

**Report to General Manager**Attachments:  
Nil**SUBJECT:** Bannerman Street Roundabout**AUTHOR:** Lindsay Menday, Sustainable Transport Projects Coordinator**ENDORSED BY:** Duncan Mitchell, Director Engineering and Property Services**EXECUTIVE SUMMARY:**

New pedestrian, cycling and traffic facilities were constructed in Bannerman Street and Murdoch Street in April and May 2018. The works were a response to community concerns over vehicle speeds in the area, and requests for improved pedestrian facilities.

The works included reconstruction of the roundabout intersection between Bannerman Street and Murdoch Street. Following reconstruction, Council received feedback from the community raising concern about the appearance of the new roundabout, the loss of a garden bed that had previously been planted in the central roundabout island, and in regards to the vehicle manoeuvrability.

The community response clearly demonstrated that the garden bed was highly valued by the community. To ensure that the amenity and character of the area remains consistent with community expectations, new garden beds will soon to be installed in beds next to the intersection. Once planted, the landscaped area will comprise approximately six (6) times the total area to that which was previously in place in the central roundabout island.

In response to the matters raised by the community regarding the roundabout, Council resolved at its meeting of 30 July 2018 to undertake a review of the intersection, including consideration of any modifications required. The review found that:

- the pedestrian crossing and cycle lane are operating as designed, however that pedestrian safety could be further improved by raising the pedestrian crossing and improving lighting.
- The size of the central roundabout island and lane widths are comparable with other intersections and that following an initial period of adjustment it is anticipated that all user groups will be able to effectively navigate the roundabout.

Community submissions regarding manoeuvrability have reduced significantly following a number of submissions in the weeks following construction, and as such it is recommended that a review period of six (6) months be undertaken before considering any further modification to the roundabout geometry. A reduction in the size of the central island would likely address any community concern about manoeuvrability, however this would also reduce the traffic calming benefits of the roundabout.

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Based on the finding of the review, this report recommends that:

- Any additional community feedback received on the garden beds following the planting be communicated to Councillors.
- Additional works be undertaken to improve the existing pedestrian crossing, including raising the crossing and installing additional lighting.
- Council monitor the operation of roundabout and community feedback for a period of six (6) months prior to determining if amendments to the central roundabout island are required.

### **FINANCIAL IMPLICATIONS:**

Funding for the planting of new garden beds formed part of the original project budget and no further funding is required for this to be completed.

The provision of a raised pedestrian crossing can be funded using the existing project contingency for this project and current Council budgets.

Additional lighting for the pedestrian crossing can be funded through Council's Pedestrian Street Lighting budget. Design, approval and installation costs would likely fall between \$60,000 to \$90,000, based on similar projects in other parts of the LGA.

Funding for the proposed works outlined in this report will come from the 2018/19 Traffic Facilities Budget.

### **RECOMMENDATION:**

- 1. THAT** Councillors will be informed of any additional community feedback received on the gardens and any proposed changes to the intersection.
- 2. THAT** the existing pedestrian crossing over Bannerman Street at the intersection with Murdoch Street be reconstructed as a raised crossing subject to further community consultation and Traffic Committee approval.
- 3. THAT** subject to approval from Ausgrid, upgraded lighting be installed at the existing pedestrian crossing over Bannerman Street.
- 4. THAT** staff monitor the performance of the new roundabout intersection between Bannerman Street and Murdoch Street, and provide a further report to Council in six (6) months regarding the need to reduce the size of the internal roundabout circle.

## LINK TO COMMUNITY STRATEGIC PLAN

The relationship with the Community Strategic Plan is as follows:

- Direction: 2. Our Built Infrastructure
- Outcome: 2.2 Vibrant centres, public domain, villages and streetscapes  
2.4 Improved traffic and parking management

## BACKGROUND

New pedestrian, bike and traffic facilities were constructed along sections of Murdoch Street and Bannerman Street in April and May 2018. Following the completion of the works, Council received feedback from the community raising concerns about the appearance of the new roundabout, the removal of a garden bed that had previously been planted in the centre of the roundabout, and regarding manoeuvrability around the new roundabout.

