



BETTER TRANSPORT FUTURES
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Medowie Retirement Village The Bower Estate Boundary Road Medowie NSW

McCloy Medowie Pty Ltd

Traffic Impact Statement
August 2018



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1 Foreword

This report updates previous work for McCloy Development Management Pty Ltd by Better Transport Futures for the proposed Medowie Retirement Village as part of The Bower Estate Subdivision at Boundary Road Medowie NSW.

Specifically it addresses modifications to the subdivision that relocates the retirement village within the overall estate, with standard residential lots, to be replaced with 110 self-contained retirement dwellings. The overall lot yield for the Bower Estate has been revised to 405 lots. The modified development plans are included in **Appendix A**. It is noted also that Council and RMS have recently endorsed the rezoning application for the subject site, which increased the standard residential lot yield from 345 lots to 480.

Intersection threshold analysis has been previously conducted on the Medowie Road / Boundary Road intersection, up to a level of 600 lots. This analysis showed that the Level of Service (LoS) predicted for the intersection would remain at LoS 'A' even at this higher lot yield. This is the highest service level of intersection performance under the Austroads Guidelines.

Traffic surveys have been updated in December 2017 and the intersection threshold analysis repeated using this more recent base traffic flow data.

2 Introduction

Better Transport Futures was commissioned by McCloy Medowie Pty Ltd in 2015 to prepare a Traffic Impact Statement for the proposed residential development of Lots 93-96 Boundary Rd Medowie NSW.

This latest report updates our previous work for the subject site, which is on land that is part of the Port Stephens LEP 2013 and draft DCP 2013. The updated assessment covers overall development of around 405 standard residential lots, as well as the Medowie Retirement Village with 110 retirement dwellings relocated toward the western boundary of the site. The proposed subdivision layout including the retirement village is included as **Appendix A** to this report. This report updates the previously recorded impacts using new traffic flow data and the new development proposal.

Construction of the subdivision is well advanced, including completion of the upgraded intersection of Boundary Road with Medowie Road.

The overall project is seen as providing a positive contribution to the ongoing redevelopment of the Medowie village as part of the Hunter Region.

This updated report presents the findings of our traffic impact assessment of the transport issues associated with the retirement village proposal and has been prepared to document the latest modifications to the development for the consideration of Port Stephens Council.

It is structured as follows:

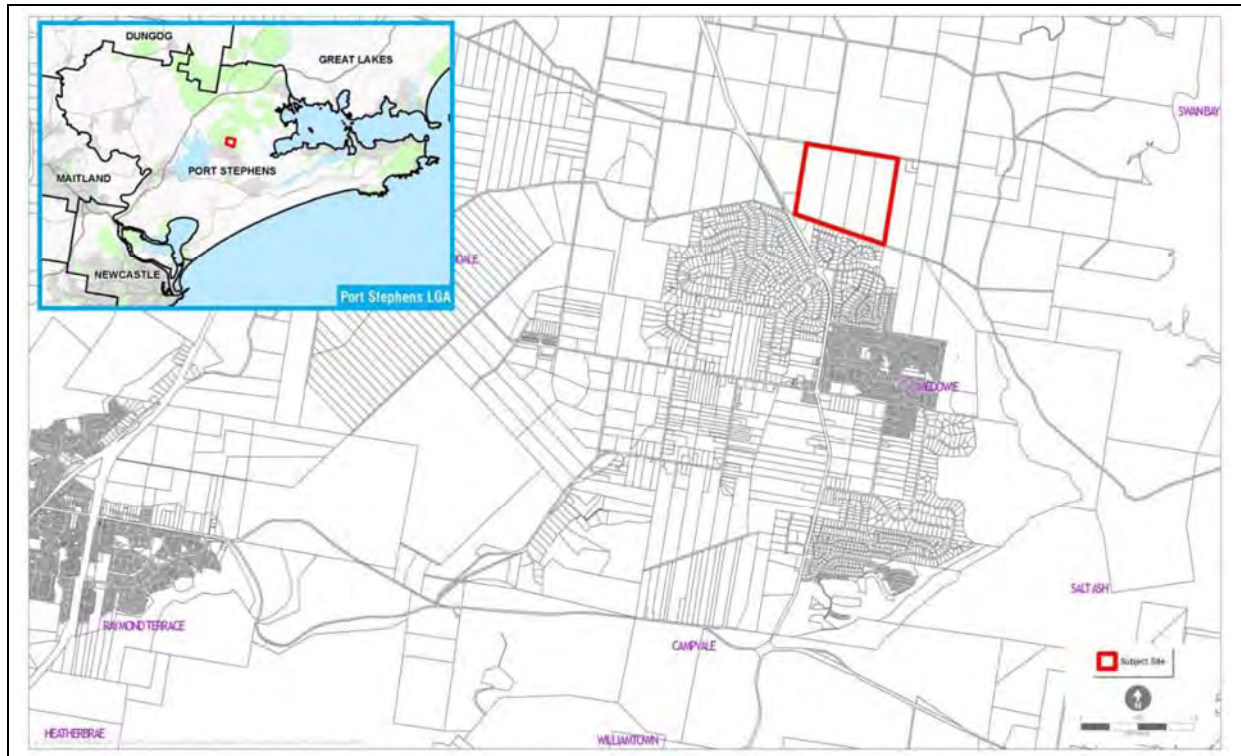
- **Chapter 2** outlines the existing situation in the vicinity of the subject site, including discussions on any other planned growth known within the vicinity and any known road network improvements.
- **Chapter 3** describes the access and traffic requirements of the proposal, its internal movement characteristics
- **Chapter 4** summarises the findings of this impact assessment
- **Chapter 5** provides an overall summary and conclusion to the assessment.

3 Existing Situation

3.1 Site Location

The site is located on a parcel of land east of Medowie Road and to the north of the existing Medowie township. It is located on the northern fringe of the town of Medowie and covers an area in the order of 127 hectares. The area of subdivision is around 50 hectares of the site. The site has road frontage along Boundary Road, James Road and Western Road. The land surrounding the site is generally rural in character with existing residential development to the south. Land to the east is part of Medowie State Forest and will not be developed.

The locality is illustrated in Figure 3-1 below.



Source: Port Stephens DCP 2013 Figure 1 North Medowie Residential Area (NMRA)

Figure 3-1 Site Location

Medowie Town Centre is located some 2.5 to 3 kms to the south of the site. As a local town centre it is experiencing some growth, in line with the continued development of the town of Medowie. The township has a range of local facilities including a number of schools.

The Medowie Strategy was adopted by Council in March 2009. It seeks to guide development, consolidate the facilities in Medowie and increase the resident population, whilst other initiatives seek to improve employment opportunities in the broader area. The subject land is an approved part of the Medowie Strategy. The site is referred to as the North Medowie Residential Area (NMRA) in Council's Port Stephens DCP 2013.

3.2 Local Road System

3.2.1 Existing Road Hierarchy

Medowie Road connects with the Pacific Highway to the north of the subject site. The Pacific Highway is a State Road (H10) and provides the main north-south route along the eastern coast of Australia north of Newcastle. As such it is an important road link that carries a significant volume of traffic. It is the main arterial route through the area with Roads and Maritime Services (RMS) as the consent authority for this road.

Port Stephens Council completed the Medowie Traffic and Transport Study in 2012. (URaP -TTW 2012) The study designated Medowie Road as a sub-arterial road in the areas hierarchy. It is a regional main road and a designation as either sub arterial or trunk collector road is appropriate for its functional role for the area. Port Stephens Council is the road authority for all roads in the area with the exception of the Pacific Highway.

Boundary Road is a local road serving a small number of existing homes and also provides access to the State Forest areas to the east of the subject site.

