<th>Cost estimate (all in 2012 dollars)</th>
<th>Traffic – 2016 performance</th>
<th>Traffic – 2026 performance</th>
<th>Safety</th>
<th>Environment / Property / Community issues</th>
<th>Comments (Pros / Cons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retain existing roundabout (i.e. no changes)</td>
<td>NIL</td>
<td>Existing Roundabout Overall LOS: B / B (AM/PM) Worst leg LOS: B - Highway S/B (AM) B - Highway S/B (PM) Worst leg – delay: 22 Johnson/Bungaree (AM) 27s Johnson St (PM) (SIDRA output)</td>
<td>Existing Roundabout Overall LOS: B / B (AM/PM) Worst leg LOS: D - High St (AM) E - Johnson/Bungaree (PM) Worst leg – delay: 52s High St (AM) 69 Johnson/Bungaree (PM) (SIDRA output)</td>
<td>Existing Roundabout 2006-2011: - 34 crashes, 13 injury and 21 towaway - 11 cross traffic, 12 rear ender, 6 loss of control, 5 side swipe - 5 darkness, 6 wet - 11 during peaks</td>
<td>Nil environment or property issues.</td>
<td>Nil change – existing roundabout. Community is keen to see the roundabout upgraded to improve safety and traffic flow</td>
</tr>
<tr>
<td>Option 1. Preferred option – Signalise Johnson Street (northern end), add slip lane into High Street and slip lane into Bungaree Street</td>
<td>$4.1M (2012)</td>
<td>Overall LOS: A / A (AM/PM) Worst leg LOS: A - All legs (AM) B - Johnson St north (PM) Worst leg – delay: 12s Highway S/B (AM) 15s High St (PM) (Paramics output)</td>
<td>Overall LOS: A / A (AM/PM) Worst leg LOS: A – All legs (AM) B - High St / Bungaree (PM) Worst leg – delay: 15s Highway S/B (AM) 21s High / Bungaree (PM) (Paramics output)</td>
<td>Would redirect some traffic from Johnson St leg of the roundabout to northern end of Johnson Street, hence reducing the number of conflicts within the roundabout. New signals would need to be coordinated with nearby John Street signals. Signalising the Johnson St (northern end) intersection will provide for a safer exit for businesses and residents of Johnson St. This movement has small gap acceptances.</td>
<td>Negligible environmental issues identified. Requires some property acquisition to cater for the left slip into High Street and Bungaree Street Impacts on parking with the introduction of a slip lane into High Street would need to be considered.</td>
<td>Would have to coordinate John Street (northern end) and John Street signals. Johnson Street signals will improve delay for vehicles making a right turn out of Johnson St. Midblock signals would need to be removed and replaced with nearby intersection signals to maximise flow on the Highway Left turn slip lane into High St and Bungaree St will improve queues for southbound and northbound traffic approaching the roundabout. Option can be achieved within the budget allocation Can be built with minimal disruption to traffic and local businesses</td>
</tr>
<tr>
<td>Option</td>
<td>Cost estimate (all in 2012 dollars)</td>
<td>Traffic – 2016 performance</td>
<td>Traffic – 2026 performance</td>
<td>Safety</td>
<td>Environment / Property / Community issues</td>
<td>Comments (Pros / Cons)</td>
</tr>
<tr>
<td>--------</td>
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</tr>
<tr>
<td>Option 2.</td>
<td>Strategic cost estimate $100M (2012) $110M outturn (2015)</td>
<td>Overall LOS: A / A (AM/PM) Worst leg LOS: B - Highway/Bungaree (AM) B - Highway/Bungaree (PM) Worst leg – delay: 23s High St (AM) 23s High St (PM) (SIDRA output)</td>
<td>Overall LOS: A / A (AM/PM) Worst leg LOS: B - Highway/S/B (AM) B - Highway/S/B (PM) Worst leg – delay: 22s High St (AM) 25s High St (PM) (SIDRA output)</td>
<td>Improves loss of control crashes and rear enders on the Highway, and reduces conflicts / potential for cross traffic crashes via reduced volumes entering the roundabout. Still has Bungaree Street and Johnson Street in close proximity to each other, so some modifications to roundabout may be required.</td>
<td>Noise mitigation almost certainly required. Would have a significant visual impact. Would require acquisition (costly) and would impact on businesses adjoining the roundabout. Would gain support from commuting (through movement) travellers.</td>