In response to the community feedback Council, at its meeting of 30 July 2018, resolved:

- 1. THAT a hold is put on starting any new traffic and bike construction projects until Council has been briefed on the processes followed for these projects.*
- 2. THAT the appearance and operation of the roundabout be reviewed as soon possible.*
- 3. THAT a report be prepared for Council's August meeting on whether modifications to the roundabout are needed. The review should include use of the bike lane and pedestrian crossing, traffic speeds and traffic jams at the roundabout and community feedback on the new flower beds.*

The works were constructed in response to matters raised by the community in regard to the road network in this area. A summary of matters raised by the community and considered at the North Sydney Traffic Committee is provided in the table below.

**Table 1. Summary of community matters raised regarding Bannerman Street**

<b>Date</b>	<b>Matter raised/outcomes</b>
April 2009	<ul style="list-style-type: none"><li>• A resident of the area raised concerns about pedestrian safety at the intersection and requested works to slow vehicles as they are entering/ leaving the roundabout and the provision of a pedestrian crossing.</li></ul>
May 2013	<ul style="list-style-type: none"><li>• Concerns raised about traffic speeds and volumes in Bannerman Street.</li></ul>
October 2014	<ul style="list-style-type: none"><li>• Concerns regarding pedestrian and driver safety at the roundabout intersection between Bannerman Street and Murdoch Street.</li></ul>
November 2014	<ul style="list-style-type: none"><li>• Speed and volume counts indicated that speeds were above the posted limit.</li><li>• Police advise Traffic Committee that radar enforcement in these streets is difficult due to the geometry of the road.</li></ul>
April 2016	<ul style="list-style-type: none"><li>• Additional community requests for traffic calming to be installed in Bannerman Street.</li></ul>

<b>Date</b>	<b>Matter raised/outcomes</b>
November 2016	<ul style="list-style-type: none"><li>• Council receive requests from residents for a marked pedestrian crossing to be installed at the intersection of Bannerman Street and Murdoch Street and an improved pedestrian crossing facility to be installed at Bannerman St and Shellcove Road.</li></ul>
5 May 2017	<ul style="list-style-type: none"><li>• Plans of works along Bannerman St between Shellcove Road and Murdoch Street, and Murdoch Street between Bannerman Street and Bennett Street presented at North Sydney Traffic Committee meeting.</li><li>• The proposed works along Bannerman Street and Murdoch Street were presented to Bennett Precinct for consideration.</li></ul>

The plans presented to Traffic Committee in May 2017 showed a garden bed in the central roundabout island being retained. During the construction process, it was identified that a 'semi mountable' central island would be required instead of a landscaped island, to ensure that heavy vehicles and buses could safely manoeuvre through the intersection in all directions (noting that buses are now longer than when the original roundabout was constructed). The loss of the central garden bed was to be offset by the installation of around 70m<sup>2</sup> of new garden bed around the intersection, a net gain of around 60m<sup>2</sup>.

## **CONSULTATION REQUIREMENTS**

Additional consultation will take place with Bennett Precinct, neighbouring residents and the general community for any proposed amendments to the roundabout geometry.

