ACN: 164611652
Newcastle Ph: (02) 4032 7979
PO Box 570,
Toronto NSW 2283
admin@secasolution.com.au

21 May 2025

P1644 Ferodale Road Subdivision Rezoning Dec24

VC Management
C/- Interface Planning
Po Box 192
Terrigal NSW 2260

Attn: Chris Smith

Dear Chris,

Re: Traffic Impact Assessment for a rezoning to enable mixed use (E1 Local Centre) and residential development, Ferodale Road, Medowie, NSW

Further to our site work and a review of the provided documentation for the proposed rezoning of land to provide for a residential and commercial subdivision on Ferodale Road, Medowie we provide the following traffic impact assessment. This assessment has been prepared in accordance with the Austroads Guidelines and Section 2.3 of the Guide to Transport Impact Assessment (GtTIA), published by Transport for NSW, which provides the structure for the reporting of key issues to be addressed when determining the impacts of traffic associated with a development. This guide indicates that the use of this format and checklist ensures that the most significant matters are considered by the relevant road authority.

The report has also taken into consideration the planning requirements outlined in the Port Stephens Council Development Control Plan 2014. Reference has also been made to the Medowie Traffic and Transport Study (URaP 2017), as well as the Medowie Planning Strategy (2016). The location of the proposed development is shown in Figure 2 below.

Port Stephens Council is the road authority however given the size of the development, with more than 200 parking spaces anticipated as part of the commercial element, the project will trigger ISEPP Schedule 3 as a traffic generating development and so shall be subject to review or concurrence by Transport for NSW (TfNSW). The potential for an access onto Medowie Road would also trigger this given it is a classified regional road.

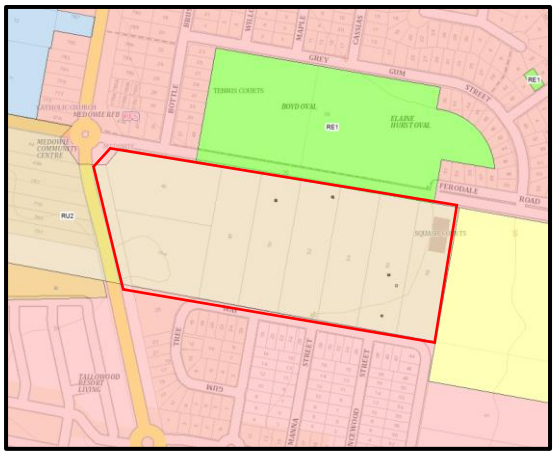


Figure 1 – Subject site proposed for rezoning

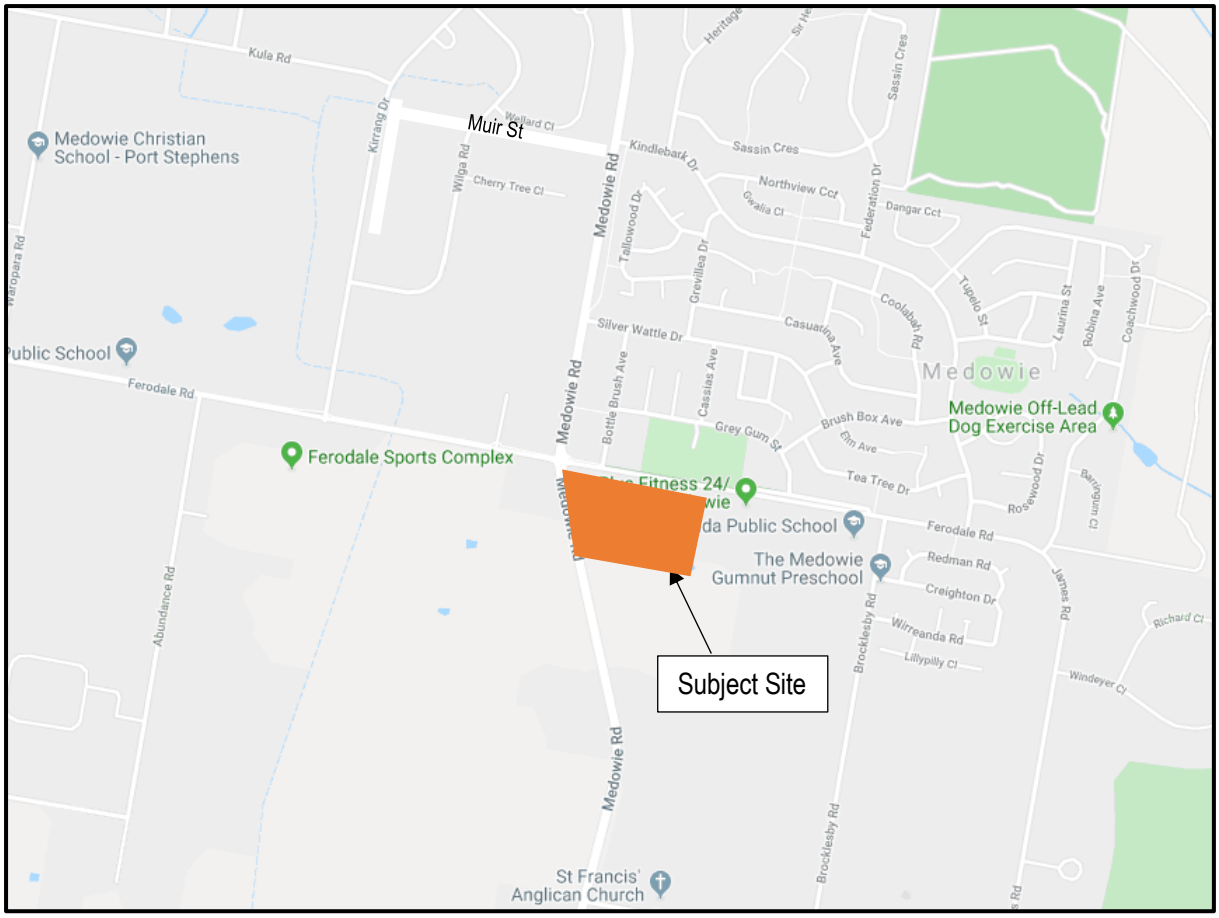


Figure 2 – Subject site in the context of the local road network

Response to Council Request for Further Information

Following their review of this assessment in early 2025, Port Stephens Council has requested the following be considered. Where applicable the report has been updated to reflect these items.

	Council RFI	Initial Response
a	The planning proposal shows a new 4-way intersection is being created. Council requires all 4-way intersections to be controlled with a roundabout or signalised intersection. Please provide amended plans to demonstrate a roundabout, compliant with Austroads requirements, can be achieved.	The intersection referred to, being the connection to the subdivision to the south of the site at Gum Tree Way has been modified to allow a traversable roundabout, to accommodate service and heavy vehicles in this location. This shall be developed as part of the detailed design stage following approval of the rezoning. **Refer Appendix A – Site Plan**
b	The planning proposal should consider how bus routes and associated bus stops can be incorporated to ensure each future	There are no bus routes currently provided within close proximity to the site ie Ferodale Road or along Medowie Road. A future bus service, if provided along Ferodale Road would be within 400m of the various lots within the site. Similarly, a proposed bus stop on Medowie Road (BS10 contributions plan) could be located to service both this site and the dwelling to the south.

	dwelling would be located within 400m walk of the bus stops.	**Refer Section 2.7.2 Bus Stops** Roads in the subdivision to the south of the site have a width of around 8 metres and so are unlikely to provide for a route to connect between the two sites through to Ferodale Road.
c	Consideration needs to be given to the upgrade of Ferodale and Medowie Road intersection to support the increasing population of Medowie and to provide safe pedestrian and cyclist connections to the existing town centre.	The SIDRA modelling undertaken for the project demonstrates that with the rezoning the roundabout intersection will continue to operate to its current standard with no change to the level of service (LoS) on any approach and minor increases in the average delays and queuing. Whilst the future design year, allowing for 20% background growth over 10 years, will continue to operate within its capacity providing an overall level of service A, background growth will see some approaches experience increases in the average delays and additional queuing however these remain within acceptable limits, with the Ferodale Road (Eastbound) approach seeing operation at LoS B. The current layout shall start to create unacceptable delays and congestion allowing for development flows as well as background growth to 2034. However, as part of the overall masterplan development for Medowie this intersection has been identified for upgrade to either a 2-lane circulation roundabout with associated upgrades to the approaches or traffic signal control. Either of these upgrades shall allow for the subject site traffic demands as well as the background growth in traffic associated with the overall development identified in the Medowie Masterplan, of which the subject site forms part. Council has previously identified this intersection could be upgraded to signal control but there is no definitive statement or timeframe for this upgrade currently available. It is noted however that Council's strategies have recommend that the Medowie Traffic and Transport Study be updated and that a RFQ was released for this in May 2025. It is therefore expected that this intersection shall be assessed as part of this study given the importance of it within the overall road network. If the roundabout is upgraded to provide 2 circulating lanes or traffic signals are installed, any design upgrade shall incorporate the appropriate pedestrian and cycling facilities as per Austroads Design Guide and Council requirements. Any upgrade works shall be designed and constructed in consultation with Council as part of the approval process.
d	All lots should be accessed from the minor local road network and where this is not able to be achieved, a Local Area Traffic Management plan should be provided with future development to support direct access onto collector roads. Please note direct access onto sub-arterial roads is generally not supported.	The original proposal allowed for individual lots to access Ferodale Road, which is a collector road.  . An LATM to support suitable speeds, given the need for reverse movements from individual lots, is evident to the east of the site on Ferodale Road.

A summary of the key issues and their comments are provided below:

Item	Comment
Existing Situation	
2.1 Site Location and Access	The subject site, known as 46 to 58 Ferodale Road & 754 Medowie Road, Medowie NSW 2318 Lots 1,2, 3, 4, 5, 6, 7 & 8 DP 243518, is located on the corner of Ferodale Road and Medowie Road, Medowie with frontage to both Medowie Road and Ferodale Road. The land is RU2 Rural Landscape with the objective of this proposal to have it rezoned R3 Medium Density Residential and E1 Local Centre. Made up of eight individual lots, each currently has vehicle access to either Ferodale Road or Medowie Road. The site is located adjacent to the Medowie town centre. To the immediate south of the site is residential lots while to the north is low density residential and playing fields. To the northwest is the Medowie commercial centre including Coles and Woolworths supermarkets, with further retail and commercial uses.
2.2.1 Road Hierarchy	The main road through the locality is **Medowie Road**, which is a regional road (MR518) that runs in a north / south orientation to the west of the subject site. It provides the primary connection between Medowie and the external road network including the Pacific Highway (to the north), Richardson Road (to the south), and Nelson Bay Road (to the south) for connection to Newcastle Airport. In the vicinity of the subject site, it provides one lane of travel in each direction, with a sealed shoulder and unformed verge. It has a pavement width in the order of 11.5 metres, allowing vehicles to pull over on both sides of the road with a 2.0m sealed shoulder. There are no footpaths nor street lighting in the vicinity of the subject site except at the roundabout intersection of Ferodale Road. There is a footpath along the western roadside from Ferodale Road north towards Silver Wattle Drive. The posted speed limit in the locality of the subject site is 50km/hr with the speed changing to 80km/hr to the south of the site. **Ferodale Road** is a major collector road through Medowie, providing connection to the town centre, as well as two primary schools. There is a shared pathway provided along its length on the northern roadside, with street lighting in the proximity of the Medowie Town Centre. At the intersection with Medowie Road, it provides one lane of travel in each direction on both the eastbound and westbound approaches to the roundabout. To the east of the roundabout, Ferodale Road provides access to a number of residential lots including the subject site and has a pavement width in the order of 9 metres. Kerb and guttering is intermittent in its built form with an unformed verge. To the east of the site, there is a Local Area Traffic Management Scheme with vertical speed control devices to manage speed along this straight length of road.