3.3 Road Network Characteristics

Pacific Highway

Pacific Highway (H10) in the vicinity of Medowie provides a dual carriageway configuration to rural highway standard. It has a posted speed limit of 100 km/h on this stretch north of Raymond Terrace, to take account of the series of at grade intersections with the local road system on this stretch of highway. Further north past the Buckets Way intersection the speed limit increases to 110 km/h, where the access controls and road environment provide a consistently higher standard. The Pacific Highway is part of the national highway system and carries a high proportion of interstate traffic between Sydney and Brisbane.

The Pacific Highway is the main north-south road along the coast of northern NSW. RMS is progressively extending the dual carriageways northwards as part of the Pacific Highway program being funded by the State and Federal Governments. Most recently the bypass of Bulahdelah was completed in 2014.

The Pacific Highway forms a higher speed link into Newcastle from areas to the north of Medowie which limits the popularity of Medowie Road as a through road. The intersection of the Pacific Highway with Medowie Road is a seagull island layout with full turning lanes.

Medowie Road

Medowie Road (Road No 518) is a regional main road through the town of Medowie. It provides the most northerly connection from the Pacific Highway through Medowie to Richardson Road and Nelson Bay Road, connecting to the Port Stephens Peninsula. It is also the most direct route from the north to Williamstown and the Newcastle Airport.

Medowie Road is a two lane two way road in the vicinity of the subject site. It has two traffic lanes marked as 3.5 metres wide but has an overall seal width of 9metres. It has a further 1m of unsealed shoulder on each side of the road. Outside of the urban areas it has a posted speed limit of 80 km/h, including presently past the intersection with Boundary Road. The first higher order control along the route is the intersection of Kirrang and Federation Drive with Medowie Road, which operates under roundabout control. All intersections to the north, including those of Boundary Road operate under priority control. Further to the south the intersection with Richardson Road operates under roundabout control along with that of Ferndale Road in the Medowie village centre. Medowie Road has no footways in the vicinity of the subject site. Further to the south and within the urban area closer to the Medowie town centre there are limited sections of existing footpaths and cycle paths.

Boundary Road intersects with Medowie Road as two offset T -intersections. The western section of the road is generally unformed, and while it provides some access to the rear of properties on local roads such as Fisher Road and Griffiths Avenue, this is not the primary access to these properties. This section of Medowie Road is not proposed to provide and additional access under the Medowie Strategy). Sight distances along Medowie Road in both directions from the Boundary Road intersection are very good.



Boundary Rd intersection

Photo 1 – Medowie Road view to the north, from south of the intersection with Boundary Rd



Photo 2 – Visibility from Boundary Road, southwards along Medowie Road (2017)

Historic traffic volume data collected from Council records shows that Medowie Road carries comparatively low traffic flows. Traffic data for Medowie Road sourced from 2015 Council reports:

North of Kirrang Drive	- 2495 vehicles per day two-way.
North of Ferodale Road	- 6489 vehicles per day two-way
South of Ferodale Road	- 9238 vehicles per day two-way.
North of Richardson Road	- 10373 vehicles per day two-way

These historic levels of traffic reflect the busier section of Medowie Road to the south of the subject site, where local traffic forms a large proportion of the vehicles using the road.

Figure 3-2 and 3-3 overleaf show the peak hour traffic flows recorded in February 2015 and December 2017 at the intersection of Medowie Road with Boundary Road. They show a combined north and south bound traffic volume of 240 vph in the morning peak, and just over 300 vehicles in the evening peak hour. This equates to approximately 2500 to 3000 vehicles per day based on a typical daily to peak flow factor of 10%. Boundary Road traffic flows are minimal, with traffic generated by the limited number of residences

located to the east along Medowie Road. The small amount of local traffic is supplemented by longer distance traffic using Medowie Road for access to regional facilities and destinations such as Williamstown and Newcastle Airport, and the Port Stephens peninsula. This includes sand/gravel extraction trucks which were observed using Medowie Road.



Photo 3 - view of Boundary Rd intersection east of Medowie Rd (2017).

Both the 2015 and 2017 peak traffic flows at Boundary road are included here for comparison purposes. While there are variations in individual movements, these are quite minor, and it needs to be emphasised these are well within the normal range of fluctuations that can occur at any intersection on the road network