## **SUSTAINABILITY STATEMENT**

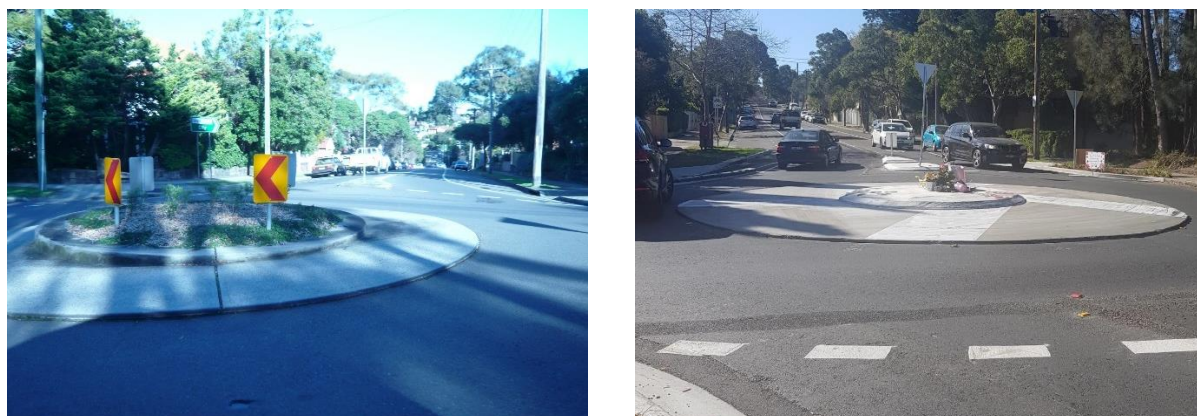
The sustainability implications were considered and reported on during the initiation phase of this project.

## **DETAIL**

In accordance with the Council resolution of 30 July 2018, a review of the intersection between Bannerman Street and Murdoch Street was undertaken in August 2018. Details of the findings of the review, with respect to each of the matters raised in the Council resolution, are provided below.

### *Appearance of roundabout*

Following construction, Council received significant community feedback regarding the removal of flowers that had been planted in the central island prior to reconstruction. Much of the feedback was expressed via social media channels and there were also some direct submissions to Council. This feedback affirmed that the roundabout garden was highly valued by the local community.



*Bannerman Street roundabout before and after reconstruction*

In response to the clear indication that garden beds are a highly valued contributor to local identity and character, staff have arranged for the new beds installed around the intersection to be planted using species similar to those used in the previous displays. The landscaped area in the central roundabout island totalled approximately 12m<sup>2</sup>. Once the new planting is completed it will bring the total landscaped area around the intersection to approximately 70m<sup>2</sup>. Further landscaped area will also be installed along Bannerman Street.

The ‘semi mountable’ centre roundabout island included as part of the reconstructed roundabout has been installed to ensure access for the range of heavy vehicles that use these roads, including buses. The outside apron of the new roundabout is ‘mountable’ in accordance with the requirements of heavy vehicles and buses, and is intended to be driven over.

It is possible to paint the central roundabout island to improve visual appearance. Members of the local community have also proposed that the central island be painted with a community art project. Maintenance and access to the roundabout associated with this would need to be carefully managed from a safety perspective given the high traffic volumes on the streets.

Planters located in central islands are not recommended on roads with heavy traffic volumes as they present high risk working areas for maintenance staff with an increased risk of being hit by a moving vehicle.

### *Use of Bike Lane*

Bannerman Street and Murdoch Street form part of ‘Route 3’ from the *North Sydney Cycling Strategy*. The route attracts a large number of trips despite the challenging topography and busy road conditions as it provides local and regional connection to major trip generating land uses. Counts along Route 3 indicate that in excess of 500 cycle trips are made along sections of the route per day (over 180,000 per year) despite the difficult conditions. The diagram below provides a ‘heat map’ of cycle movements in the area and indicates that both Bannerman Street and Murdoch Street receive high levels of cycling traffic relative to other parts of the network.



Extract from Strava Heat Map showing relative volumes for cycling. Brighter lines show the highest cycling volumes.

A key safety concern along the route is the potential for conflict between vehicle and bicycles that due to a significant difference in speeds because of the topography. For this reason, the *North Sydney Integrated Cycling Strategy* proposed separation of cycle and vehicle movements on steep or long climbs along the route, where speed differences are greatest. This both increases safety for people riding and makes it easier for those driving to safely pass slow moving riders. These 'uphill' cycling lanes have been installed on Bannerman Street and Murdoch Street as part of these works. This type of separation on hills has received positive feedback from both riders and drivers.