2.2.2 Current and Proposed Roadworks, Traffic Management Works and Bikeways

A review of the Port Stephens Council and the TfNSW websites shows there are currently no road works occurring in the immediate vicinity of the subject site.

A map of the existing shared paths has been provided in **Attachment C**. Proposed bike paths have also been identified in the Medowie Traffic and Transport Study, with an excerpt from this report shown in Figure 3 below.

Figure 3 – Proposed bike paths in Medowie surrounding the subject site★ (Source: URaP 2017 Figure 4.3)

A shared pathway has been constructed on the eastern side of Medowie Road between Ferodale Road and South Street. There is also a shared path on the northern side of Ferodale Road, opposite the site.

2.3 Traffic Flows

Seca Solution collected traffic data at the intersection of Medowie Road and Ferodale Road to determine the current road operation and peak flows.

This survey was completed during the morning and afternoon on Wednesday 2nd March 2022. The AM peak hour was determined as 8:15am to 9:15am, whilst the PM peak was 4:00pm to 5:00pm. The survey data is provided in **Attachment E**.

A summary of the current distribution of traffic during the peak hour is provided below in Table 1.

Table 1 –Peak traffic flows in the vicinity of the subject site

Location	Distribution	AM Peak	PM Peak
Medowie Road (South of Ferodale Road)	Northbound	419	594
	Southbound	493	393
Medowie Road (North of Ferodale Road)	Northbound	215	394
	Southbound	290	227
Ferodale Road	Eastbound	197	271

	(East of Medowie Road)	Westbound	291	168
	Ferodale Road	Eastbound	374	484
	(West of Medowie Road)	Westbound	469	415

Austroads Guidelines provides typical mid-block capacities for urban roads, with a capacity of 900 vehicles per hour per direction. The traffic flows along Medowie Road to the south of Ferodale Road are well within this capacity with critical flows of around 500 vehicles southbound (AM) and 600 vehicles northbound (PM). These flows represent a Level of Service C with northbound at the upper limit between this and D per the GtTIA for urban road peak hour flows per direction.

Ferodale Road is a major collector road for the area, providing the main access to Medowie Town Centre. Given this classification Ferodale Road has been assessed as per the rate for urban roads above. Traffic flows on Ferodale Road to the east of Medowie Road are within the mid-block capacity for Level of Service B with 291 vehicles westbound (AM) and 271 vehicles eastbound in the critical PM peak.

2.3.1 Daily Traffic Flows

Peak hour flows typically represent around 10% of the daily traffic flows. This would indicate daily traffic flows in the locality in the order of:

- 9,500 vehicles per day (vpd) along Medowie Road (south of Ferodale Road)
- 4,700 vpd along Ferodale Road (east of Medowie Road)

2.3.2 AADT

There is no AADT data available in the locality.

2.3.3 Daily Traffic Flow Distribution

It can be seen from Section 2.3.1 above that there is a high demand for travel to the south along Medowie Road in the AM, representing commuters travelling to employment opportunities including Williamtown RAAF base, Newcastle airport and the City of Newcastle. These flows are tidal with the reverse occurring during the PM.

This pattern is also reflected in the flows along Ferodale Road along the site frontage.

There are ongoing demands throughout the day west of the roundabout associated with the local shopping centre.

2.3.4 Vehicle Speeds

No speed surveys were completed as part of the study work, however the volume of traffic in the peak periods along Ferodale Road and Medowie Road, to the south of the roundabout does not encourage drivers to speed. The interaction between driveways in the locality also sees drivers travelling at or below the posted speed limit.

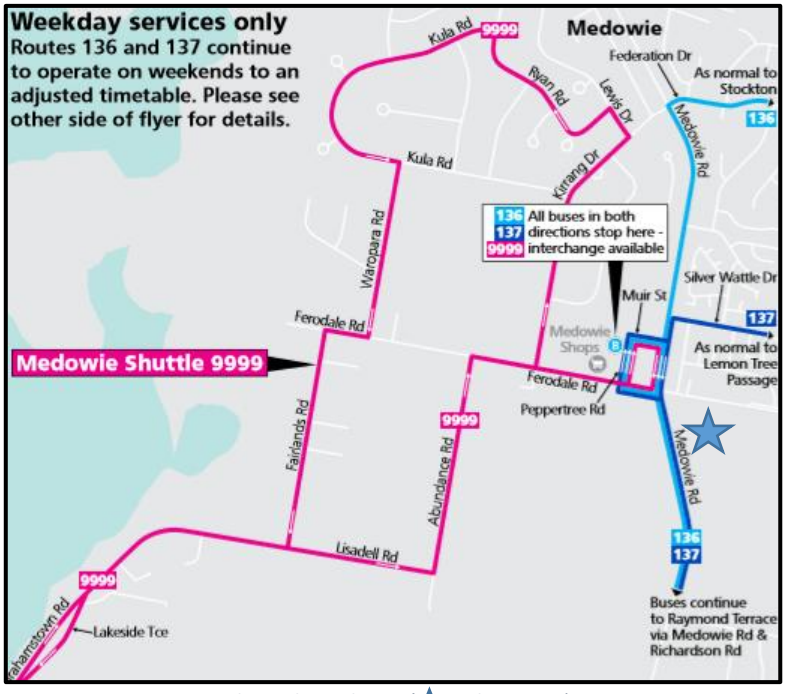
2.3.5 Existing Site Flows

The site currently has eight individual lots with single dwellings on each. Traffic flows based on the GtTIA would be in the order of 7 trips in the peak hour and 72 trips daily.

2.3.6 Heavy Vehicle Flows

Data recorded during the traffic survey found higher proportion of heavy vehicles in the AM peak, with 60 heavy vehicle movements at the intersection

	of Medowie Road and Ferodale Road representing 4.4% of the total traffic flows. From observation a number of these related to public and school buses in the locality. Afternoon flows were much lower being 1.4%.
2.3.7 Current Road Network Operation	Observations on site during the peak periods showed that the roundabout controlled intersection of Medowie Road and Ferodale Road operates very well with minimal delays and congestion
2.4 Traffic Safety and Accident History	A review of Crash Statistics (Centre for Road Safety) **(Attachment B)** during the past five years (2019-2023) indicates that 9 accidents have been recorded within the vicinity of the subject site. Of these eight accidents were recorded at the intersection of Medowie Road and Ferodale Road. One resulted in a serious injury being off road on bend. There are no repeat causes for accidents in the area, with a low number of accidents recorded relative to the traffic volumes. Given the good road alignment it is considered that Medowie Road and Ferodale Road in the vicinity of the subject site operate in a safe and appropriate manner.
2.5 Parking Supply and Demand	
2.5.1 On-street Parking Provision	As there are no sealed shoulders or verges along Ferodale Road there is little opportunity for on-street parking along the site frontage. Similarly, while Medowie Road provides for a vehicle to stop if necessary, there is no facilities to encourage parking in this area.
2.5.2 Off-street Parking Provision	Given the size of the residential lots parking is able to be provided within individual lots.
2.5.3 Current Parking Demand and Utilisation	There was no demand observed for on-street parking along either Medowie or Ferodale roads in the vicinity of the site.
2.5.4 Short term set down or pick up areas	There are no set down or pick up areas in the vicinity of the site.
2.6 Modal Split	Given the proximity of the subject site to surrounding commercial facilities and schools, it is considered there is good walkability for local residents to access these from the subject site as well as residents from surrounding dwellings being able to walk to the new commercial elements. Given the semi-rural nature of the area it is considered the majority of longer trips in Medowie are undertaken by private vehicle with a number of trips being detours as commuters travel to or from work or from taking or picking up children from school
2.7 Public Transport	
2.7.1 Rail Station Locations	There are no train services in the locality, with the nearest rail station located in Hexham, 20 kilometres to the south of the site.
2.7.2 Bus Stops and Associated Facilities	There is a bus stop located on Ferodale Road 100m west of the roundabout and 200-300m from the subject site. The depth of the site (approximately 200m north to south) means that the majority would be within walking distance of this existing bus stop or all lots

	could be within a 400m walk to an additional bus stop on Ferodale Road, depending upon the future availability of bus services in this location. There is also a bus stop included in the Contributions Plan to be located on Medowie Road which could also service the needs of this site as well as the dwellings to the south.
2.7.3 Transport Services	Bus services in the locality are provided by Hunter Valley Buses and shown below in Figure 4. There are three routes that run through Medowie Road in the vicinity of the subject site. • 136 – Raymond Terrace to Stockton: Operates 7 days a week with frequent trips throughout the day. • 137 – Raymond Terrace to Lemon Tree Passage: Operates daily, with frequent trips Monday-Friday and limited trips on weekends and public holidays. • 9999 – Medowie Shuttle: Operates Monday to Friday at regular intervals.  *Figure 4 – Bus services through Medowie (Subject site)* The Medowie Traffic and Transport Study (2017) stated there were five school buses which service the area however this may have increased along with the growth of local schools and the opening of Catherine McCauley Catholic College.
2.8 Pedestrian Network	To the north of the site along Ferodale Road and in the vicinity of the commercial centre there are pedestrian paths providing connection from the subject site through to the Medowie Town Centre and bus stops. A pedestrian refuge has been incorporated into the splitter island on Ferodale Road on the eastern leg of the roundabout.
2.9 Other Proposed Developments	Medowie is subject to ongoing growth in conjunction with the Medowie Planning Strategy.