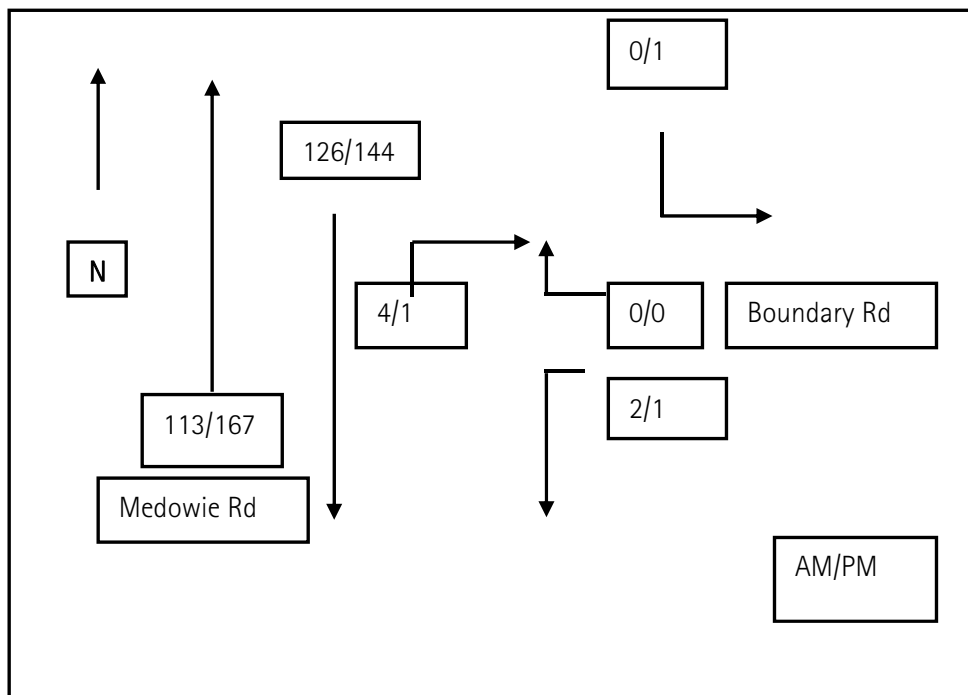


Figure 3-2 Existing Peak Hour Traffic Flows, BTF- February 2015

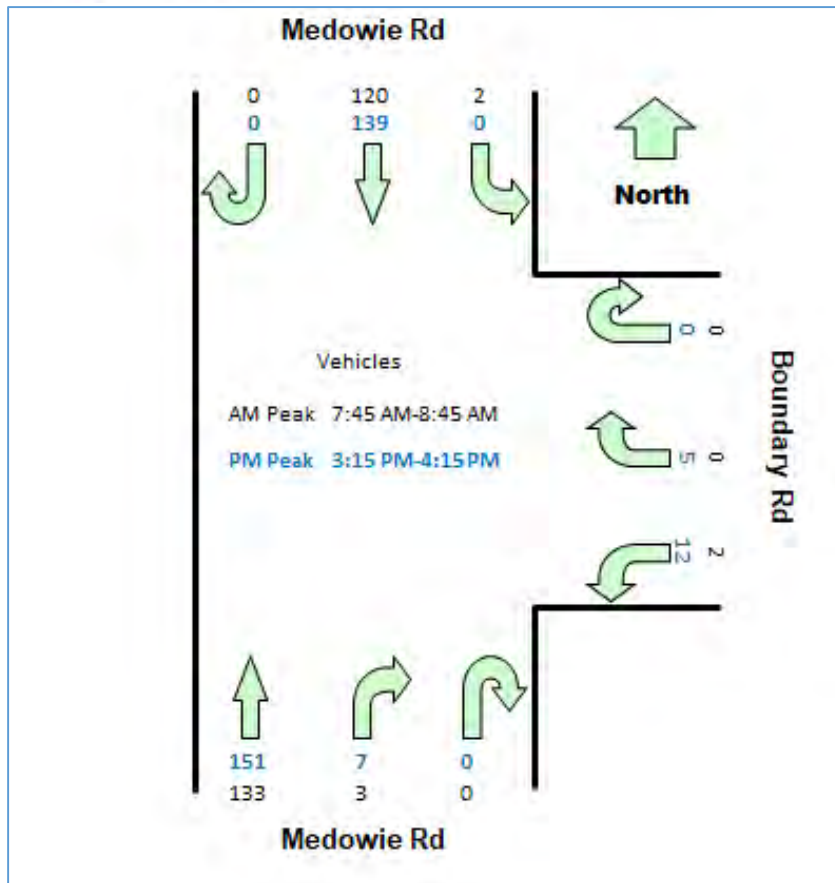


Figure 3-3 Peak Hour Traffic Flows, BTF- December 2017

Boundary Road

Boundary Road east of Medowie Road has been completely re-constructed as part of the Bower Estate as shown in Phot 3 above. The two sections of Boundary Road, east and west of Medowie Road have been staggered to eliminate a four way cross roads intersection. The two intersections are approximately 40m apart and operate as two separate T intersections.

James Road

James Road is an unsealed road approximately 4.5m wide located along the north side of the site to be rezoned. It services a small number of properties and forest areas. As no access is proposed from this road traffic surveys were not undertaken.

Western Road

Now constructed to the subdivision road standards of Council, Western Road is part of the Bower Estate local road network, and replaces the former unsealed crown road used previously for forest access.

3.4 Existing Pedestrian, Cyclist and Public Transport Facilities

There are no existing pedestrian or cyclist facilities in the Boundary Road area. None of the residential roads to the south or west of Boundary Road have any footpaths provided. The nearest footpath is located at the intersection with Federation Drive, about 700m to the south of Boundary Road.

Public transport services in the Medowie area are provided through Comfort Delgro Cabcharge (CDC) operating as Hunter Valley Buses. Bus Route 136 links Medowie from Raymond Terrace to Stockton via Fern Bay and the Newcastle Airport whilst Route 137 connects to Raymond Terrace and Lemon Tree Passage. In this area Route 136 uses Federation Drive, and Medowie Road south of Federation Drive. This service is located over 500m walk from the proposed rezoned land along Medowie Road.

The location of these existing services in relation to the subject site is shown in **Appendix B**

In addition to the local route services, five school buses service the area providing a connection to local schools and schools in Raymond Terrace.

3.5 Development Planning

3.5.1 Other Developments

The subject site is the only approved development in the Boundary Road area included in Council's Port Stephens LEP 2013, and draft DCP 2013. There are a number of in-fill developments proposed as part of the Strategy in the vicinity of the town centre, however, these are unlikely to impact on traffic characteristics in the vicinity of Boundary Road.

3.5.2 Traffic and Transport Planning Considerations

Council considered the provision of traffic and transport facilities in the area as part of its development of the Medowie Planning Strategy which was adopted by Council in 2016.

The following features of the development contributions plan are relevant to the subject site on Boundary Road and have been considered as part of the traffic impact assessment of the subject site. Location details along with these descriptions are also included in **Appendix C**.

Table 1 – S94 Works directly related to Boundary Road development

Project	Location	Description	Comment
1	Medowie Road	Road network - North of Boundary Road – Gateway treatment at entrance to Medowie and change in speed zone from 100 km/h to 80 km/h	As a gateway treatment. This benefits the whole Medowie area from a road safety and environment perspective.
2	Various roads	On-road routes within rural residential area - Implement 50km/h area speed zoning, share the road signs supplemented with pavement markings (50 numerals & bicycle logos) at regular intervals throughout area	Applies across all rural roads and benefits the wider Medowie area
3	Medowie Road	Road network - Between Boundary Road and Kirrang Drive – Horizontal displacement mid-block treatment	As a LATM treatment on Medowie Road as main northern access, this benefits the whole Medowie area
4	Medowie Road	Pedestrian and cycle way - Boundary Road to Kirrang Drive - Off-road shared path on west side to future residential area. Investigate possible alternate route – Boundary road to Federation Drive via Settlers Close/Overland Avenue/Explorers Close.	Recommend consideration of the URaP alternate route been investigated? It could significantly reduce this cost.
5	Medowie Road	Pedestrian and cycle way - Federation Close to Kindiebark Drive - off-road shared path on east side	Not directly related to Boundary Road
22	Medowie Road	Pedestrian and cycle way - At Kirrang Drive/Federation Drive - Upgrade pedestrian refuge island to current standards	This benefits a wider area in Medowie than just Boundary Road precinct.

Source: Extract from Port Stephens Council Medowie Section 94 Plan Summary Sheet released for public exhibition, March 2015

The proposed introduction of a gateway treatment, with reduction in speed limit from 100 kph to 80 kph is considered appropriate to reinforce the changing road environment as vehicles enter the Medowie urban area. Similarly the implementation of 50kph local speed limits with share the road signs and logos is considered a worthwhile safety initiative in low volume applications such as for the subject site.

The consideration of pedestrian and cyclist facilities is discussed in Section 3.5 of this report.

4 Proposed Development

4.1 The Proposal

Medowie is recognised in the Lower Hunter Regional Strategy as one of seven major Greenfield release areas. The Medowie Strategy, adopted by Port Stephens Council sets the framework for integrated and sustainable growth and development of large parts of the central and southern sections of Medowie.

The revised subdivision layout plan for the subject site is included as **Appendix A**. The total site area is approximately 127 hectares of which the proposed subdivision comprises about 50 hectares.

The last rezoning assessment of the development proposal assumed up to 480 residential lots being developed on the subject site. This included a mix of lot sizes ranging from 500m² to 4,000m². No other land uses such as retail, recreational or commercial facilities are proposed as part of the plan.

The current proposal seeks to develop up to 405 residential lots plus a retirement village of up to 110 dwellings on the subject land. The retirement village will incorporate community facilities as well as an area for storage of caravans and bots separate to each seniors dwelling.

The site is well located approximately 2.5km north of the existing Medowie centre with direct access from Medowie Road, via Boundary Road.

4.2 Staging

The subject site is likely to be developed in stages. The road network would be upgraded in stages to match staged access needs, with Boundary Road sealed in the first stages.

4.3 Development Traffic

4.3.1 Trip Generation

Trip generation has been assessed using the rates available from the standard Guidelines for Traffic Generating Developments (RTA 2002). These guidelines indicate a range of traffic generation rates depending on the type of land use activities.

McCloy Medowie Pty Ltd are now considering a lot yield for the subject site of up to 405 residential lots plus the retirement village of 110 dwellings. This change in dwelling mix for the site reflects current demand for seniors living and results in a total yield of around 515 dwellings.

In the past traffic assessment applied the pre 2013 standard residential dwelling generation rates of 9 daily vehicle trips with 0.85 trips per dwelling per peak hour have been adopted. In the process of reviewing the lot yield to accommodate the rezoning proposal for up to 480 standard residential lots, BTF considered the most recent residential traffic generation rates published by RMS in August 2013, which show a reduction in generation when compared to older trip rates.

The residential trip rates for low density residential dwellings in regional areas have been revised to 7.4 trips per day, and 0.78 trips in the evening peak hour. (0.71 trips in the morning peak hour.) Retirement village trip rates are noted as 2.1 trip per day and 0.4 trips in peak hour.