The uphill cycle lane bypasses the roundabout intersection between Bannerman Street and Murdoch Street in the uphill direction. The lane occupies space not required for vehicle turning movements. Roundabout intersections present a significantly higher rate of risk in terms of bicycle crashes, and the risk is exacerbated in this location due to the slow riding speed, topography and traffic volumes. These factors provided the basis for the inclusion of the cycling bypass, however, it is considered that the lane also benefits vehicle drivers as they do not need to interact with slow moving riders through the intersection.



Roundabout Cycle Bypass

Mechanical (tube) counts were taken in the cycle bypass, the results of which are provided in the table below.

**Table 2. Bannerman Street Roundabout cycle bypass mechanical counts**

	Number	50% speed	85% speed
Weekday AADT	69	16kph	20kph

Tube counts taken for bicycles regularly undercount volumes (due to the light weight) and so observational counts were also taken during the pm peak (the highest concentration of cycle and vehicle traffic in the eastbound direction) to test accuracy. These counts gave higher volumes than the mechanical counts as shown in Table 3 below.

**Table 3. Bannerman Street Roundabout cycle bypass observational counts**

Day/Time	15-minute count	Mechanical count peak hour rate	Observational count peak hour rate
14 August. 5.00 – 5.15	11	30	44
14 August. 5.30 – 5.45	17	30	72

From these figures, and counts previously conducted along other parts of the route, it is estimated that at least 100 trips are made in an eastbound direction along this route and through the cycle bypass per day (36,500 eastbound trips per year). During site observations, all riders turning left from Bannerman Street into Murdoch Street used the cycle bypass. Two riders were observed using the roundabout lane to make a right turn from Bannerman Street. From these observations, it was concluded that the bypass is effective in reducing the potential for conflict between bicycle and motor vehicle movements.

*Use of Pedestrian crossing*

Pedestrian counts were taken prior to the installation of the crossing. A rate of 39 crossing movements in a one-hour period was observed at the location where the pedestrian crossing is now installed. This number meets the criteria set by the Roads and Maritime Services (RMS) to warrant a pedestrian crossing and is anticipated to increase with the installation of the crossing.



*Pedestrian crossing over Bannerman Street*

Council have received feedback of instances where drivers have failed to give way to pedestrians crossing at the new pedestrian crossing, although this was not observed during site visits conducted for the review (7 August 2018 and 14 August 2018). To further increase pedestrian safety at the crossing it is recommended as part of this report that the crossing be raised. This was not proposed as part of the original design as pedestrian crossings were not used on regional roads in North Sydney at the time of design (both Bannerman Street and Murdoch Street are classified as regional roads). Since this time, Council has begun designing and constructing raised crossings on regional roads. Any raised crossing constructed will need to be designed to levels which comfortably accommodate heavy vehicles (i.e. max height 75mm). Advanced warning signage for the crossing is also due to be installed over the next 6 weeks

It is further recommended that lighting of the crossing be upgraded with funding available in Council’s Pedestrian Street Lighting budget.

*Vehicle Speeds*

Speed counts were taken post construction as part of the review. These were taken on the southern approach to the roundabout as this location presents as likely to get the highest speeds (due to the roundabout geometry and amount of vehicle deflection created). The results show that speeds on both approach and exit are well below the posted 50kph limit, and considerably lower than speeds recorded in comparable locations. The below table provides a summary of the speeds, and comparison against two roundabouts with more open geometry. It shows that the speeds on both entry and exit to the Bannerman Street/Murdoch Street intersection are substantially lower than the comparison sites.

**Table 4. Vehicle Speeds Bannerman Street and Murdoch Street Intersection approach**

Bannerman Street, approx. 40m from intersection			
50% speed (entry)	85% speed (entry)	50% speed (exit)	85% speed (exit)
27kph (July 2018)	35kph (July 2018)	35kph (July 2018)	41kph (July 2018)
Comparison Sites			
Amherst Street approx. 70m from intersection.			
Lavender Street approx. 70m from intersection with raised pedestrian crossing			
50% speed (entry)	85% speed (entry)	50% speed (exit)	85% speed (exit)
39kph (October 2014)	48kph (October 2014)	39kph (October 2014)	48kph (October 2014)
40kph (June 2018)	48kph (June 2018)	41kph (June 2018)	49kph (June 2018)

The speeds recorded at the intersection between Bannerman Street and Murdoch Street, represent a significantly safer environment in terms of pedestrian safety to the comparison sites. The risk of pedestrian fatality or injury increases significantly for each minor increase in speed above 40kph. Lower speeds also contribute to amenity benefits in terms of pedestrian amenity and noise and Council have received feedback from residents immediately adjacent to the roundabout that noise has reduced since reconstruction.