	A number of developments have been proposed or approved within the Medowie town and its environs.
The Development	
3.1.1 Nature of Development	The development is located on the corner of Ferodale Road and Medowie Road, incorporating lots 46 to 54 Ferodale Road & 754 Medowie Road lots 1,2, 3, 4, 5, 6, 7 & 8 DP 243518. It has frontage to both Medowie Road and Ferodale Road. The land is currently RU2 Rural Landscape with the objective of this proposal for it to be rezoned R3 Medium Density Residential and E1 Local Centre. The subject site is made up of eight individual lots with the potential for the following yield: 108 residential dwellings, including detached dwellings, dual occupancy, townhouses and apartments; • Supermarket; • General retail • Café / Fast Food; • Commercial; • Early Learning Centre; and • Office space The commercial element is proposed on the corner of Ferodale Road and Medowie Road with the residential element east of the site.
3.1.2 Access and Circulation Requirements	The layout of the subdivision shall be designed in accordance with Council's design requirements.
3.2 Access	Two access points for the internal roadway are proposed onto Ferodale Road along with a direct access to the commercial lot and secondary access to Macadamia Circuit (noted as Gum Tree Way on the plan). Some lots shall have direct access onto Ferodale Roads in a manner consistent with other residential lots in the area. The most westerly access into the residential subdivision is located approximately 160m east of the intersection of Ferodale Road with the concept plan indicating a location east of Bottlebrush Avenue, opposite the driveway into the skate park. The access into the commercial site is proposed to the west of Bottlebrush Avenue, in the order of 80 metres from Medowie Road. A secondary access to Medowie Road has been provided offering a left in only option.
3.2.1 Driveway Location	Individual driveways would be subject to future DAs for each future dwelling or proposed development. Lots accessing directly to Ferodale Road, a collector road, would require driveways with vehicles able to reverse onto the local roads.
3.2.2 Sight Distances	Sight distances at the proposed intersections are to be provided in accordance with Austroads Guidelines. Ferodale Road and Medowie Road have posted speed limits of 50km/hr and offer straight and relatively level

	alignments. The necessary sight distance of 97 metres can be achieved in both directions along Ferodale Road or Medowie Road. Sight distance for the individual driveways within the subdivision will be provided in accordance with AS2890. For the speed limit of 50km/hr along Ferodale Road AS2890 states a desirable sight distance of 69 metres, with a minimum of 45 metres for driveways. Ferodale Road provide straight horizontal alignment along their lengths with sight distances at any future driveways achievable.
3.2.3 Service Vehicle Access	There will be occasional demands for delivery vehicles within the residential site as well as regular waste collection. The design of the internal roads will be in accordance with the Council DCP which will cater for the swept path requirements for the largest design vehicle. The commercial lot shall require large vehicles including 19m semi trailers to access the site as well as waste collection by commercial providers. This access will be via the left in off Medowie Road to allow for one-way circulation of these vehicles and access to the loading docks.
3.2.4 Queuing at entrance to site	Given the low flows passing the site access points there are minimal vehicle queues expected for vehicles entering the site at the new intersections. Allowing for traffic to be distributed across the various intersections, as motorists will use whichever intersection is closest to their destination, traffic flows will be generally equally split. Peak traffic entering the site will typically be of a morning associated with the commercial site which shall be after the local road peak. Of an evening, when 80% of the residential flows are inbound, the main traffic flows along Ferodale Road are eastbound. Any queues associated with vehicles turning right out of the site will be minimal and shall be contained within the site so shan't impact on through traffic.
3.2.5 Comparison with existing site access	There are currently driveways on both Ferodale Road and Medowie Road associated with the eight individual lots. The future subdivision may see in the order of nine driveways accessing Ferodale Road. There will be no driveways with egress to Medowie Road from the site.
3.2.6 Access to Public Transport	The development is well located with regard to public bus services through the locality. Bus stops are provided along both Ferodale Road and Medowie Road in the vicinity of the town centre. This is within 400m of the subject site.
3.3 Circulation	
3.3.1 Pattern of circulation	The internal road layout allows for two-way movements. The driveway access of Medowie Road allows for entry movement only.
3.3.2 Internal Road width	All internal roads will be designed in accordance with the DCP requirements.
3.3.3 Internal Bus Movements	There are no internal bus movements anticipated for the development.
3.3.4 Service Area Layout	Generally, no service area required for the residential lots.

	The commercial / retail element shall be subject to a separate DA that shall assess the requirements for the end users however it is expected there shall be requirements for service areas associated with loading bays and waste collection.
3.4 Parking	
3.4.1 Proposed Supply	Individual lots shall provide parking in accordance with the DCP.
3.4.2 Authority Parking	Port Stephens Council DCP provides parking rates relevant to various end uses for the development. Individual lots shall be subject to individual DAs.
3.4.3 Parking Layout	Parking will be designed in accordance with AS2890.
3.4.5 Service Vehicle Parking	Service vehicle parking shall typically be minimal with suitable areas provided within the Commercial element. Waste collection shall occur on street or by waste contractor for the commercial lot.
3.4.6 Pedestrian and Bicycle Facilities	Internal footpaths shall be provided in accordance with the DCP. Connection to the shared footpath on Medowie Road should be considered as part of the detailed design for the subject site.
Traffic Assessment	
4.1 Traffic Generation	Traffic generation for the proposed uses has been determined using rates provided in the GtTIA. The following rates have been applied to the project: **0.83 trips per low density dwelling AM peak and 0.84 trips PM** **0.41 trips per medium density dwelling AM peak and 0.60 trips PM** **0.066A+126 AM peak small suburban shopping centre and 0.089A+170 PM peak** **206 vehicles AM peak fast food and 201 PM peak** **0.86 trips AM peak per licenced space ELC and 0.76 PM peak** **2 trips per 100 m2 GFA AM and PM peak for office and commercial**

Combined Development

Use		AM Peak (Inbound/Outbound)	PM Peak (Inbound/Outbound)
Low Density Residential	11	9 trips (1 / 8)	9 trips (8 / 1)
Medium density residential	97	40 (8 / 32)	58 (46 / 12)
Retail	4283 m2	Assumed to be 100 trips during road peak (50 / 50)	551 (275 / 275) 440 trips (220 / 220)

Allowing for 20% cross use		100 trips	
Commercial	2820m2	56 trips (42 / 14)	56 trips (14 / 42)
100 place ELC	100 place	86 (43 / 43)	76 (38 /38)
Fastfood	840m	188 (94 / 94)	183 (91 / 91)
Total with cross use		479 trips (238 / 241)	822 trips (417 / 405)

	No reduction has been allowed for the existing dwellings and their current traffic generation. The following points are made for the above development flows: For the ELC, the vast majority of traffic shall be passing trips and not additional traffic movements. A value of 80% passing trips has been assumed For the retail element, for the AM peak the demands shall be low, generally associated with staff and some customers only. The peak morning demand shall occur after the peak on the road network. For the fast-food element 50% is considered to be passing trade and 50% additional traffic Assume cross use of 20% between the retail / fast-food outlet
4.1.1 Daily and Seasonal Factors	Limited daily and seasonal variation in traffic movements are anticipated. For residential developments weekend flows are typically less than weekend flows whilst depending upon the commercial end user there may be some seasonal reduction over Christmas.
4.1.2 Pedestrian Movements	The site is located within easy walking distance of the Medowie Town Centre, as such it is considered there will be considerable demand for pedestrian movements to the north/west of the subject site. There are footpaths provided along the north side of Ferodale Road to cater for these movements.
4.2 Hourly distribution of trips	
4.2.1 Origin / destinations assignment	Traffic demands are anticipated to replicate the existing patterns on the adjoining road network . • 20% with an origin / destination to the east of the site along Ferodale Road • 20% with an origin / destination to the west of the site along Ferodale Road • 20% with an origin / destination north of the site along Medowie Road • 40% with an origin / destination south of the site along Medowie Road

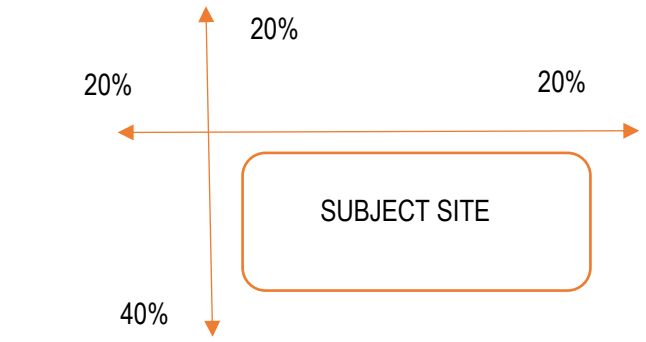


Figure 5 – Traffic distribution

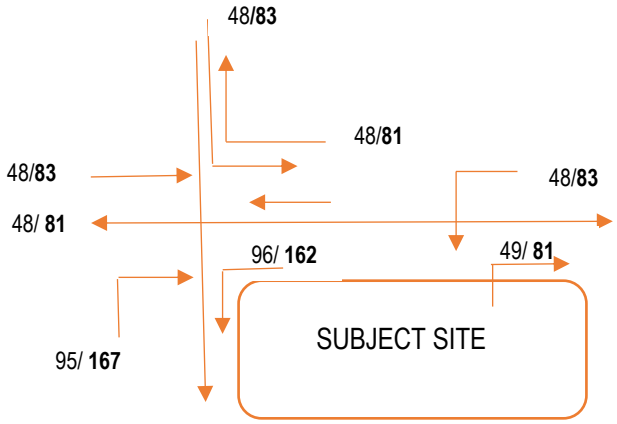


*Figure 6 – Traffic distribution (AM/**PM**)*

4.3 Impact on Road Safety

Sight distances at the new intersections can be provided in accordance with the Austroads Guidelines allowing good visibility for drivers entering and exiting the site. The local roads operate in a safe and appropriate manner with good visibility and road alignment at the key intersection of Medowie Road/Ferodale Road.

A review of the accident data provided by TfNSW found no repeating pattern for crash types at this intersection, indicating there are no identifiable safety concerns.

The intersection of Ferodale Road and Peppertree Road west of the site has been identified in the Medowie Traffic and Transport Study for upgrade to a roundabout, to improve the efficiency and safety of turning movements at this intersection.

The intersection of Medowie Road and Ferodale Road has also been identified for potential future upgrade to a 2-lane roundabout or traffic signals to cater for overall growth in Medowie and resulting increases in vehicle and pedestrian volumes. Observations indicate the existing roundabout operates in a safe and efficient manner, with the traffic flows associated with the

	development to have minimal impact upon the existing operation as shown in the Sidra Assessment to follow.
4.4 Impact of Generated Traffic	
4.4.1 Impact on Daily Traffic Flows	The development could generate an additional 3,500 trips per day with vehicles split across the various access points depending upon the location of their dwelling/commercial element within the subdivision. These trips would however have an origin/destination primarily from Medowie or be traffic travelling into or out of the town and thus being passing trade and contained trips. The majority of the residential trips are expected to travel south along Medowie Road to leave the township for employment. As such the extent of additional traffic movements is relatively low and primarily only associated with the residential element of the project. It can be seen that the retail and commercial centre will not be of a large enough size to act as a major attractor for external demands from other centres e.g. Raymond Terrace. Medowie Road and Ferodale Road are both major collector roads in the area, with spare capacity during the peak periods (as outlined in Section 2.3.1) to cater for the movements generated by this development. There is no specific guidelines with regards to daily capacity of roads, however it is considered that as the roads have adequate capacity in the peak periods it follows that they have capacity across the day too. Other local roads within the vicinity of the local shopping centre have been assessed in the Medowie Traffic and Transport Study to accommodate future local demands. Road upgrades have been identified as part of the overall development of Medowie and shall cater for the additional traffic movements associated with this project. The impact of this traffic can therefore be accommodated within the local road network.
4.4.2 Peak Hour Impacts on Intersections	The Medowie Traffic and Transport Study nominates the intersection of Medowie Road and Ferodale Road for potential future upgrade to a 2-lane roundabout or signals. Sidra Intersection modelling has been used to analyse the impact of the development on this intersection to assess the capacity of the existing layout. The results for this assessment detailed following this table, with the outputs provided in **Attachment F**. The scenarios modelled are detailed below and included: • 2024 Existing Situation • 2034 with Background Growth (2% per annum) • 2024 with Proposed Rezoning • 2034 with Proposed Rezoning plus Background Growth (2% per annum)
4.4.3 Impact of Construction Traffic	While no construction is required to support the rezoning there will be a requirement for construction vehicles (light and heavy) to access the site for