Along with these variations in trip rates, the standard RMS practice of applying a background growth factor to traffic volumes has been applied to the through flows, north and south along Medowie Road.

Based on the current dwelling yield of 515 lots (including the retirement village component) this equates to traffic generation from the revised proposal of 3228 vehicles per day, 332 vph (AM) and 360 vph (PM). By comparison, the 2015 assessment allowed for 3330 vehicles per day, and peak factor of 320 (AM) to 350 (PM) vph. The difference in peak flows generated is only 10 to 12 vph.

4.3.2 Traffic Distribution and Assignment

It is still considered that traffic to and from the subject site will be heavily biased to the south, either contained within Medowie or travelling on to locations such as Raymond Terrace or Newcastle. For the purposes of this assessment, the following trip distribution has been assumed:

- South via Medowie Road – 90%
- North via Medowie Road – 10%

This directional split could vary, dependent upon new development in the area (Karuah for example) over the timeframe of the regional strategy (up to 25 years).

For the purpose of this assessment the following assumptions have been made in relation to trip distribution and assignment:

Peak Directional Split:

- 80% out AM, 20% in AM
- 80% in PM, 20% out PM

Peak Assignment

- 10 % N (Karuah and beyond)
- 90% S (Medowie and beyond)

4.3.3 Future Development Traffic Flows

The future possible total development flows based on this distribution are presented in **Figure 4-1** below:

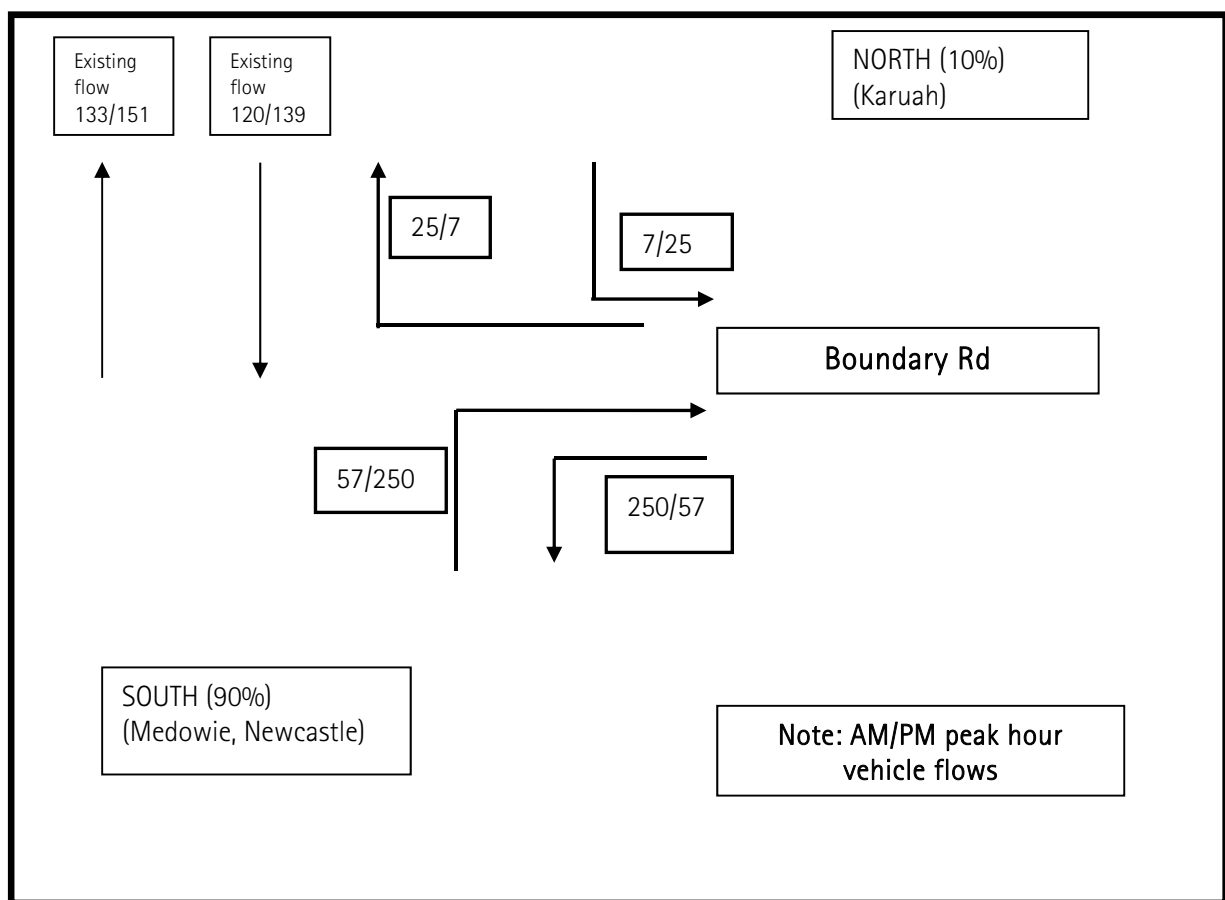


Figure 4-1 Potential Future Flows. Medowie Rd/Boundary Rd

It needs to be noted that the order of magnitude of change in the observed 2017 flows from those recorded in 2015 is negligible in terms of overall movement patterns. And it follows that overall intersection performance will remain ostensibly the same.

4.4 Proposed Site Road Layout and Intersection Concepts

4.4.1 Proposed Site Road Layout

The modified subdivision layout plan allowing for the proposed retirement village (See **Figure 4-2** over) still provides for four (4) connections to Boundary Road in addition those to the west for the traditional residential subdivision component of the subject site. Road widths have been discussed and agreed previously with Council and are understood to meet Council's requirements.

The revised development plan still focuses on the one key route in and out of the site, being Boundary Road which still performs the function of a collector street/road for the subdivision. All other roads being local streets.

The intersection of Boundary Road with Medowie Road has been designed and constructed in accordance with Council and RMS road design guidelines. The combination of Basic Left Turn (BAL) and Channelised Right (CHR) turn treatments are as recommended and agreed with Council.



Figure 4-2 Revised Retirement Village Proposal by McCloy Medowie Pty Ltd

The internal road layout and alignment has been developed to provide an environment that encourages low speed vehicle movement, improving overall safety and enhancing the environmental amenity for the residents. It recognises the need for provision for a bus route through the main site, and provides for roundabout control at some intersections within the site.

The proposed retirement village layout replaces standard residential allotments toward the western end of the subject site. All traffic would still use the intersection with Medowie Road.

4.4.2 Intersection Concepts

Traffic volumes within the subdivision still make use of multiple access routes to Boundary Road and will have traffic volumes substantially below the threshold flows tested for the Medowie Road / Boundary Road intersection. As such they will all operate well below the intersection volume thresholds for free flow conditions (refer to Section 4.2 for further explanation of these thresholds.)

With such low traffic volumes and a proposed local 50 kph speed limit the operation of the internal local road network will perform essentially at free flow conditions throughout the subject site.

Road access to retirement village access is proposed from Boundary Road at the eastern end of the subject site.

Even if it is assumed that traffic were to be generated at the conservatively higher standard residential trip generation rates, the intersections serving the retirement village component of the subject site will still operate at levels where capacity analysis is unnecessary. (Austroads (2009)

4.5 Pedestrian and Cyclist Access

4.5.1 Off-site Connections

Current pedestrian and cyclist facilities in the vicinity of the site are very limited, due to the limited amount of development within the surrounding area. There are currently no footpaths on the surrounding roads and specifically no footpaths on Medowie Road in this area. The nearest pedestrian facility is provided at Federation Drive, around 700 metres away.

Council has considered the provision of pedestrian and cyclist facilities as part of its recent development of the Medowie Local Area Contributions Plan – Traffic and Transport. This plan is based on the Medowie Traffic and Transport Study (URaP –TTW 2012).