Counts were also taken approximately 250m west of the intersection where a prior speed count was taken. These indicate that there has also been a reduction in speeds at this location following the works.

**Table 5. Vehicle Speeds Bannerman Street Midblock**

Bannerman Street, midblock, eastbound speeds.			
50% speed before	50% speed after	85% speed before	85% speed after
52kph (October 2014)	49kph (June 2018)	58kph (October 2014)	57kph (June 2018)

*Intersection Function*

The changes to the intersection geometry (relative to the previous configuration), and the corresponding reduction in entry/exit speed are unlikely to have a discernible impact on road network capacity or congestion. In general, roundabout intersections allow for greater capacity than a priority or signalised intersection, and no significant queues have been observed at the roundabout during peak hours. Queues have been observed continuing through the roundabout as a result of vehicles not clearing the traffic signals at the downstream intersection between Murdoch Street and Rangers Road, however this is not attributed to the roundabout itself.

No concerns have been raised to Council regarding impact on capacity from Roads and Maritime Services (RMS) or Transport Management Centre (TMC).

The addition of the pedestrian crossing has the potential to result in short additional wait times at the intersection at times when pedestrians cross. The total volumes of pedestrian and vehicle moving through the area falls within the warrants set by the Road and Maritime Services (RMS) for pedestrian crossings and therefore delays at this site would be comparable to other pedestrian crossings across the road network.

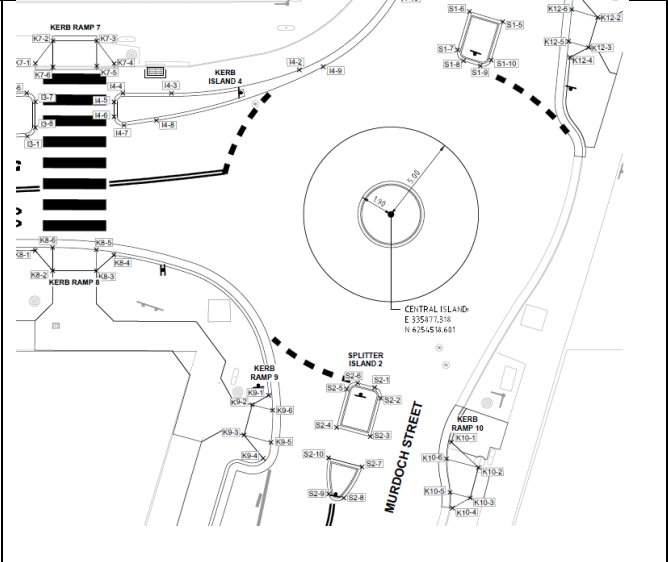

Feedback received from Sydney Buses regarding the project did not identify any concerns relating to manoeuvring through the roundabout. Various types of heavy vehicles have been observed negotiating the roundabout as designed.




*Bus travelling southbound through the roundabout intersection between Bannerman Street and Murdoch Street.*

Council received community feedback that some users are finding the new roundabout more difficult to negotiate due the revised geometry and reduced lane widths. It is noted that this feedback was primarily received in the two weeks immediately following construction and has since reduced, such that no community submissions were received in the two weeks leading up to this report. This is consistent with a period of initial adjustment that is often observed when road network changes are made. While the intersection geometry is tighter than the previous layout, the new central roundabout island and lane widths are comparable to other roundabouts in North Sydney. Table 6 below provides an overview of the Bannerman Street roundabout geometry relative to a selection of other roundabouts in North Sydney.