	infrastructure works associated with the future DA including roads, stormwater etc. The majority of the construction work shall be located on the site. Construction of the new intersections shall require a Construction Traffic Management Plan outlining appropriate controls which shall be prepared by the contractor in conjunction with the CC for the project. The construction traffic will be less than the traffic associated with the completed development and as such is considered to have an acceptable impact upon the local road network.
4.4.4 Other Developments	Ongoing expansion of Medowie sees future developments including residential, commercial and education.
4.5 Public Transport	
4.5.1 Options for improving services	No requirement to improve services. There is capacity within the existing services with any upgrades completed as part of the overall development across Medowie.
4.5.2 Pedestrian Access to Bus Stops	Pedestrian movements for the development shall be accommodated by internal pathways that will provide connection to existing footpaths along Ferodale Road to access the bus stop west of the subject site.
4.6 Recommended Works	
4.6.1 Improvements to Access and Circulation	Ensure access and internal roads are designed and constructed in accordance with Council requirements.
4.6.2 Improvements to External Road Network	No road upgrades required in conjunction with the proposed development. The development shall provide the new access roads for the project site together with kerb and guttering along the site boundary to both Medowie Road and Ferodale Road in accordance with Council requirements.
4.6.3 Improvements to Pedestrian Facilities	The site shall connect to pedestrian facilities in the area. Ensure the site connects with the new shared pathway on Medowie Road.
4.6.4 Effect of Recommended Works on Adjacent Developments	Nil.
4.6.5 Effect of Recommended Works on Public Transport Services	None.
4.6.6 Provision of LATM Measures	None Required.
4.6.7 Funding	All internal site work will be funded by the developer.

Sidra Modelling

Sidra modelling has been completed for the intersection of Medowie Road / Ferodale Road to determine the capacity to support the additional traffic demands associated with the proposed development. The following scenarios were considered in the modelling:

- 2024 Existing Situation
- 2034 with Background Growth (2% per annum, consistent with the high growth rate URaP 2017)
- 2024 with Proposed Rezoning
- 2034 with Proposed Rezoning plus Background Growth (2% per annum)

The results of this modelling are provided below.

Medowie Road / Ferodale Road

Table 2 - Sidra Results - Existing Situation 2024 (AM/PM)

Approach	Degree of saturation	Level of Service	Average Delay (s)	95% Queue (m)
Medowie Road (Northbound)	0.434 / 0.531	A / A	5.5 / 4.9	19.7 / 26.9
Ferodale Road (Westbound)	0.360 / 0.190	A / A	6.8 / 5.5	15.0 / 6.8
Medowie Road (Southbound)	0.342 / 0.276	A / A	6.6 / 6.3	14.4 / 11.2
Ferodale Road (Eastbound)	0.387 / 0.529	A / A	6.8 / 7.4	16.8 / 27.0
Overall	0.434 / 0.531	A / A	6.4 / 6.0	19.7 / 27.0

The results in Table 3 show that the roundabout intersection currently operates well with very minimal delays and queuing on all approaches during the peak hours, consistent with observations on site. Each approach operates well within its capacity providing an overall level of service A.

Table 3 - Sidra Results - Existing Situation 2024 with proposed rezoning (AM/PM)

Approach	Degree of saturation	Level of Service	Average Delay (s)	95% Queue (m)
Medowie Road (Northbound)	0.586 / 0.808	A / A	8.2 / 11.7	35.5 / 82.5
Ferodale Road (Westbound)	0.601 / 0.560	A / A	9.7 / 4.4	37.2 / 31.0
Medowie Road (Southbound)	0.456 / 0.497	A / A	8.4 / 3.9	22.8 / 28.0
Ferodale Road (Eastbound)	0.503 / 0.831	A / B	8.1 / 12.4	25.4 / 87.2
Overall	0.601 / 0.831	A / A	8.6 / 12.4	37.2 / 87.2

Allowing for the increase in traffic demands associated with the proposed development (Section 4.2.1), the roundabout intersection will continue to operate to its current standard with no change to the level of service (LoS) on any approach and minor increases in the average delays and queuing.

Table 4 - Sidra Results - 2034 design year with 20% background growth (AM/PM)

Approach	Degree of saturation	Level of Service	Average Delay (s)	95% Queue (m)
Medowie Road (Northbound)	0.545 / 0.652	A / A	6.4 / 5.6	29.6 / 40.5
Ferodale Road (Westbound)	0.473 / 0.242	A / A	8.6 / 6.1	24.1 / 9.3
Medowie Road (Southbound)	0.442 / 0.364	A / A	7.6 / 7.1	21.1 / 16.6
Ferodale Road (Eastbound)	0.482 / 0.677	A / B	7.2 / 10.0	23.4 / 49.0
Overall	0.545 / 0.677	A / A	7.3 / 7.4	29.6 / 49.0

Table 5 shows for the future design year, allowing for 20% background growth over 10 years, the intersection will continue to operate within its capacity providing an overall level of service A. Background growth will see some approaches experience increases in the average delays and additional queuing however these remain within acceptable limits, with the Ferodale Road (Eastbound) approach seeing operation at LoS B.

Table 5 - Sidra Results – 2034 design year with 20% growth and Proposed Rezoning

Approach	Degree of saturation	Level of Service	Average Delay (s)	95% Queue (m)
Medowie Road (Northbound)	0.763 / 0.941	A / B	12.2 / 21.6	69.0 / 171.8
Ferodale Road (Westbound)	0.798 / 0.624	B / A	16.6 / 9.8	77.4 / 40.1
Medowie Road (Southbound)	0.623 / 0.601	A / A	12.3 / 13.1	42.7 / 39.2
Ferodale Road (Eastbound)	0.653 / 1.050	A / F	10.6 / 82.8	46.0 / 321.6
Overall	0.798 / 1.050	A / C	13.0 / 34.6	77.4 / 321.6

It can be seen in that allowing for development flows as well as background growth to 2034, the current layout of the intersection of Medowie Road and Ferodale Road shall start to create unacceptable delays and congestion. However, as part of the overall masterplan development for Medowie this intersection has been identified for upgrade to either a 2-lane circulation roundabout with associated upgrades to the approaches or traffic signal control. Either of these upgrades shall allow for the subject site traffic demands as well as the background growth in traffic associated with the overall development identified in the Medowie Masterplan, of which the subject site forms part.

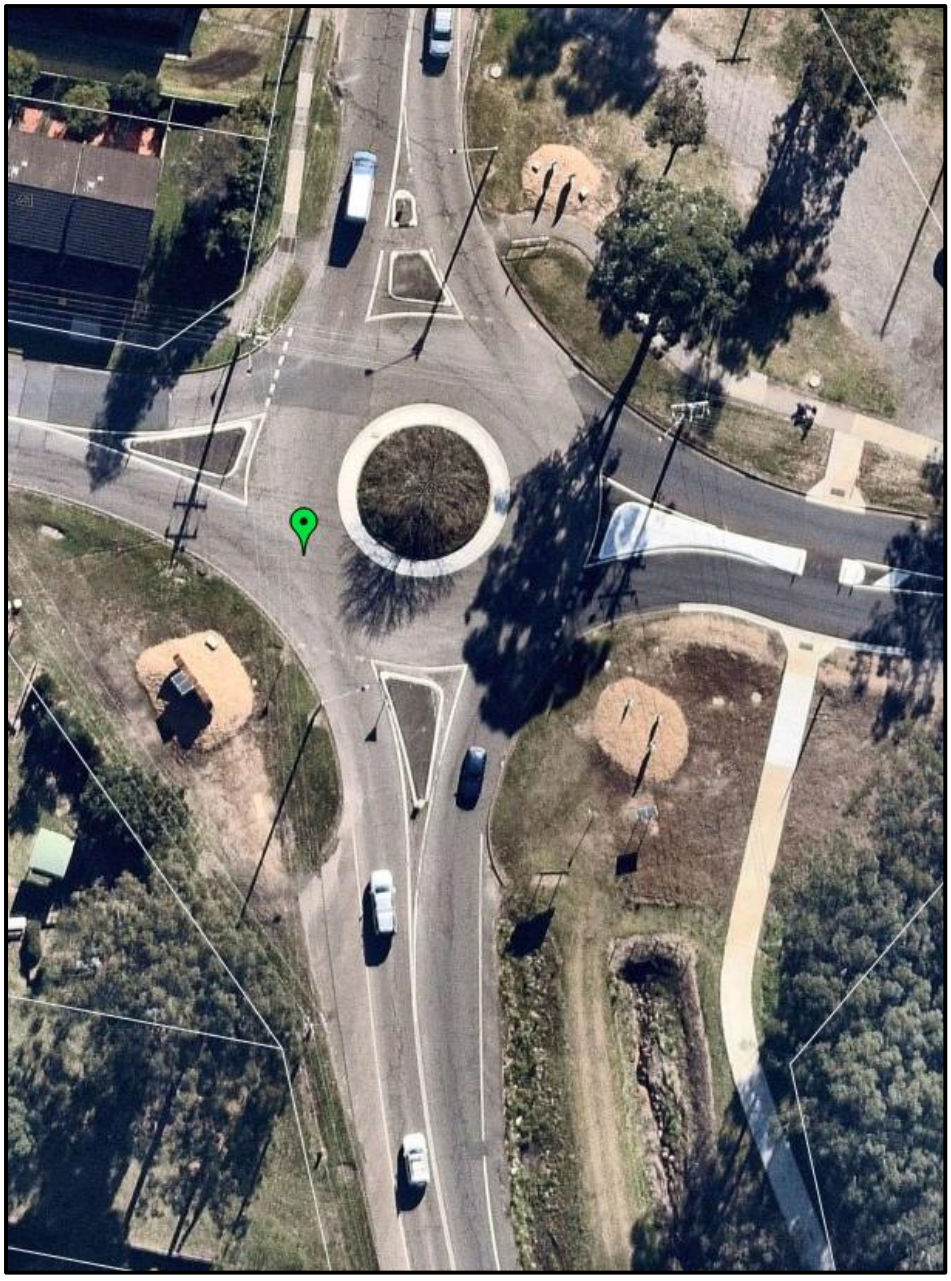


Figure 7 – Layout of roundabout at Ferodale Road and Medowie Road (source: nearmap)

Site Photos

Photo 1 – Cross section of Ferodale Road looking east in vicinity of the eastern access, with the subject site on the right

Photo 2 – View to left for driver exiting the proposed eastern access point on Ferodale Road

Photo 3 - View to right for driver exiting the proposed eastern access point on Ferodale Road

Photo 4 – Existing footway / cycleway on Ferodale Road on opposite side to the subject site

Photo 5 – View to left for driver exiting the western access point on Ferodale Road

Photo 6 – View to right for driver exiting the western access point on Ferodale Road

Conclusion

From the above assessment and the review of the proposed rezoning and lot yield against the requirements of the Guide to Transport Impact Assessment published by TfNSW and Austroads Guide to Traffic Management, it is considered that the rezoning is acceptable on traffic and access grounds.