<td>Requires a large footprint, acquisition, costly. Cost significantly exceeds available budget for project. Construction would be difficult / disruptive to existing conditions over an extensive period of time. Provides best outcome in terms of modelling at the intersection, however increases traffic flow arrival rate at intersections to the north (such as John St and Aberglasslyn Rd). Queues would essentially be moved to adjoining intersections.</td>
</tr>
<tr>
<td>Option 3.</td>
<td>In excess of $50M (based on comparison to Railway Roundabout estimates)</td>
<td>Similar results as above, with additional delays and queuing due to the 2-1 lane merge required for both directions on the Highway</td>
<td>Similar results as above, with additional delays and queuing due to the 2-1 lane merge required for both directions on the Highway</td>
<td>As per above. Highway traffic will need to merge from 2 lanes into 1 lane to get onto the overpass which increases the risk for merging crashes.</td>
<td>As per above.</td>
<td>Same issues as per above but not as extensive. Cost not within budget. Expensive to upgrade to 2 lanes each direction in the future.</td>
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<td>Option 4.</td>
<td>Costs difficult to estimate without detailed study. Rough cost estimate significantly exceeds available budget</td>
<td>Would remove some of the traffic from the Highway that travels between High Street and Bungaree Street, reducing conflicts at the roundabout</td>
<td></td>
<td>There are environmental and flooding issues associated with this area. Property acquisition is required. This will also place extra traffic on Ledsam Street which is a very narrow local road.</td>
<td>Requires extensive construction work and has several environmental and property issues. Would have minimal benefits on overall roundabout traffic (&lt;10% of traffic would be removed from the roundabout). There is a much greater traffic benefit for much less cost in forming a left slip lane into High Street (southbound) for example.</td>
<td></td>
</tr>
<tr>
<td>Option</td>
<td>Cost estimate (all in 2012 dollars)</td>
<td>Traffic – 2016 performance</td>
<td>Traffic – 2026 performance</td>
<td>Safety</td>
<td>Environment / Property / Community issues</td>
<td>Comments (Pros / Cons)</td>
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<td>Option 5. 4 way traffic signals (TCS) – 2 through lanes north and south on the Highway (Option shown in original community update in early 2012)</td>
<td>Cost estimated in the order of $12M (2012) $14M outturn (2015)</td>
<td>Overall LOS: C / C (AM/PM)</td>
<td>Overall LOS: C / D (AM/PM)</td>
<td>Improved control of turning movements over existing roundabout, and improvements to conflicts by reducing from 5 legs to 4 legs. Provides safer facilities for pedestrians crossing near the intersection.</td>
<td>Negligible environmental issues identified. Would be built primarily within existing footprint. Some property may be required off Johnson Street / Bungaree Street depending on the alignment of this leg. Mixed community views on traffic signals – some opposing any further signals, others in support of traffic signals.</td>
<td>This option works in the short term but requires upgrades before 2026. Not a long term traffic solution. Provides pedestrian facilities. Benefits to side streets with reduced delay, but negative impact on Highway. Overall the impact is negative due to the dominant Highway movement being adversely affected.</td>
</tr>
<tr>
<td>Option 6. 4 way traffic signals (TCS) – 3 through lanes north and south on the Highway</td>
<td>In excess of $12M (2012) $14M outturn (2015)</td>
<td>Overall LOS: B / C (AM/PM)</td>
<td>Overall LOS: C / C (AM/PM)</td>
<td>As per above</td>
<td>As per above. Would have a larger footprint than 2 lane approaches, requiring some widening and property acquisition.</td>
<td>Requires larger footprint than existing roundabout. Would have a better traffic impact than 2 lanes each way (previous option). Longer term this option doesn’t work as well as the existing roundabout due to the impacts on Highway traffic flow. Further expansion of the intersection is difficult due to proximity of local businesses to the intersection.</td>
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</table>