The plan includes pedestrian and cycling features that are relevant to the subject site on Boundary Road. The Medowie Traffic and Transport Study quotes the Austroads and RTA Bicycle guides as the basis for justifying the extent of pedestrian and cycling infrastructure proposed for the Medowie area.

The contribution plan as it relates to pedestrian and cycling facilities in the vicinity of Boundary Road is justified in part on the basis of:

"Provision of off-road shared paths within footways along major routes leading to the town centre and joining with major attractors such as schools."

This directly affects the Boundary Road development, in that it proposes an off road pedestrian / cycle path from Boundary Road to Kirrang Drive, at a considerable estimated cost of \$460,000

Of note is the studies recommendation included in the plan summary to:

"Investigate possible alternate route – Boundary road to Federation Drive via Settlers Close/Overland Avenue/Explorers Close."

The alternate pedestrian and cycling route option nominated in the Medowie Traffic and Transport Study would look to utilise the corridor created by the existing high voltage power lines connecting the site with the residential development to the south. This would provide connectivity for pedestrian and cyclists to the adjoining housing area via Squire Close and County Close and would provide a more direct pedestrian access to the existing bus route run along Federation Drive.

This route is considered a sensible alternative. It uses quiet residential streets, keeping cyclists and pedestrian's away from exposure to higher passing traffic and connects with the existing local bus route. By utilising existing residential streets, the implementation costs are likely to be substantially less than the Medowie Road alternative.

It is therefore recommended that the Medowie Traffic and Transport Study recommendation to *"Investigate possible alternate route – Boundary road to Federation Drive via Settlers Close/Overland Avenue/Explorers Close"* be actioned prior to finalising any pedestrian and cycling facilities on Medowie Road.

4.5.2 On-Site Facilities

The proposal seeks to develop up to 405 residential lots plus a retirement village of up to 110 dwellings on the subject land. The retirement village component will incorporate community facilities as well as an area for storage of caravans and boats separate to each seniors dwelling. These are intended for residents of the retirement village and as such are not considered to be additional traffic generators for the purposes of this assessment.

As part of the development of the site, pedestrian and cyclist links will be developed in line with Council's guidelines for new subdivisions. As the site is essentially a green site, the provision of pedestrian and cycle routes from the beginning of the development is highly desirable, so as to act as a positive encouragement to the use of these facilities as well as ease of construction.

The development plan proposed outlines proposed road widths. Footpaths and dedicated cycling facilities are not generally required in rural residential developments due to the low traffic flows. Traffic volumes in these developments are generally low enough for pedestrians and cyclists to use the road network. This is acknowledged in the Medowie Traffic and Transport Study with the recommendation that *"on-road routes within*

rural residential area be established through the implementation of a 50km/h area speed zoning with share the road signs supplemented with pavement markings and signs at regular intervals throughout the area". The subject site is considered a suitable area for this treatment of cycling movements.

Based on the assumption the proposed road layout will be a very permeable road network with no cul-de-sacs, the traffic can be expected to be evenly distributed with only Boundary Road carrying more than 1000vpd. Consequently, all roads will be suitable for pedestrian and cyclist use.

Allowance will be made for a footpath on Boundary Road to link into any future footpaths on Medowie Road should they be constructed.

Similarly Boundary Road will be designed to allow cyclist access to Medowie Road. This area of Medowie is largely level terrain making cycling attractive with many local destinations being within a short distance of the site.

4.6 Public Transport

Public transport services are limited to the existing urban area to the south, with the closest service running along Federation Drive (**See Appendix B**). There is an opportunity for longer term improvements to the public transport in this area, and preliminary discussions indicate that provision of a bus route through the subject site is warranted. The proposed road layout allows for a bus route to give good coverage of the site and two alternate routes have been considered as illustrated in **Figure 4.3** below. It is recommended that the optional route as shown be adopted because of the better coverage it provides within the 400 metre planning threshold for access to a bus stop.

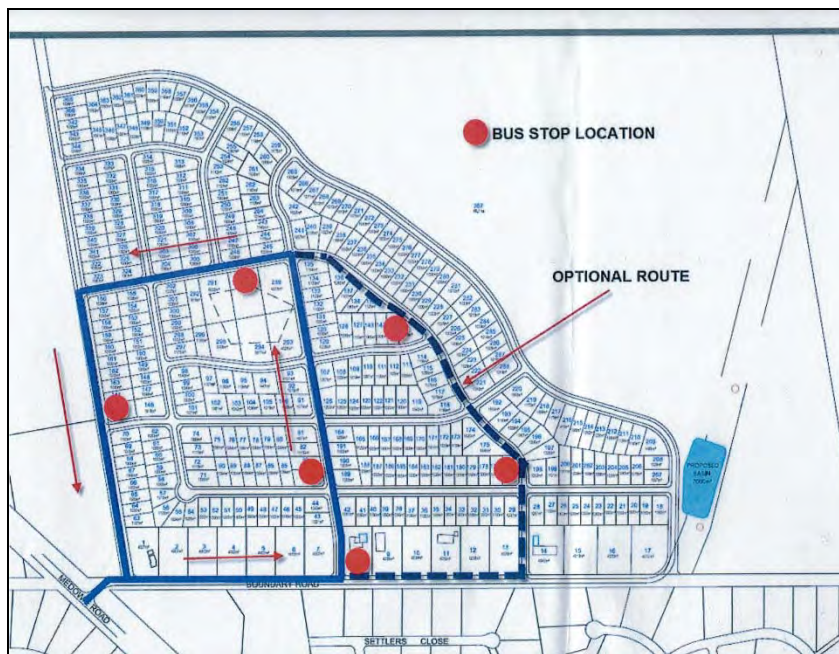


Figure 4-3 Possible Bus Routes

(As supplied by McCloy Medowie Pty Ltd 2017, Note: applies an earlier subdivision layout to that currently proposed)

Transport for New South Wales has previously advised that they are endeavouring to enable more responsive arrangements for all of their bus services, providing greater flexibility to emerging demands where the customer is at the centre of the transport experience. It is noted that the existing contract structure does provide incentives for operators to provide services which support student patronage. This may enable the provision of some bus services to the subject site however this will be dependent upon the demographics of the end purchasers of the site residences. School bus routes currently run through the housing area west of Medowie Road as well as along Federation Drive south of the site.

The alternate pedestrian and cycling route option nominated in the Medowie Traffic and Transport Study and recommended here for further investigation (in line with that study's recommendation) would provide more direct pedestrian access to the existing bus route run along Federation Drive. This could provide early access to public transport as the staged development of the subdivision proceeds.

5 Traffic Impact Assessment

5.1 Road Network Requirements

A key factor in the planning of any new development is access and the capacity of the surrounding road system. The forecast flows along Medowie Road as predicted in the Medowie Traffic and Transport Study indicate the road in the vicinity of Boundary Road will continue to operate at good levels of service, as a two lane two way road. This will also apply even allowing for growth in the background traffic levels of traffic of 3% per annum for 10 years on Medowie Road.

It is noted here that a 3% per annum growth rate is actually conservatively high when compared to the normally recommended 2% per annum for 10 years recommended by the NSW Roads and Maritime Services.

The predicted traffic flow of about 3228 vehicle trips per day from the development is able to be catered for within the existing road network, even allowing for this growth in the background traffic levels of 3% per annum for 10 years on Medowie Road. The base traffic load of around 300 vehicles per hour (PM two-way) would only grow to around 400 vehicles per hour (two way), and with the forecast total PM peak traffic flow in the order of 360 vph (two way) the total traffic volume is well within the technical capacity of two lanes at 900 vehicles per hour per lane (as adopted by Austroads for capacity analysis). Allowing for peak one way flow factors the forecast peak one directional flow, allowing for 10 year growth at around 480 vph in the PM peak northbound, is still well within the technical capacity of 900 vehicles per hour per lane.