The potential for additional traffic movements generated by the development will have an acceptable impact on the surrounding road network. The SIDRA results show that the key intersection of Medowie Road and Ferodale Road will continue to operate at an acceptable Level of Service for the current design year 2024 and shall have capacity for a number of years. However, as per the Medowie Masterplan, this intersection will need to be upgraded to accommodate the on-going development in the Medowie area, which includes the subject site prior to 2034, assuming the rate of development continues over the planning horizon of 10 years.

The intersection of Ferodale Road and Peppertree Road has been identified as part of Council's Contributions Plan for upgrade to a roundabout or traffic signals in order to accommodate future development in Medowie.

It is considered the proposal can meet the requirements of the Development Control Plan in relation to traffic, and access as well as the overall planning for the subject site. Parking and site servicing shall be the subject of future DAs for the site and individual lots.

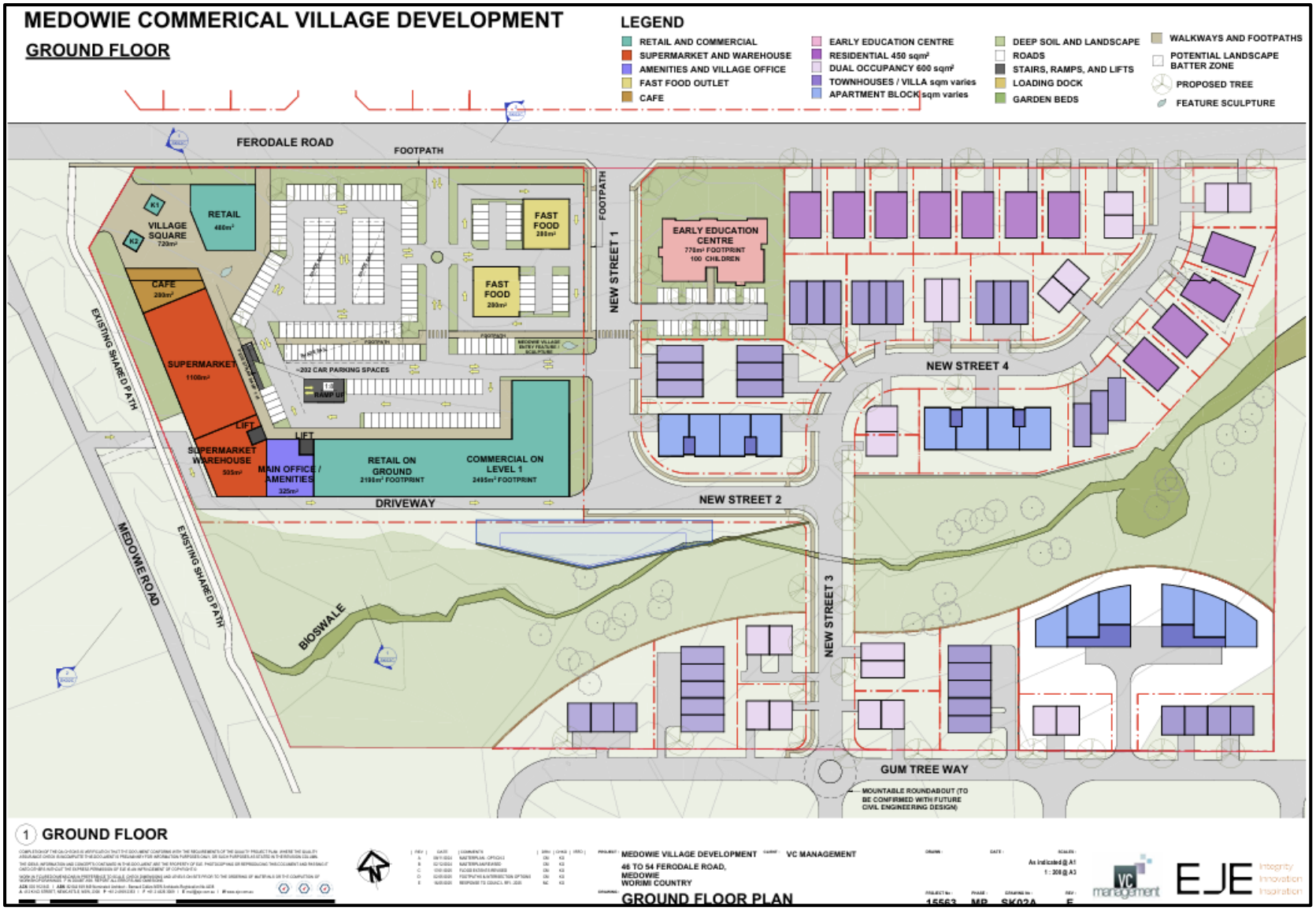
Please feel free to contact our office on 4032 7979, should you have any queries.

Yours sincerely

Sean Morgan
Senior Traffic Engineer

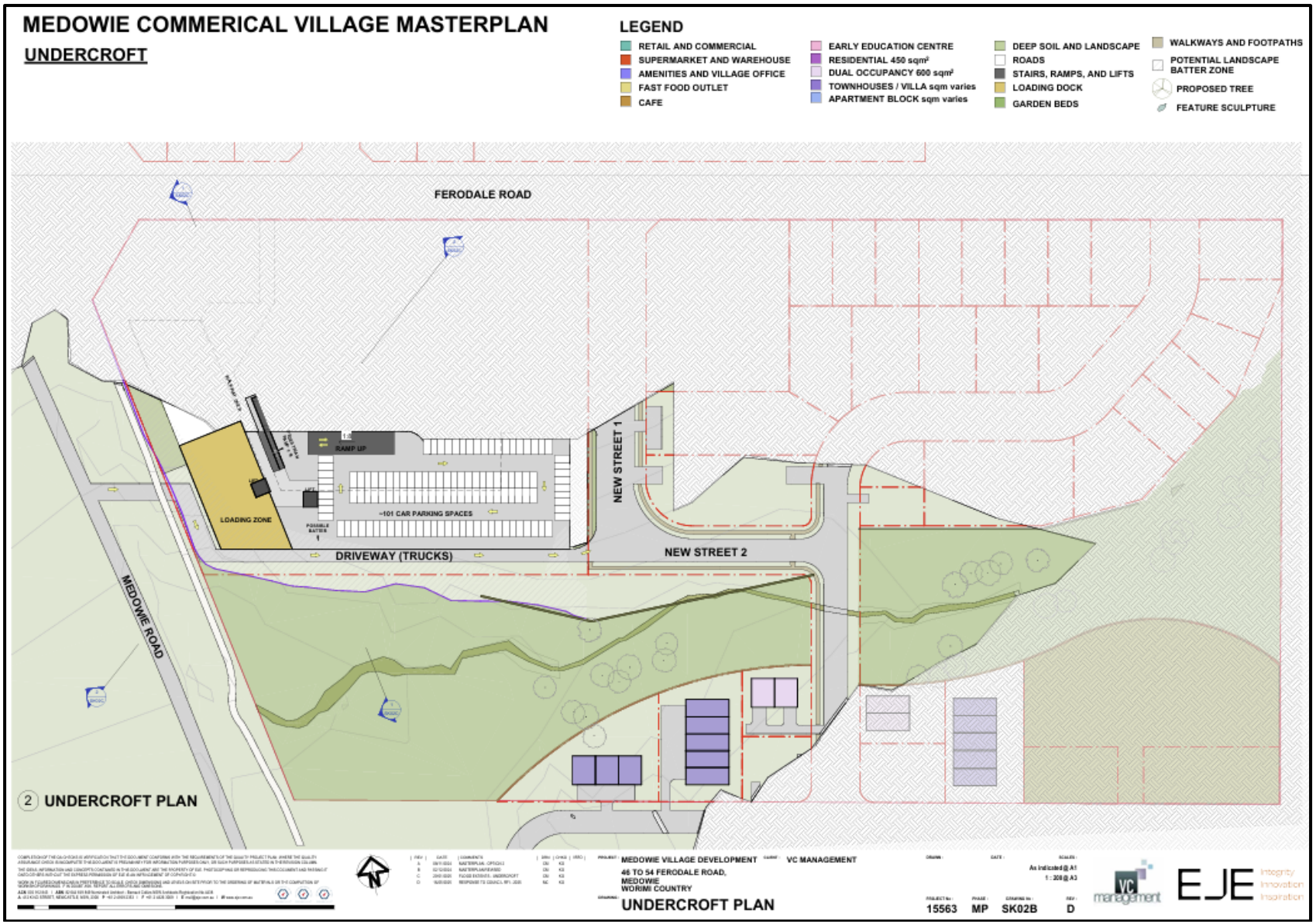
Attached:
A – Site Plan
B – Accident Data
C – Shared Paths
D – Medowie Town Centre Master plan
E – Survey Data
F – Sidra Analysis