Improved control of turning movements over existing roundabout, and improvements to conflicts by reducing from 5 legs to 4 legs.

Provides safer facilities for pedestrians crossing near the intersection.

Main risks are red light runners and rear enders (especially in peak periods, sun setting).

Negligible environmental issues identified. Would be built primarily within existing footprint. Some property may be required off Johnson Street / Bungaree Street depending on the alignment of this leg. Mixed community views on traffic signals – some opposing any further signals, others in support of traffic signals.
<table>
<thead>
<tr>
<th>Option</th>
<th>Cost estimate (all in 2012 dollars)</th>
<th>Traffic – 2016 performance</th>
<th>Traffic – 2026 performance</th>
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<th>Comments (Pros / Cons)</th>
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<tr>
<td>Options 7 and 8. Replace 5 leg roundabout with 5 way traffic signals</td>
<td>Cost would be greater than the four way signal option $12M (2012) $14M outturn (2015) assuming two lane approaches on the Highway. More expensive for 3 lane approaches</td>
<td>For 2 lane approaches: LOS = C / D (AM/PM) Worst leg LOS: D – All 3 side streets (AM) E – High St (PM) Worst leg – delay: 53s High St (AM) 60s High St (PM) (SIDRA output) For 3 lane approaches: LOS = C / C (AM/PM) Worst leg LOS: D - High/Johnson and Highway S/B (AM) D – Side streets &amp; NEH S/B (PM) Worst leg – delay: 53s High St (AM) 50s Johnson St (PM)</td>
<td>For 2 lane approaches LOS = D / D (AM/PM) Worst leg LOS: E - All 3 side streets (AM) E - All 3 side streets (PM) Worst leg – delay: 64s High/Bungaree (AM) 61s High St (PM) For 3 lane approaches LOS = D / D (AM/PM) Worst leg LOS: E - High / Johnson (AM) E - Johnson St (PM) Worst leg – delay: 58s High/Bungaree (AM) 65s Johnson St (PM) (SIDRA output)</td>
<td>Would be more complex and confusing than 4 leg traffic signals. However, would provide greater control of turning movements / conflicts than 5 leg roundabout. Increased safety for pedestrians crossing near the intersection. Risks with red light runners.</td>
<td>Negligible environmental and property issues identified. Mixed views from the community on traffic signals being installed at this intersection.</td>
<td>Operates less efficiently than 4 leg traffic signals, and is more complex. Would retain 5 legs in close proximity to each other, hence not addressing the key safety issue near Johnson St / Bungaree St. Overall operates poorly due to the need for more signal phases. No Right Turn from Johnson St into Bungaree St. Increasing to 3 lane approaches on the Highway improves performance of the intersection but requires a larger footprint than existing roundabout.</td>
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<td>Option 9. Signalise all legs of the existing roundabout and operate each leg sequentially during peak periods</td>
<td>Low cost option in the order of $2M (2012) $2.2M outturn (2015). 2013 Post-HEX Results LOS=F / F (AM/PM) Worst leg LOS: F - ALL Legs (AM) F - ALL Legs (PM) Worst leg – delay: 139s Bungaree St (AM) 167s NEH N/B (PM) Not modelled due to poor outcomes for 2013 (with HEX). (SIDRA output)</td>
<td>Retains 5 legs of the roundabout, with legs closely spaced (existing problem). Cross traffic crashes should improve with controlled movements, provided red-light runners and speeds are managed. Legs operate in isolation within the roundabout. U-turning vehicles create an un-manageable conflict risk</td>
<td>Negligible environmental and property issues identified. Same community issues as other traffic signal options.</td>
<td>Doesn’t provide long term solution. Would need to be built onto in the future. Results in an inefficient system as parallel turning movements are not well catered for, resulting in times where parts of the roundabout are not utilised at all. Provides an adverse impact on all legs of the roundabout. Potential for confusion about signal versus roundabout operation. U-turns create an un-controlled conflict risk.</td>
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<td>Option</td>
<td>Cost estimate (all in 2012 dollars)</td>
<td>Traffic – 2016 performance</td>
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<td>Option 10. Signalise the existing roundabout and operate during peak periods (Roundabout Metering Signals on the Highway)</td>
<td>Low cost option around $1M - $2M.</td>
<td>Overall LOS: B / B (AM/PM) Worst leg LOS: C - Highway S/B (AM) C - Highway S/B (PM) Worst leg – delay: 31s Highway S/B (AM) 30s Highway S/B (PM) (SIDRA output)</td>
<td>Overall LOS: F / F (AM/PM) Worst leg LOS: F - Highway S/B (AM) F - Highway N/B (PM) Worst leg – delay: 180s Highway S/B (AM) 176s Highway N/B (PM) (SIDRA output)</td>
<td>Retains 5 legs of the roundabout, with legs closely spaced (existing problem). Cross traffic crashes should improve with controlled movements, provided red-light runners and speeds are managed. Increases complexity at the roundabout as both Highway directions need to be metered (stopped) in order to release traffic from streets on both sides of the Highway.</td>
<td>Negligible environmental and property issues identified. Same community issues as other traffic signal options.</td>
<td>Doesn’t provide long term solution. Would need to be built onto in the future. Results in an inefficient system as parallel movements are not well catered for, resulting in times where parts of the roundabout are not utilised. Provides an adverse impact on New England Highway traffic (increased delays in peak periods).</td>
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<tr>
<td>Option 11. Reduce roundabout to 4.5 legs, signalise Johnson Street (northern end), add slip lane into High Street. Provide a link road between John Street and Elizabeth Street west of the rail line.</td>
<td>$5.8M (2012)</td>
<td>Not modelled as minimal difference expected as compared to preferred option</td>
<td>Not modelled as minimal difference expected as compared to preferred option</td>
<td>Similar safety benefit to preferred option. The link road may redirect some Bungaree St traffic from the roundabout up to John St. John St traffic would increase, but there would be fewer conflicting movements at Bungaree Street.</td>
<td>Link road would pass through low point at the southern end of John St which may lead to water ponding and drainage issues. Noise assessment would be required – potential for increased noise in John St/Elizabeth Street.</td>
<td>The link road would provide an alternate route to the NEH for the Bungaree St catchment. However it would only be successful if traffic takes the alternative route which will be slightly longer and more circuitous for many residents in Telarah. Would require an upgrade to the John St traffic signals to accommodate extra traffic. Upgrading of the existing section of John Street would be required as it is currently very narrow and is not formed for the total length.</td>
</tr>
</tbody>
</table>
Attachment G