As far as the local road system is concerned, Boundary Road will perform as a collector street / road and is still proposed to be upgraded in line with Council's guidelines for road design. The subdivision layout will also adopt local street standards consistent with Council's road design guidelines.

No considerations have been made about road upgrading other than the operations of the Medowie Road / Boundary Road intersection as outlined below.

5.2 Intersection Operations

A key factor in the planning of any new development is access and the capacity of the surrounding road system. The proposed development provides for one key access to the external road system at the existing intersection of Boundary Road with Medowie Road. It is recognised as part of the development that the intersection with Medowie Road will need to be designed to cater for this level of movement to ensure access and egress to the site is satisfactory as well as road conditions for existing road users' remains satisfactory.

Observations on site show that there are essentially no delays for through traffic movements along Medowie Road at its intersection with Boundary Road. Vehicles entering or exiting the side roads also experience minimal delay, essentially only geometric delay caused by drivers having to slow down and negotiate the intersection.

Figure 5-1 drawn from Austroads Guide to Traffic Management Part 3 Traffic Studies and Analysis (Austroads 2009) provides advice on intersection operation where traffic flows are relatively low. Where these limits are not met, traffic effectively operates under free flow conditions.

Type of road	Light cross and turning volumes maximum design hour volumes vehicles per hour (two way)		
Two-lane major road	400	500	650
Cross road	250	200	100
Four-lane major road	1000	1500	2000
Cross road	100	50	25

Figure 5-1 Intersection volumes below which capacity analysis is unnecessary

Source: Austroads Guide to Traffic Management Part 3 Traffic Studies and Analysis

It can be seen that for the revised traffic flows to consider this current proposal for a mix of standard residential and retirement village development, these limits are not met and therefore capacity modelling is not required at the intersections of Medowie Road and Boundary Road for the existing situation. Based on **Figure 5-1** above the traffic volumes on Medowie Road could more than double before there is a need to undertake capacity modelling.

By applying the above and assessing intersection capacity based on approach lane capacity the existing number of approach lanes (one in each direction) is considered satisfactory. In fact the future traffic flows applying the latest 2017 traffic survey date still suggest a near even split of movements with Boundary Road south (283 vph) and Medowie Road (240 vph) the less dominant flow.

5.3 Medowie Rd / Boundary Rd SIDRA Analysis

Previous capacity analysis performed using the SIDRA traffic modelling software, indicated that as traffic volumes increase during the evening peak hour, there may be some minor delays to vehicles turning right into Boundary Road. Vehicles may have to wait momentarily in the centre of the road to turn.

In order to assess the impacts of a change in lot yield for the subject site, a series of sensitivity analyses were previously completed. These lot yield tests are still valid for this current development proposal which in fact is a reduction in overall traffic generation potential from the subject site.

The threshold tests included the following changes to past analysis to reflect the potential future traffic flow scenario under the altered development profile:

1. Junction control remains as a 3 way priority (Give Way) controlled intersection
2. PM Threshold analysis is to be applied for 450, 500 & even 600 lots. (Up from the previously assumed 370 lots). A yield of 600 lots has been assumed initially on the basis that if this level of development is technically able to be accommodated through the Boundary Road access, then it follows that the lesser yields of 450 to 500 lots will also perform well, and in fact better than the 600 lot threshold predictions. The results will be repeated for a lower yield should the 600 test indicate an unsatisfactory performance level.
3. RMS Updated Trip rates and + 10 year growth factor applied to traffic flows
4. Applying the 600 lot threshold, the resulting SIDRA analysis shows:
 - a. Intersection and individual movement Levels of Service are still at LoS 'A'
 - b. 95% back of queue levels are still very minor (~ 2 @ PM peak.)
5. No changes were made to the previously assumed configuration of the Medowie Road / Boundary Road intersection. That is, a Short Urban Channelised Right Turn (CHR(S)) treatment operating under priority control.

A summary of the future PM analysis is included as **Appendix D** to this report.

Delays at the intersection of Boundary Road with Medowie Road are still not a major issue. Delays were forecast in the modelling work to only around 6 seconds and a vehicle storage length of one vehicle being forecast by the traffic analysis.

It is noted that the overall road environment will also be improved with Council's proposed reduction of the posted speed limit from 100 kph to 80 kph at a point north of the Boundary Road intersection.

The Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (Austroads 2009) provides guidance on the warrants for various auxiliary lane treatments at intersections. **Figure 5-3** below illustrates the principles for a design speed of less than 100 kph. The posted speed limit on Medowie Road is proposed to be reduced from 100 kph to 70 kph at a new gateway treatment proposed by Council. This treatment and speed reduction is supported by the proposed development. The warrants relate turn treatments to a combination of major road traffic volume and turning volumes.

For the forecast traffic flows at the Boundary Road intersection a **BA**sic **L**eft turn treatment (BAL) and a **CH**annelised **R**ight Turn Treatment (CHR) are the appropriate turn treatments for this junction.

The intersection analysis performed indicates that queues for vehicles waiting to turn right from Medowie Road into Boundary Road will be minimal (one vehicle in the evening peak) and so a short urban Channelised Right turn treatment (CHR (S) is considered adequate for this intersection.

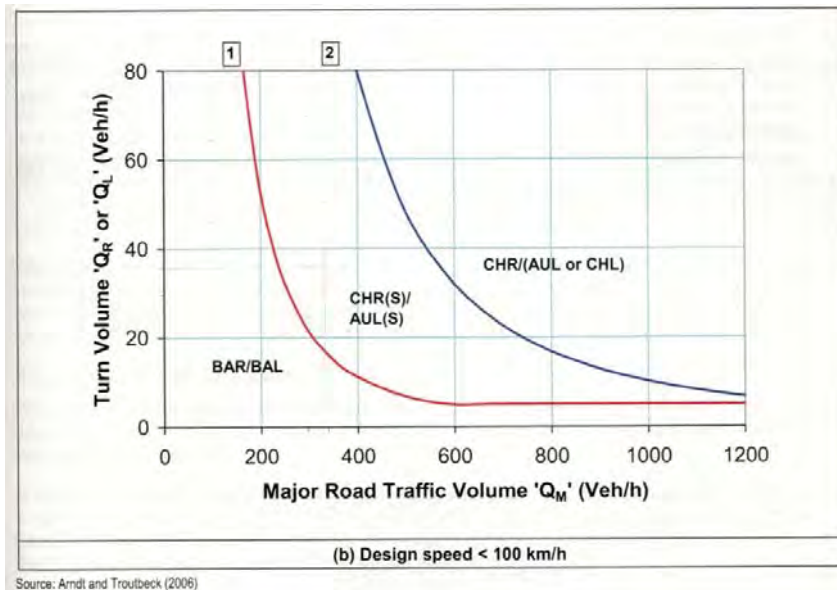


Figure 5-3 Warrants for turn treatments on major roads at Unsignalised intersections

Source: Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (Austroads 2009)

Given the nominated sub-arterial function of Medowie Road and with a proportion of the traffic flow being heavy trucks Boundary road was previously recommended (and approved by Council) for upgrading to provide a northbound right turn lane into Boundary Road east. **Figure 5-4** illustrates the concepts for the junction proposed.