Attachment A Site Plan



MEDOWIE COMMERICAL VILLAGE MASTERPLAN

UNDERCROFT



Attachment B TfNSW Accident Data

LGA view - crashes map

All

Degree of crash

All

Type of crash

All

Speed limit

All

RUM code group

All

Type of location group

All

Speeding involved in crash

All

Fatigue involved in crash

All

Road classification

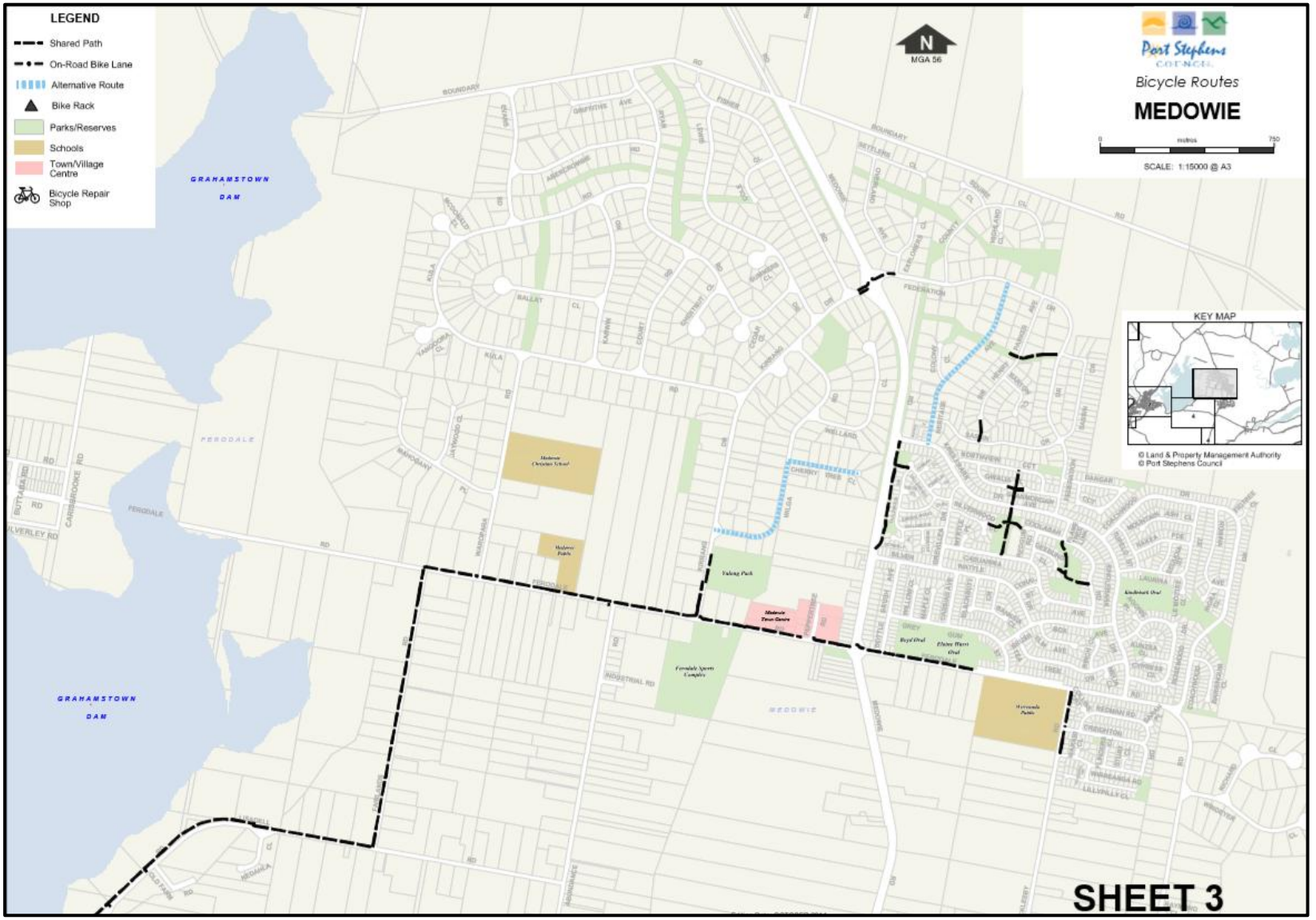
All

DATA AVAILABILITY

Finalised data is available for the 5 year period 2019 to 2023

Reporting year	Crash Id	Degree of crash	RUM - code	RUM - description	Type of location	Natural lighting	Longitude	Latitude	Number killed	Number injured
2019	1205175	Non-casualty (towaway)	71	Off rd left => obj	2-way undivided	Daylight	151.871433	-32.742047		
2019	1206069	Moderate Injury	10	Cross traffic	Roundabout	Daylight	151.867701	-32.741493		1
2020	1224535	Non-casualty (towaway)	10	Cross traffic	Roundabout	Darkness	151.867701	-32.741493		
2020	1232213	Moderate Injury	10	Cross traffic	Roundabout	Darkness	151.867557	-32.741596		2
2020	1235764	Non-casualty (towaway)	33	Lane sideswipe	Roundabout	Daylight	151.867397	-32.741447		
2020	1239271	Serious Injury	88	Out of cont on bend	Roundabout	Daylight	151.867546	-32.741335		1
2021	1256972	Non-casualty (towaway)	19	Other adjacent	Roundabout	Daylight	151.867557	-32.741596		
2021	1278235	Non-casualty (towaway)	10	Cross traffic	Roundabout	Darkness	151.867701	-32.741493		
2022	1316139	Minor/Other Injury	10	Cross traffic	Roundabout	Darkness	151.867557	-32.741596		1

Attachment C Shared Paths



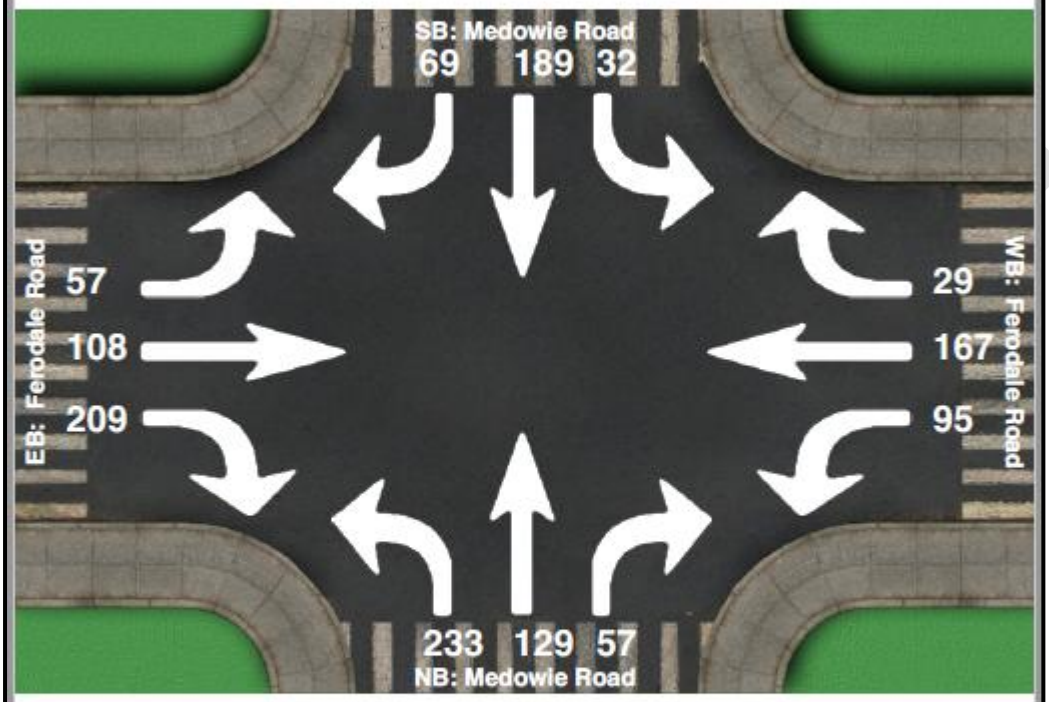
Attachment D Medowie Town Centre Masterplan

Attachment E Survey Data

Medowie Road / Ferodale Road AM/PM

Intersection Peak Hour

Location: Medowie Road at Ferodale Road, Medowie
GPS Coordinates:
Date: 2022-03-02
Day of week: Wednesday
Weather: Rain
Analyst: KS



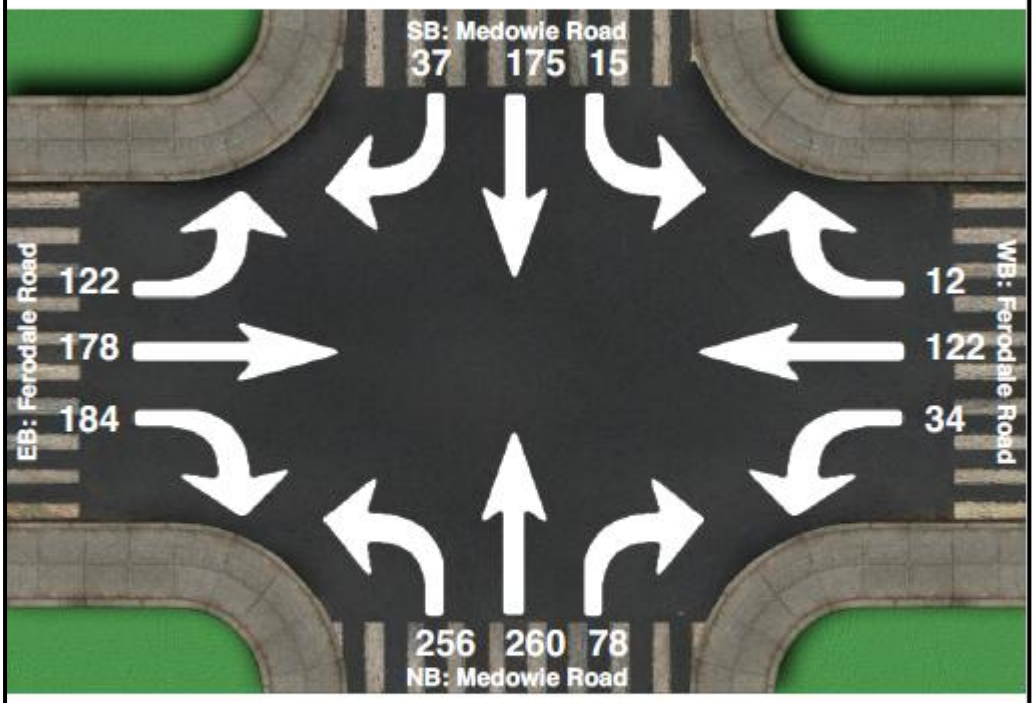
Intersection Peak Hour

08:15 - 09:15

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	32	189	69	95	167	29	233	129	57	57	108	209	1374
Factor	0.67	0.80	0.78	0.85	0.79	0.66	0.76	0.83	0.79	0.75	0.61	0.70	0.81
Approach Factor	0.90			0.82			0.82			0.68			

Intersection Peak Hour

Location: Medowie Road at Ferodale Road, Medowie
GPS Coordinates:
Date: 2022-03-02
Day of week: Wednesday
Weather: Cloudy
Analyst: CT



Intersection Peak Hour

16:00 - 17:00

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	15	175	37	34	122	12	256	260	78	122	178	184	1473
Factor	0.75	0.80	0.58	0.85	0.82	0.60	0.89	0.94	0.89	0.85	0.81	0.98	0.94
Approach Factor	0.92			0.88			0.94			0.88			

Attachment F Sidra Analysis

Criteria for Interpreting Results of Sidra

1-Level of Service (LoS)

LoS	Traffic Signals and Roundabouts	Give Way and Stop Signs
A	Good	Good
B	Good, with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	Satisfactory	Satisfactory, but requires accident study
D	Operating near capacity	Near capacity and requires accident study
E	At capacity, excessive delay: roundabout requires other control method	At capacity, requires other control mode
F	Unsatisfactory, requires other control mode or additional capacity	Unsatisfactory, requires other control mode

2-Average Vehicle Delay (AVD)

The AVD is a measure of operational performance of an intersection relating to its LoS. The average delay should be taken as a guide only for an average intersection. Longer delays may be tolerated at some intersections where delays are expected by motorists (e.g. those in inner city areas or major arterial roads).

LoS	Average Delay / Vehicle (secs)	Traffic Signals and Roundabouts	Give Way and Stop Signs
A	Less than 15	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	28 to 42	Satisfactory	Satisfactory but accident study required
D	42 to 56	Operating near capacity	Near capacity, accident study required
E	56 to 70	At capacity, excessive delays: roundabout requires other control mode	At capacity; requires other control mode
F	Exceeding 70	Unsatisfactory, requires additional capacity	Unsatisfactory, requires other control mode

3-Degree of Saturation (D/S)

The D/S of an intersection is usually taken as the highest ratio of traffic volumes on an approach to an intersection compared with the theoretical capacity, and is a measure of the utilisation of available green time. For intersections controlled by traffic signals, both queues and delays increase rapidly as DS approaches 1.0. An intersection operates satisfactorily when its D/S is kept below 0.75. When D/S exceeds 0.9, queues are expected.