**Table 6. Comparison of Bannerman/Murdoch Street roundabout geometry relative to other roundabouts in North Sydney**



Location	Radius	Min. lane width	Aerial image
Bannerman Street  (Road level pedestrian crossing)	5.0m	4.5m	 <p>The diagram shows a top-down view of the roundabout with various labeled components: KERB RAMP 7, KERB ISLAND 4, KERB RAMP 8, KERB RAMP 9, SPLITTER ISLAND 2, and KERB RAMP 10. It also shows MURDOCH STREET and CENTRAL ISLAND with dimensions like 14.2, 14.6, 14.7, 14.8, 14.9, 15.1, 15.2, 15.3, 15.4, 15.5, 15.6, 15.7, 15.8, 15.9, 16.0, 16.1, 16.2, 16.3, 16.4, 16.5, 16.6, 16.7, 16.8, 16.9, 17.0, 17.1, 17.2, 17.3, 17.4, 17.5, 17.6, 17.7, 17.8, 17.9, 18.0, 18.1, 18.2, 18.3, 18.4, 18.5, 18.6, 18.7, 18.8, 18.9, 19.0, 19.1, 19.2, 19.3, 19.4, 19.5, 19.6, 19.7, 19.8, 19.9, 20.0, 20.1, 20.2, 20.3, 20.4, 20.5, 20.6, 20.7, 20.8, 20.9, 21.0, 21.1, 21.2, 21.3, 21.4, 21.5, 21.6, 21.7, 21.8, 21.9, 22.0, 22.1, 22.2, 22.3, 22.4, 22.5, 22.6, 22.7, 22.8, 22.9, 23.0, 23.1, 23.2, 23.3, 23.4, 23.5, 23.6, 23.7, 23.8, 23.9, 24.0, 24.1, 24.2, 24.3, 24.4, 24.5, 24.6, 24.7, 24.8, 24.9, 25.0, 25.1, 25.2, 25.3, 25.4, 25.5, 25.6, 25.7, 25.8, 25.9, 26.0, 26.1, 26.2, 26.3, 26.4, 26.5, 26.6, 26.7, 26.8, 26.9, 27.0, 27.1, 27.2, 27.3, 27.4, 27.5, 27.6, 27.7, 27.8, 27.9, 28.0, 28.1, 28.2, 28.3, 28.4, 28.5, 28.6, 28.7, 28.8, 28.9, 29.0, 29.1, 29.2, 29.3, 29.4, 29.5, 29.6, 29.7, 29.8, 29.9, 30.0, 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79.9, 80.0, 80.1, 80.2, 80.3, 80.4, 80.5, 80.6, 80.7, 80.8, 80.9, 81.0, 81.1, 81.2, 81.3, 81.4, 81.5, 81.6, 81.7, 81.8, 81.9, 82.0, 82.1, 82.2, 82.3, 82.4, 82.5, 82.6, 82.7, 82.8, 82.9, 83.0, 83.1, 83.2, 83.3, 83.4, 83.5, 83.6, 83.7, 83.8, 83.9, 84.0, 84.1, 84.2, 84.3, 84.4, 84.5, 84.6, 84.7, 84.8, 84.9, 85.0, 85.1, 85.2, 85.3, 85.4, 85.5, 85.6, 85.7, 85.8, 85.9, 86.0, 86.1, 86.2, 86.3, 86.4, 86.5, 86.6, 86.7, 86.8, 86.9, 87.0, 87.1, 87.2, 87.3, 87.4, 87.5, 87.6, 87.7, 87.8, 87.9, 88.0, 88.1, 88.2, 88.3, 88.4, 88.5, 88.6, 88.7, 88.8, 88.9, 89.0, 89.1, 89.2, 89.3, 89.4, 89.5, 89.6, 89.7, 89.8, 89.9, 90.0, 90.1, 90.2, 90.3, 90.4, 90.5, 90.6, 90.7, 90.8, 90.9, 91.0, 91.1, 91.2, 91.3, 91.4, 91.5, 91.6, 91.7, 91.8, 91.9, 92.0, 92.1, 92.2, 92.3, 92.4, 92.5, 92.6, 92.7, 92.8, 92.9, 93.0, 93.1, 93.2, 93.3, 93.4, 93.5, 93.6, 93.7, 93.8, 93.9, 94.0, 94.1, 94.2, 94.3, 94.4, 94.5, 94.6, 94.7, 94.8, 94.9, 95.0, 95.1, 95.2, 95.3, 95.4, 95.5, 95.6, 95.7, 95.8, 95.9, 96.0, 96.1, 96.2, 96.3, 96.4, 96.5, 96.6, 96.7, 96.8, 96.9, 97.0, 97.1, 97.2, 97.3, 97.4, 97.5, 97.6, 97.7, 97.8, 97.9, 98.0, 98.1, 98.2, 98.3, 98.4, 98.5, 98.6, 98.7, 98.8, 98.9, 99.0, 99.1, 99.2, 99.3, 99.4, 99.5, 99.6, 99.7, 99.8, 99.9, 100.0.</p>
Clarke Road, North Sydney	4.9m	4.14m	 <p>Source: Nearmap</p>