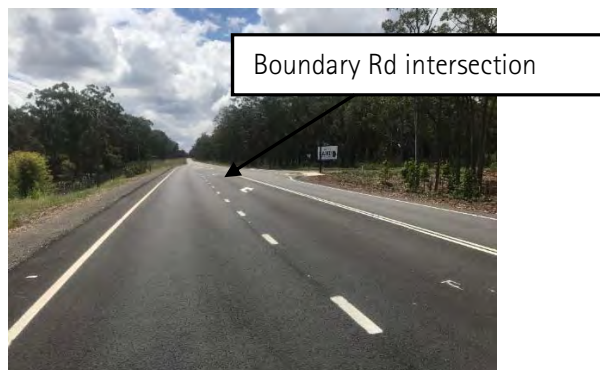
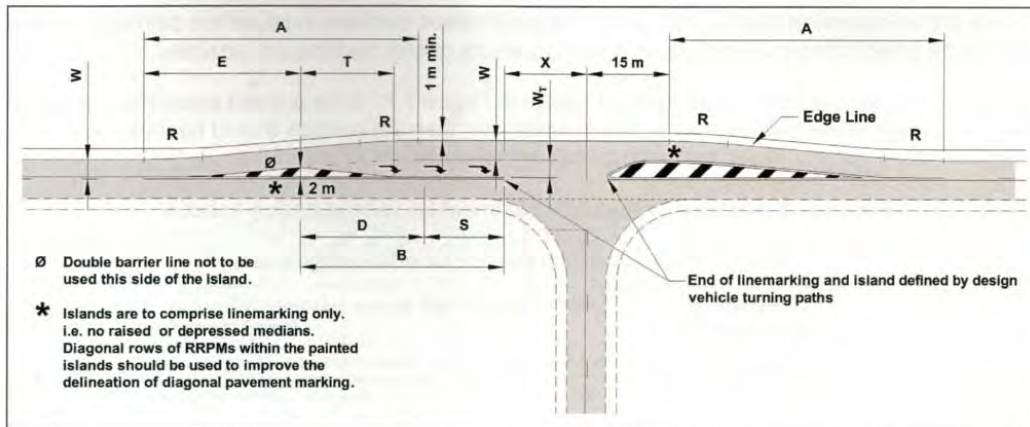


Photo 4 – Medowie Road view to the north, from south of the intersection with Boundary Rd



Photo 5 – Visibility from Boundary Road, southwards along Medowie Road (2017)



Note: The dimensions of the treatment are defined below and values of A, D, R and T are shown in Table 7.1:

W = Nominal through lane width (m) (including widening for curves). For a new intersection on an existing road, the width is to be in accordance with the current link strategy.

W_T = Nominal width of turn lane (m), including widening for curves based on the design turning vehicle = 3.0 m minimum.

B = Total length of auxiliary lane including taper, diverge/deceleration and storage (m).

E = Distance from start of taper to 2.0 m width (m) and is given by:

$$E = 2 \left(\frac{A}{W_T} \right)$$

T = Taper length (m) and is given by:

$$T = \frac{0.33xVxW_T}{3.6}$$

S = Storage length to cater for one design turning vehicle (m).

V = Design speed of major road approach (km/h).

X = Distance based on design vehicle turning path, typically 10–15 m.

Source: QDMR (2006)

Figure 5-4 Recommended CHannelised Right (CHR) turn treatment for a short turn slot [CHR(S)]

Source: Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (Austroads 2009)

6 Summary and Recommendations

6.1 Summary

This report documents the traffic impacts arising from the change in development profile for the subject site, to locate up to 110 retirement village dwelling in lieu of standard residential dwellings toward the western end of the site. With an area of 127 ha, it is proposed to subdivide about 50 hectares into around 405 standard lots and a further 110 dwelling retirement village complex.

Access to the residential area will still be via a single access on Medowie Road at the location of the existing Boundary Road intersection. This intersection is now completed and open to traffic. Existing traffic flows along Medowie Road in the vicinity of the site are low (in the order of 2500vpd) and well within acceptable limits for a two lane two way road. Council's Medowie Traffic and Transport Study forecast future flows on Medowie Road in the vicinity of the subject site at a peak of around 600 vph two way (and this includes the subject site traffic flows). This is well within the capacity of the existing road.

Updated traffic flow data was collected at the Medowie Road / Boundary Road intersection in December 2017. This has confirmed that there is very little change in flows from that previously observed in 2015.

Whilst the additional traffic generated by the revised development will increase the daily traffic flows on Medowie Road the forecast level of traffic, even allowing for 10 year growth in background traffic levels, forecast flows are still well within the capacity of this road.

No capacity improvements are warranted for Medowie Road as a result of the subject development.

Updated (2017) assessment of the proposed single access to the site has highlighted that the intersection of Boundary Road and Medowie Road will continue to operate well under priority control. The forecast level of traffic movements is such that intersection operations are at or near to free flow conditions, with minimal delays predicted. This is so even under the threshold testing levels to an extreme of yield up to 600 lots.

The warrants for auxiliary lanes indicated that a northbound Channelised Right turn (CHR(S)) auxiliary lane, and a southbound Basic Left (BAL) auxiliary lane are appropriate for intersection control. These will enhance safety for the intersection under future flow conditions. The completed intersection now open to traffic.

Council has produced a Medowie Contributions Plan – Traffic and Transport. Features relevant to the subject site include:

- Proposed gateway treatment, with speed limit reduction from 100 kph to 80 kph. This is considered appropriate to reinforce the changing road environment as vehicles enter the Medowie urban area.
- Implementation of 50kph local speed limits with share the road signs and logos is considered a worthwhile safety initiative in low volume area such as the subject site.
- Investigation of the alternate pedestrian and cycling route option as nominated in the Medowie Traffic and Transport Study is recommended prior to confirming facilities for pedestrians and cyclists.

Features of the site's road network are planned to cater for bus movements, and pedestrian and cyclist movements in a low volume environment. Road design will conform to Council's road design guidelines.

Traffic calming is effectively provided through the layout of the subdivision roads and will apply also to the retirement village component of the subject site. Priority controls (Stop signs) are recommended for internal 4-way junctions. Higher order junction controls are not cost effective and are not warranted on capacity grounds. They also are not recommended on proposed bus routes, and will also impact on other heavy vehicle movements, and on adjacent property access.

6.2 Recommendations

Based on the traffic impact assessment conducted into the development of the subject site, including the latest proposal to convert a portion (30 lots) of the site to accommodate an up to 106 dwelling retirement village complex, and subject to the recommendations contained herein, it is concluded that the proposed development of Lots 93-96 Boundary Road, Medowie remains acceptable on traffic planning and engineering grounds. The proposed development will not have a major impact upon the local road network, and with the now completed upgrade to the Medowie Road / Boundary Road intersection will continue to offer good levels of service into the future.

It is recommended that the revised proposal for 405 standard residential dwellings and up to 110 retirement village dwellings toward the western end of the site, be approved on traffic and transport grounds.

Appendix A. Proposed Site Plans (November 2017)





Appendix B. CBC Medowie Bus Routes



Figure B -1 Existing Bus Routes (Effective September 2017)

Source: Adapted from <http://www.cdcbus.com.au/IgnitionSuite/uploads/docs/Maitland%20Et%20Raymond%20Terrace%20Region%20Map%20Effective%2027%20January%202015.pdf>

Appendix C. Proposed S94 Works directly related to NMRA

Table C -1 – S94 Works directly related to North Medowie Residential Area (NMRA) development

Project	Location	Description	Comment
1	Medowie Road	Road network – North of Boundary Road – Gateway treatment at entrance to Medowie and change in speed zone from 100 km/h to 80 km/h	As a gateway treatment. This benefits the whole Medowie area from a road safety and environment perspective.
2	Various roads	On-road routes within rural residential area – Implement 50km/h area speed zoning, share the road signs supplemented with pavement markings (50 numerals & bicycle logos) at regular intervals throughout area	Applies across all rural roads and benefits the wider Medowie area
3	Medowie Road	Road network – Between Boundary Road and Kirrang Drive – Horizontal displacement mid-block treatment	As a LATM treatment on Medowie Road as main northern access, this benefits the whole Medowie area
4	Medowie Road	Pedestrian and cycle way – Boundary Road to Kirrang Drive – Off-road shared path on west side to future residential area. Investigate possible alternate route – Boundary road to Federation Drive via Settlers Close/Overland Avenue/Explorers Close.	Recommend consideration of the URaP alternate route been investigated? It could significantly reduce this cost.
5	Medowie Road	Pedestrian and cycle way – Federation Close to Kindlebark Drive – off-road shared path on east side	Not directly related to Boundary Road
22	Medowie Road	Pedestrian and cycle way – At Kirrang Drive/Federation Drive – Upgrade pedestrian refuge island to current standards	This benefits a wider area in Medowie than just Boundary Road precinct.