MOVEMENT SUMMARY

Site: 101 [2024 AM Medowie Road / Ferodale Road (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Medowie Road / Ferodale Road
Site Category: (None)
Roundabout
Design Life Analysis (Final Year): Results for 2 years

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Medowie Road															
1	L2	All MCs	255	2.6	255	2.6	0.434	5.0	LOS A	2.7	19.7	0.54	0.57	0.54	45.4
2	T1	All MCs	141	7.8	141	7.8	0.434	5.1	LOS A	2.7	19.7	0.54	0.57	0.54	45.6
3	R2	All MCs	62	3.5	62	3.5	0.434	8.8	LOS A	2.7	19.7	0.54	0.57	0.54	45.1
Approach			459	4.3	459	4.3	0.434	5.5	LOS A	2.7	19.7	0.54	0.57	0.54	45.4
East: Ferodale Road															
4	L2	All MCs	104	3.2	104	3.2	0.360	6.4	LOS A	2.1	15.0	0.65	0.65	0.65	44.8
5	T1	All MCs	183	3.6	183	3.6	0.360	6.4	LOS A	2.1	15.0	0.65	0.65	0.65	45.1
6	R2	All MCs	32	0.0	32	0.0	0.360	10.1	LOS A	2.1	15.0	0.65	0.65	0.65	44.6
Approach			319	3.1	319	3.1	0.360	6.8	LOS A	2.1	15.0	0.65	0.65	0.65	45.0
North: Medowie Road															
7	L2	All MCs	35	0.0	35	0.0	0.342	5.6	LOS A	1.9	14.4	0.59	0.62	0.59	44.8
8	T1	All MCs	207	8.5	207	8.5	0.342	5.8	LOS A	1.9	14.4	0.59	0.62	0.59	45.0
9	R2	All MCs	76	4.3	76	4.3	0.342	9.5	LOS A	1.9	14.4	0.59	0.62	0.59	44.5
Approach			317	6.6	317	6.6	0.342	6.6	LOS A	1.9	14.4	0.59	0.62	0.59	44.9
West: Ferodale Road															
10	L2	All MCs	62	5.3	62	5.3	0.387	4.7	LOS A	2.3	16.8	0.48	0.59	0.48	44.7
11	T1	All MCs	118	1.9	118	1.9	0.387	4.5	LOS A	2.3	16.8	0.48	0.59	0.48	45.0
12	R2	All MCs	251	3.9	251	3.9	0.387	8.4	LOS A	2.3	16.8	0.48	0.59	0.48	44.4
Approach			431	3.6	431	3.6	0.387	6.8	LOS A	2.3	16.8	0.48	0.59	0.48	44.6
All Vehicles			1526	4.3	1526	4.3	0.434	6.4	LOS A	2.7	19.7	0.56	0.60	0.56	45.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [2024 PM Medowie Road / Ferodale Road (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Medowie Road / Ferodale Road, allowing 2.4% background growth all legs to 2029
Site Category: (None)
Roundabout
Design Life Analysis (Final Year): Results for 2 years

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Stop Rate	Eff.	Aver. No. of Cycles	Aver. Speed km/h
South: Medowie Road																
1	L2	All MCs	280	1.2	280	1.2	0.531	4.5	LOS A	3.8	26.9	0.49	0.52	0.49	45.5
2	T1	All MCs	285	1.2	285	1.2	0.531	4.4	LOS A	3.8	26.9	0.49	0.52	0.49	45.7
3	R2	All MCs	84	2.6	84	2.6	0.531	8.3	LOS A	3.8	26.9	0.49	0.52	0.49	45.2
Approach			649	1.3	649	1.3	0.531	4.9	LOS A	3.8	26.9	0.49	0.52	0.49	45.6
East: Ferodale Road																
4	L2	All MCs	37	2.9	37	2.9	0.190	5.3	LOS A	1.0	6.8	0.52	0.57	0.52	45.3
5	T1	All MCs	134	0.0	134	0.0	0.190	5.2	LOS A	1.0	6.8	0.52	0.57	0.52	45.6
6	R2	All MCs	13	8.3	13	8.3	0.190	9.3	LOS A	1.0	6.8	0.52	0.57	0.52	45.0
Approach			184	1.2	184	1.2	0.190	5.5	LOS A	1.0	6.8	0.52	0.57	0.52	45.5
North: Medowie Road																
7	L2	All MCs	16	6.7	16	6.7	0.276	5.9	LOS A	1.6	11.2	0.61	0.61	0.61	44.8
8	T1	All MCs	192	2.9	192	2.9	0.276	5.7	LOS A	1.6	11.2	0.61	0.61	0.61	45.2
9	R2	All MCs	41	2.7	41	2.7	0.276	9.5	LOS A	1.6	11.2	0.61	0.61	0.61	44.6
Approach			249	3.1	249	3.1	0.276	6.3	LOS A	1.6	11.2	0.61	0.61	0.61	45.0
West: Ferodale Road																
10	L2	All MCs	134	2.5	134	2.5	0.529	6.1	LOS A	3.8	27.0	0.66	0.66	0.69	44.5
11	T1	All MCs	195	0.6	195	0.6	0.529	6.0	LOS A	3.8	27.0	0.66	0.66	0.69	44.8
12	R2	All MCs	201	0.0	201	0.0	0.529	9.7	LOS A	3.8	27.0	0.66	0.66	0.69	44.2
Approach			530	0.8	530	0.8	0.529	7.4	LOS A	3.8	27.0	0.66	0.66	0.69	44.5
All Vehicles			1611	1.4	1611	1.4	0.531	6.0	LOS A	3.8	27.0	0.57	0.59	0.58	45.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [2024 AM Medowie Road / Ferodale Road+dev (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Medowie Road / Ferodale Road
Site Category: (None)
Roundabout
Design Life Analysis (Final Year): Results for 2 years

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Medowie Road															
1	L2	All MCs	255	2.6	255	2.6	0.586	6.8	LOS A	4.9	35.5	0.73	0.71	0.81	44.9
2	T1	All MCs	141	7.8	141	7.8	0.586	6.9	LOS A	4.9	35.5	0.73	0.71	0.81	45.1
3	R2	All MCs	166	1.3	166	1.3	0.586	11.3	LOS A	4.9	35.5	0.73	0.71	0.81	46.6
Approach			563	3.5	563	3.5	0.586	8.2	LOS A	4.9	35.5	0.73	0.71	0.81	45.4
East: Ferodale Road															
4	L2	All MCs	209	1.6	209	1.6	0.601	9.2	LOS A	5.2	37.2	0.79	0.80	0.95	46.5
5	T1	All MCs	235	2.8	235	2.8	0.601	9.0	LOS A	5.2	37.2	0.79	0.80	0.95	45.9
6	R2	All MCs	84	0.0	84	0.0	0.601	13.2	LOS A	5.2	37.2	0.79	0.80	0.95	46.6
Approach			529	1.9	529	1.9	0.601	9.7	LOS A	5.2	37.2	0.79	0.80	0.95	46.3
North: Medowie Road															
7	L2	All MCs	88	0.0	88	0.0	0.456	7.9	LOS A	3.1	22.8	0.74	0.73	0.79	46.6
8	T1	All MCs	207	8.5	207	8.5	0.456	7.6	LOS A	3.1	22.8	0.74	0.73	0.79	44.9
9	R2	All MCs	76	4.3	76	4.3	0.456	11.2	LOS A	3.1	22.8	0.74	0.73	0.79	44.4
Approach			370	5.6	370	5.6	0.456	8.4	LOS A	3.1	22.8	0.74	0.73	0.79	45.2
West: Ferodale Road															
10	L2	All MCs	62	5.3	62	5.3	0.503	6.1	LOS A	3.5	25.4	0.67	0.68	0.69	44.6
11	T1	All MCs	171	1.3	171	1.3	0.503	6.3	LOS A	3.5	25.4	0.67	0.68	0.69	45.9
12	R2	All MCs	251	3.9	251	3.9	0.503	9.8	LOS A	3.5	25.4	0.67	0.68	0.69	44.3
Approach			484	3.2	484	3.2	0.503	8.1	LOS A	3.5	25.4	0.67	0.68	0.69	44.9
All Vehicles			1945	3.4	1945	3.4	0.601	8.6	LOS A	5.2	37.2	0.73	0.73	0.81	45.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [2024 PM Medowie Road / Ferodale Road+dev (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Medowie Road / Ferodale Road, allowing 2.4% background growth all legs to 2029
Site Category: (None)
Roundabout
Design Life Analysis (Final Year): Results for 2 years

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Medowie Road															
1	L2	All MCs	280	1.2	280	1.2	0.808	10.0	LOS A	11.7	82.5	0.92	0.87	1.19	43.3
2	T1	All MCs	285	1.2	285	1.2	0.808	10.0	LOS A	11.7	82.5	0.92	0.87	1.19	43.6
3	R2	All MCs	267	0.8	267	0.8	0.808	14.6	LOS B	11.7	82.5	0.92	0.87	1.19	45.1
Approach			832	1.1	832	1.1	0.808	11.5	LOS A	11.7	82.5	0.92	0.87	1.19	43.9
East: Ferodale Road															
4	L2	All MCs	215	0.5	215	0.5	0.560	7.7	LOS A	4.4	31.0	0.71	0.71	0.79	49.3
5	T1	All MCs	222	0.0	222	0.0	0.560	7.3	LOS A	4.4	31.0	0.71	0.71	0.79	48.3
6	R2	All MCs	102	1.1	102	1.1	0.560	11.7	LOS A	4.4	31.0	0.71	0.71	0.79	49.1
Approach			539	0.4	539	0.4	0.560	8.3	LOS A	4.4	31.0	0.71	0.71	0.79	48.9
North: Medowie Road															
7	L2	All MCs	107	1.0	107	1.0	0.497	10.4	LOS A	3.9	28.0	0.86	0.82	0.99	46.6
8	T1	All MCs	192	2.9	192	2.9	0.497	9.6	LOS A	3.9	28.0	0.86	0.82	0.99	44.3
9	R2	All MCs	41	2.7	41	2.7	0.497	13.4	LOS A	3.9	28.0	0.86	0.82	0.99	43.7
Approach			339	2.3	339	2.3	0.497	10.3	LOS A	3.9	28.0	0.86	0.82	0.99	44.9
West: Ferodale Road															
10	L2	All MCs	134	2.5	134	2.5	0.831	17.4	LOS B	12.4	87.2	1.00	1.15	1.66	39.7
11	T1	All MCs	284	0.4	284	0.4	0.831	17.7	LOS B	12.4	87.2	1.00	1.15	1.66	40.8
12	R2	All MCs	201	0.0	201	0.0	0.831	21.0	LOS B	12.4	87.2	1.00	1.15	1.66	39.5
Approach			619	0.7	619	0.7	0.831	18.7	LOS B	12.4	87.2	1.00	1.15	1.66	40.1
All Vehicles			2329	1.0	2329	1.0	0.831	12.5	LOS A	12.4	87.2	0.88	0.90	1.19	44.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [2034 AM Medowie Road / Ferodale Road (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Medowie Road / Ferodale Road
Site Category: (None)
Roundabout
Design Life Analysis (Final Year): Results for 12 years