Layouts / schematics for Preferred and Alternative Options
1. **Preferred Option**

Retain the existing roundabout, signalise the northern end of Johnson Street, add a southbound slip lane into High Street and a northbound slip lane into Bungaree St, and remove the existing Pedestrian near Johnson Street (north). (See attachment E)

2. **Eastbound and westbound overpass – 2 lanes each direction with signals at-grade (below)**

Intersection Layout does not show the New England Highway - which passes over the signalised junction via a four-lane, two-way overpass

3. **Eastbound and westbound overpass – 1 lane each direction with signals at-grade (below)**

As per the Intersection Layout above, but including a two-lane, two-way overpass
4. **Provide a link road between Bungaree Street and Ledsam Street under the Highway**

Option assessed but not modelled

5. **4 way traffic signals (TCS) – 2 through lanes north and south on the Highway**
6. **4 way traffic signals (TCS) – 3 through lanes north and south on the Highway**
7. **Replace 5 leg roundabout with 5 way traffic signals (with 2 through lanes on the Highway)**

Signal phasing for this option does not permit the right turn from Johnson Street into Bungaree Street
8. Replace 5 leg roundabout with 5 way traffic signals (with 3 through lanes on the Highway)

Signal phasing for this option does not permit the right turn from Johnson Street into Bungaree Street.
9. Signalise all legs of the existing roundabout and operate each leg sequentially during peak periods

Signal phasing for this option operates each leg of the roundabout exclusively in an anti-clockwise rotation with a minimal inter-green period.
10. **Signalise the existing roundabout and operate during peak periods (Roundabout Metering Signals)**

Roundabout Metering of Highway flows, based on conditions in either High Street or Bungaree St. Northbound flows on the Highway are temporarily metered (stopped) in response to conditions in Bungaree Street. Southbound flows on the Highway are temporarily metered (stopped) in response to conditions in High Street.

In the Layout below, green indicates the controlling approach, while the red patch represents the metered approach (under signal control).

11. **Reduce roundabout to 4.5 legs, signalise Johnson Street (northern end), add slip lane into High Street. Provide a link road between John Street and Elizabeth Street west of the rail line.**
Option assessed but not modelled as minimal difference expected when compared to preferred option
Attachment H

Layouts / schematics for Network models of Preferred and other Options (Paramics microsimulation models)
A. Preferred Option

Retain the existing roundabout, signalise the northern end of Johnson Street, add a southbound slip lane into High Street and a northbound slip lane into Bungaree St, and remove the existing Pedestrian near Johnson Street (north). (See attachment E)
B. Traffic Signals

4-leg traffic signals, with Johnson Street re-aligned westwards to connect with Bungaree Street. New roundabout at the Bunnings entry point which provides access to Johnson Street.
C. Traffic Signals

4-leg traffic signals with both Johnson Street and Bungaree Street realigned westwards which then intersect at a new roundabout. New link road connection the roundabout to the traffic signals Retain the Railway Roundabout, with straighter Highway departures. Construct a two-lane eastbound overpass of the Highway from 400m west to 400m east of the roundabout. Remove the Walker Street exit. Access to the roundabout from Walker St will be via a left slip lane onto Cessnock Road and then a u-turn on Cessnock Rd before approaching the roundabout northwards on Cessnock Rd.
D. Roundabout

Reduce the Hospital Roundabout to 4-legs by creating a new link road which connects to Johnson Street and Bungaree Street, both of which are realigned westwards and intersect at a new roundabout.

Retain the Railway Roundabout, with straighter Highway departures. Construct a two-lane eastbound overpass of the Highway from 400m west to 400m east of the roundabout. Remove the Walker Street exit. Access to the roundabout from Walker St will be via a left slip lane onto Cessnock Road and then a u-turn on Cessnock Rd before approaching the roundabout northwards on Cessnock Rd.