Location	Radius	Min. lane width	Aerial image
Lavender Street, Milsons Point  (Includes raised pedestrian crossing)	5.1m	5.1m	 <p>Source: Nearmap</p>

As that the roundabout is comparable in size and lane widths to others in the road network, it is anticipated that the users will adjust to the revised geometry, which is consistent with the sharp drop in community feedback on the intersection changes. In this context, it is recommended that Council monitor use of the roundabout and any additional community feedback for a period of six (6) months, prior to considering changes to geometry. Following the review period, if any ongoing issues are found, modifications to the geometry can be achieved by reducing the size of the internal roundabout circle. Changes to the circle would likely increase vehicle speeds either side of the roundabout and therefore increase risk, particularly for pedestrians crossing at the intersection.

It was also concluded that minor changes to linemarking may assist with manoeuvring around the roundabout. Staff will further investigate if linemarking changes are appropriate and report any minor changes to the North Sydney Traffic Committee for their consideration. There are a number of more recently built roundabout in North Sydney LGA which utilise mountable designs in order to facilitate access by heavy vehicles in accordance with contemporary Australian Standards requirements. Table 7 below provides examples of other mountable roundabouts in North Sydney.

**Table 7. examples of mountable roundabouts in North Sydney LGA**

Location	Year of construction	Aerial image
Alexander Street Crows Nest	2010	 <p>Source: Nearmap</p>
Burlington Street, Crows Nest	Approx.2008	 <p>Source: Nearmap</p>

*Summary of Review Outcomes and Proposed Modifications*

Table 8 below provides a summary of the proposed actions detailed in the above.

**Table 8. Summary of Review Outcomes and Proposed Modifications**

Issue	Recommended Response	Timeframe
Appearance of roundabout	<ul style="list-style-type: none"> <li>Garden beds are currently being planted with plant species similar to those which existed in the roundabout.</li> </ul>	Commenced

<b>Issue</b>	<b>Recommended Response</b>	<b>Timeframe</b>
	<ul style="list-style-type: none"><li>• Inform Councillors of any additional community feedback received after the gardens have been established</li></ul>	
Pedestrian Crossing	<ul style="list-style-type: none"><li>• Raise pedestrian crossing.</li><li>• Install lighting upgrades.</li></ul>	Design 6-8 weeks  Subject to approval by the North Sydney Traffic Committee
Geometry of roundabout centre	<ul style="list-style-type: none"><li>• Monitor use and community feedback for a period of six (6) months. Should an ongoing issue with manoeuvrability arise, design and seek approval from the North Sydney Traffic Committee for modifications to the internal roundabout circle.</li><li>• Investigate minor linemarking changes and report to the North Sydney Traffic Committee</li></ul>	Review period six (6) months