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Medowie Road															
1	L2	All MCs	304	2.6	304	2.6	0.545	5.9	LOS A	4.1	29.6	0.66	0.64	0.69	45.0
2	T1	All MCs	168	7.8	168	7.8	0.545	6.0	LOS A	4.1	29.6	0.66	0.64	0.69	45.3
3	R2	All MCs	74	3.5	74	3.5	0.545	9.7	LOS A	4.1	29.6	0.66	0.64	0.69	44.7
Approach			547	4.3	547	4.3	0.545	6.4	LOS A	4.1	29.6	0.66	0.64	0.69	45.0
East: Ferodale Road															
4	L2	All MCs	124	3.2	124	3.2	0.473	8.2	LOS A	3.4	24.1	0.76	0.75	0.85	44.0
5	T1	All MCs	218	3.6	218	3.6	0.473	8.2	LOS A	3.4	24.1	0.76	0.75	0.85	44.3
6	R2	All MCs	38	0.0	38	0.0	0.473	11.9	LOS A	3.4	24.1	0.76	0.75	0.85	43.8
Approach			380	3.1	380	3.1	0.473	8.6	LOS A	3.4	24.1	0.76	0.75	0.85	44.1
North: Medowie Road															
7	L2	All MCs	42	0.0	42	0.0	0.442	6.5	LOS A	2.9	21.1	0.70	0.68	0.72	44.5
8	T1	All MCs	247	8.5	247	8.5	0.442	6.7	LOS A	2.9	21.1	0.70	0.68	0.72	44.7
9	R2	All MCs	90	4.3	90	4.3	0.442	10.4	LOS A	2.9	21.1	0.70	0.68	0.72	44.1
Approach			379	6.6	379	6.6	0.442	7.6	LOS A	2.9	21.1	0.70	0.68	0.72	44.5
West: Ferodale Road															
10	L2	All MCs	74	5.3	74	5.3	0.482	5.1	LOS A	3.2	23.4	0.58	0.62	0.58	44.5
11	T1	All MCs	141	1.9	141	1.9	0.482	5.0	LOS A	3.2	23.4	0.58	0.62	0.58	44.8
12	R2	All MCs	299	3.9	299	3.9	0.482	8.8	LOS A	3.2	23.4	0.58	0.62	0.58	44.2
Approach			514	3.6	514	3.6	0.482	7.2	LOS A	3.2	23.4	0.58	0.62	0.58	44.4
All Vehicles			1820	4.3	1820	4.3	0.545	7.3	LOS A	4.1	29.6	0.67	0.66	0.70	44.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [2034 PM Medowie Road / Ferodale Road (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Medowie Road / Ferodale Road, allowing 2.4% background growth all legs to 2029
Site Category: (None)
Roundabout
Design Life Analysis (Final Year): Results for 12 years

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Stop Rate	Eff.	Aver. No. of Cycles	Aver. Speed km/h
South: Medowie Road																
1	L2	All MCs	334	1.2	334	1.2	0.652	5.1	LOS A	5.7	40.5	0.62		0.57	0.63	45.1
2	T1	All MCs	339	1.2	339	1.2	0.652	5.1	LOS A	5.7	40.5	0.62		0.57	0.63	45.4
3	R2	All MCs	101	2.6	101	2.6	0.652	8.9	LOS A	5.7	40.5	0.62		0.57	0.63	44.8
Approach			774	1.3	774	1.3	0.652	5.6	LOS A	5.7	40.5	0.62		0.57	0.63	45.2
East: Ferodale Road																
4	L2	All MCs	44	2.9	44	2.9	0.242	5.9	LOS A	1.3	9.3	0.59		0.61	0.59	45.1
5	T1	All MCs	159	0.0	159	0.0	0.242	5.8	LOS A	1.3	9.3	0.59		0.61	0.59	45.4
6	R2	All MCs	16	8.3	16	8.3	0.242	9.9	LOS A	1.3	9.3	0.59		0.61	0.59	44.7
Approach			219	1.2	219	1.2	0.242	6.1	LOS A	1.3	9.3	0.59		0.61	0.59	45.3
North: Medowie Road																
7	L2	All MCs	20	6.7	20	6.7	0.364	6.7	LOS A	2.3	16.6	0.72		0.67	0.72	44.5
8	T1	All MCs	228	2.9	228	2.9	0.364	6.5	LOS A	2.3	16.6	0.72		0.67	0.72	44.8
9	R2	All MCs	48	2.7	48	2.7	0.364	10.3	LOS A	2.3	16.6	0.72		0.67	0.72	44.3
Approach			296	3.1	296	3.1	0.364	7.1	LOS A	2.3	16.6	0.72		0.67	0.72	44.7
West: Ferodale Road																
10	L2	All MCs	159	2.5	159	2.5	0.677	8.7	LOS A	6.9	49.0	0.82		0.81	1.01	43.3
11	T1	All MCs	232	0.6	232	0.6	0.677	8.6	LOS A	6.9	49.0	0.82		0.81	1.01	43.5
12	R2	All MCs	240	0.0	240	0.0	0.677	12.4	LOS A	6.9	49.0	0.82		0.81	1.01	43.1
Approach			632	0.8	632	0.8	0.677	10.0	LOS A	6.9	49.0	0.82		0.81	1.01	43.3
All Vehicles			1921	1.4	1921	1.4	0.677	7.4	LOS A	6.9	49.0	0.70		0.67	0.77	44.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [2024 PM Medowie Road / Ferodale Road+dev (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Medowie Road / Ferodale Road, allowing 2.4% background growth all legs to 2029
Site Category: (None)
Roundabout
Design Life Analysis (Final Year): Results for 2 years

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Medowie Road															
1	L2	All MCs	280	1.2	280	1.2	0.808	10.0	LOS A	11.7	82.5	0.92	0.87	1.19	43.3
2	T1	All MCs	285	1.2	285	1.2	0.808	10.0	LOS A	11.7	82.5	0.92	0.87	1.19	43.6
3	R2	All MCs	267	0.8	267	0.8	0.808	14.6	LOS B	11.7	82.5	0.92	0.87	1.19	45.1
Approach			832	1.1	832	1.1	0.808	11.5	LOS A	11.7	82.5	0.92	0.87	1.19	43.9
East: Ferodale Road															
4	L2	All MCs	215	0.5	215	0.5	0.560	7.7	LOS A	4.4	31.0	0.71	0.71	0.79	49.3
5	T1	All MCs	222	0.0	222	0.0	0.560	7.3	LOS A	4.4	31.0	0.71	0.71	0.79	48.3
6	R2	All MCs	102	1.1	102	1.1	0.560	11.7	LOS A	4.4	31.0	0.71	0.71	0.79	49.1
Approach			539	0.4	539	0.4	0.560	8.3	LOS A	4.4	31.0	0.71	0.71	0.79	48.9
North: Medowie Road															
7	L2	All MCs	107	1.0	107	1.0	0.497	10.4	LOS A	3.9	28.0	0.86	0.82	0.99	46.6
8	T1	All MCs	192	2.9	192	2.9	0.497	9.6	LOS A	3.9	28.0	0.86	0.82	0.99	44.3
9	R2	All MCs	41	2.7	41	2.7	0.497	13.4	LOS A	3.9	28.0	0.86	0.82	0.99	43.7
Approach			339	2.3	339	2.3	0.497	10.3	LOS A	3.9	28.0	0.86	0.82	0.99	44.9
West: Ferodale Road															
10	L2	All MCs	134	2.5	134	2.5	0.831	17.4	LOS B	12.4	87.2	1.00	1.15	1.66	39.7
11	T1	All MCs	284	0.4	284	0.4	0.831	17.7	LOS B	12.4	87.2	1.00	1.15	1.66	40.8
12	R2	All MCs	201	0.0	201	0.0	0.831	21.0	LOS B	12.4	87.2	1.00	1.15	1.66	39.5
Approach			619	0.7	619	0.7	0.831	18.7	LOS B	12.4	87.2	1.00	1.15	1.66	40.1
All Vehicles			2329	1.0	2329	1.0	0.831	12.5	LOS A	12.4	87.2	0.88	0.90	1.19	44.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [2034 PM Medowie Road / Ferodale Road+dev (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Medowie Road / Ferodale Road, allowing 2.4% background growth all legs to 2029
Site Category: (None)
Roundabout
Design Life Analysis (Final Year): Results for 12 years

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Medowie Road															
1	L2	All MCs	334	0.9	334	0.9	0.941	20.3	LOS B	24.4	171.8	1.00	1.35	1.90	38.6
2	T1	All MCs	339	0.9	339	0.9	0.941	20.2	LOS B	24.4	171.8	1.00	1.35	1.90	38.8
3	R2	All MCs	271	0.8	271	0.8	0.941	24.8	LOS B	24.4	171.8	1.00	1.35	1.90	39.9
Approach			943	0.9	943	0.9	0.941	21.6	LOS B	24.4	171.8	1.00	1.35	1.90	39.1
East: Ferodale Road															
4	L2	All MCs	215	0.5	215	0.5	0.624	9.2	LOS A	5.7	40.1	0.80	0.79	0.96	48.2
5	T1	All MCs	244	0.0	244	0.0	0.624	8.8	LOS A	5.7	40.1	0.80	0.79	0.96	47.1
6	R2	All MCs	101	1.0	101	1.0	0.624	13.3	LOS A	5.7	40.1	0.80	0.79	0.96	48.0
Approach			560	0.4	560	0.4	0.624	9.8	LOS A	5.7	40.1	0.80	0.79	0.96	47.6
North: Medowie Road															
7	L2	All MCs	104	1.0	104	1.0	0.601	13.1	LOS A	5.5	39.2	0.93	0.92	1.20	44.8
8	T1	All MCs	227	2.3	227	2.3	0.601	12.4	LOS A	5.5	39.2	0.93	0.92	1.20	42.7
9	R2	All MCs	48	2.2	48	2.2	0.601	16.2	LOS B	5.5	39.2	0.93	0.92	1.20	42.2
Approach			380	1.9	380	1.9	0.601	13.1	LOS A	5.5	39.2	0.93	0.92	1.20	43.2
West: Ferodale Road															
10	L2	All MCs	158	2.0	158	2.0	1.050	81.5	LOS F[11]	45.7	321.6	1.00	2.70	4.79	23.5
11	T1	All MCs	317	0.3	317	0.3	1.050	81.7	LOS F[11]	45.7	321.6	1.00	2.70	4.79	23.8
12	R2	All MCs	240	0.0	240	0.0	1.050	85.2	LOS F[11]	45.7	321.6	1.00	2.70	4.79	23.4
Approach			715	0.6	715	0.6	1.050	82.8	LOS F[11]	45.7	321.6	1.00	2.70	4.79	23.6
All Vehicles			2598	0.9	2598	0.9	1.050	34.6	LOS C	45.7	321.6	0.95	1.54	2.39	34.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.
11 Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.