Figure C –1 Project Locations

Source: Extracts from Port Stephens Council Medowie Section 94 Plan Summary Sheet released for public exhibition, March 2015

Appendix D. SIDRA Analysis – Future Conditions Summary

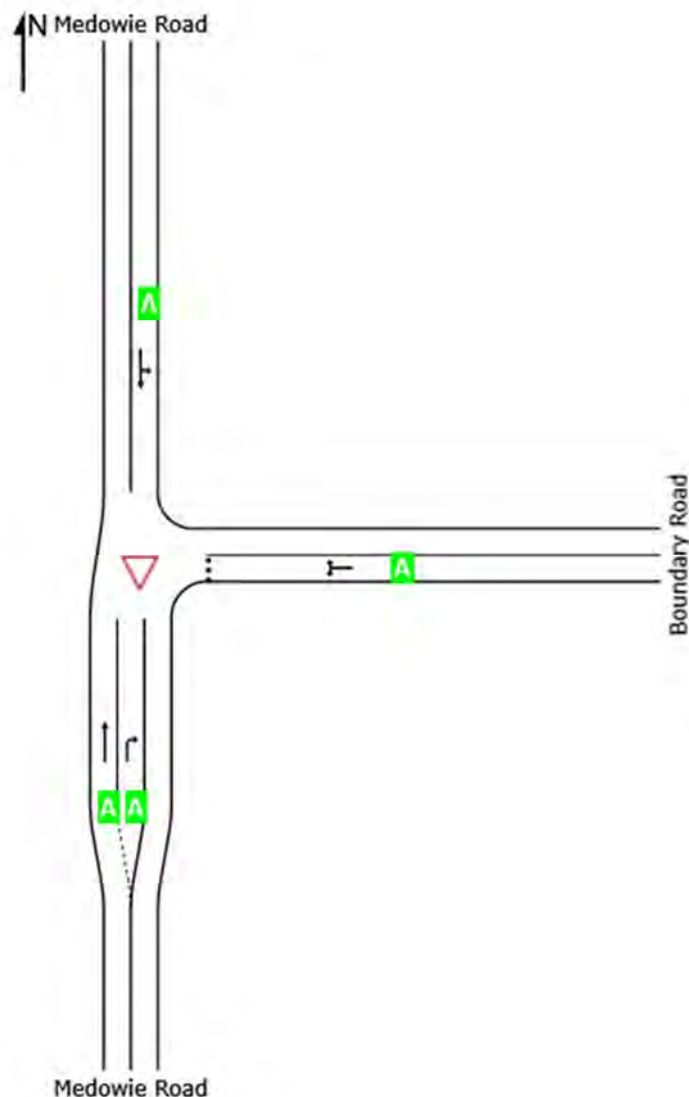
Lane Level of Service

▽ Site: Boundary Rd East - PM (600) Threshold Analysis

Medowie Road
Give way / Yield (Two-Way)

All Movement Classes

	South	East	North	Intersection
LOS	NA	A	NA	NA



Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Lane LOS values are based on average delay per lane.

Minor Road Approach LOS values are based on average delay for all lanes.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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Medowie\SIDRA\BTF20151 McCloy Boundary Rd.sip7

INTERSECTION SUMMARY

▽ Site: 1 [Boundary Rd East - PM Threshold Analysis]

Medowie Road
Give way / Yield (Two-Way)

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Travel Speed (Average)	55.6 km/h	55.6 km/h
Travel Distance (Total)	926.9 veh-km/h	1112.2 pers-km/h
Travel Time (Total)	16.7 veh-h/h	20.0 pers-h/h
Demand Flows (Total)	917 veh/h	1100 pers/h
Percent Heavy Vehicles (Demand)	0.0 %	
Degree of Saturation	0.244	
Practical Spare Capacity	301.2 %	
Effective Intersection Capacity	3753 veh/h	
Control Delay (Total)	0.87 veh-h/h	1.05 pers-h/h
Control Delay (Average)	3.4 sec	3.4 sec
Control Delay (Worst Lane)	6.8 sec	
Control Delay (Worst Movement)	12.6 sec	12.6 sec
Geometric Delay (Average)	2.9 sec	
Stop-Line Delay (Average)	0.5 sec	
Idling Time (Average)	0.0 sec	
Intersection Level of Service (LOS)	NA	
95% Back of Queue - Vehicles (Worst Lane)	1.3 veh	
95% Back of Queue - Distance (Worst Lane)	8.8 m	
Queue Storage Ratio (Worst Lane)	0.00	
Total Effective Stops	300 veh/h	360 pers/h
Effective Stop Rate	0.33 per veh	0.33 per pers
Proportion Queued	0.18	0.18
Performance Index	18.8	18.8
Cost (Total)	382.04 \$/h	382.04 \$/h
Fuel Consumption (Total)	64.9 L/h	
Carbon Dioxide (Total)	152.5 kg/h	
Hydrocarbons (Total)	0.012 kg/h	
Carbon Monoxide (Total)	0.189 kg/h	
NOx (Total)	0.041 kg/h	

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

NA: Intersection LOS for Vehicles is Not Applicable for two-way sign control since the average intersection delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	440,084 veh/y	528,101 pers/y
Delay	420 veh-h/y	504 pers-h/y
Effective Stops	143,837 veh/y	172,604 pers/y
Travel Distance	444,898 veh-km/y	533,878 pers-km/y
Travel Time	8,002 veh-h/y	9,602 pers-h/y
Cost	183,382 \$/y	183,382 \$/y
Fuel Consumption	31,139 L/y	
Carbon Dioxide	73,176 kg/y	
Hydrocarbons	6 kg/y	
Carbon Monoxide	91 kg/y	
NOx	20 kg/y	

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MOVEMENT SUMMARY

▽ Site: 1 [Boundary Rd East - PM Threshold Analysis]

Medowie Road
Give way / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Medowie Road											
2	T1	228	0.0	0.117	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
3	R2	355	0.0	0.244	6.4	LOS A	1.3	8.8	0.39	0.62	52.1
Approach		583	0.0	0.244	3.9	NA	1.3	8.8	0.23	0.38	54.9
East: Boundary Road											
4	L2	88	0.0	0.086	6.2	LOS A	0.3	2.4	0.31	0.59	52.7
6	R2	9	0.0	0.086	12.6	LOS A	0.3	2.4	0.31	0.59	52.1
Approach		98	0.0	0.086	6.8	LOS A	0.3	2.4	0.31	0.59	52.6
North: Medowie Road											
7	L2	39	0.0	0.122	5.6	LOS A	0.0	0.0	0.00	0.10	57.5
8	T1	197	0.0	0.122	0.0	LOS A	0.0	0.0	0.00	0.10	59.1
Approach		236	0.0	0.122	0.9	NA	0.0	0.0	0.00	0.10	58.8
All Vehicles		917	0.0	0.244	3.4	NA	1.3	8.8	0.18	0.33	55.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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