STRATHALBYN NORTH CODE AMENDMENT
ADELAIDE ROAD, STRATHALBYN

TRANSPORT INVESTIGATIONS REPORT

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CIRQA Pty Ltd
ABN 12 681 029 983
PO Box 144, Glenside SA 5065
150 Halifax Street, Adelaide SA 5000
(08) 7078 1801
www.cirqa.com.au

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1. INTRODUCTION

CIRQA has been engaged to provide traffic impact investigations in relation to the proposed rezoning of the following allotments (referred to herein as the 'Affected Area'):

- Lot 11 Braemar Drive, Strathalbyn;
- Lot 12 Braemar Drive, Strathalbyn;
- Lot 13 Hampden Way, Strathalbyn;
- Lot 14 Hampden Way, Strathalbyn; and
- Lot 20 Hampden Way, Strathalbyn.

Specifically, CIRQA's investigations relate to the proposed rezoning of the Affected Area from 'Hills Neighbourhood Zone' to 'Local Town Centre Zone'.

This report includes assessment of the forecast traffic generation associated with the proposed rezoning and redevelopment of the subject land, the associated impact on the adjacent existing road network, active and sustainable transport provisions and consideration of potential infrastructure provisions and upgrades.

2. BACKGROUND

2.1 SUBJECT SITE

The Affected Area is bound by undeveloped (greenfield) land to the north, Adelaide Road to the east, Braemar Drive to the south and Hampden Way to the west.

Figure 1 illustrates the location of the Affected Area and adjacent road network.

Figure 1 – Location of the Affected Area and adjacent road network (Source: Ekistics)

The Affected Area comprises five (5) allotments, namely:

- Allotment 11 Hampden Way (CT 6271/891, comprising approximately 2,223 m² of land area;
- Allotment 12 Braemar Drive (CT 9271/892), comprising approximately 4,580 m² of land area;
- Allotment 13 Braemar Drive (CT 6274/133), comprising approximately 2,700 m² of land area;

- Allotment 14 Braemar Drive (CT 6274/134), comprising approximately 2,100 m² of land area; and
- Allotment 20 Braemar Drive (CT 6274/135), comprising approximately 34,160 m² of land area.

The Planning and Design Code identifies that the Affected Area is currently located within a Hills Neighbourhood Zone, with the following overlays applicable:

- Affordable Housing;
- Hazards (Bushfire – Urban Interface);
- Hazards (Flooding – Evidence Required);
- Murray-Darling Basin;
- Native Vegetation;
- Prescribed Water Resources Area;
- River Murray Tributaries Protection Area;
- Traffic Generating Development;
- Urban Transport Routes; and
- Water Resources.

The Affected Area is currently undeveloped (greenfield) land, currently earmarked for future residential development (as reflected by the site's current zoning). As such, existing traffic volumes generated by the Affected Area would be negligible, albeit larger volumes would be envisaged by its current zoning.

Vehicle access to the Affected Area is currently provided via an access point on Braemar Drive (via Allotment 12 Braemar Drive), at which all turning movements are permitted.

It should be noted that Allotments 11 and 12 Braemar Drive, and Allotments 13 and 14 were only recently created (via land division from 'Allotment 20 Braemar Drive', previously referred to as Allotment 5 Hampden Way). While Allotment 11 has 'free and unrestricted' rights-of-way over a portion of Allotment 12, no formal (legal) vehicle access is currently provided to Allotment 20. Similarly, no formal vehicle access is currently provided to Allotments 13 or 14.

2.2 SURROUNDING DEVELOPMENT

Planning approval was recently granted by the Alexandrina Council's 'Council Assessment Panel' (the Fleurieu Regional Assessment Panel) for a mixed-use

proposal on Allotment 12. The approval will facilitate the following key development yields:

- 420 m² of medical floor area;
- 211 m² of allied health floor area;
- 505 m² of gym floor area; and
- 211 m² of pharmacy floor area.

Vehicle access to the Allotment 12 development was approved via a two-way crossover on Braemar Drive (approximately midblock between Adelaide Road and Hampden Way), at which all movements are permitted.

In addition to the above, development approval is also understood to have recently been granted for the construction of an 'On the Run' petrol station on Allotment 508 Braemar Drive (southern side of Braemar Drive, directly opposite the Affected Area). The 8,633 m² development site is understood to comprise four (4) fuel double-sided fuel bowsers, a 794 m² control building (comprising retail area, back-of-house facilities, and quick-service restaurants with associated drive-through facilities) and a car wash (comprising four (4) manual bays and two (2) automatic bays).

Vehicle access to the OTR was approved via a two-way access on North Parade (all movements permitted), a two-way access on Braemar Drive (all movements) and separate ingress and egress crossovers on Braemar Drive.

CIRQA is unaware of any other development approvals recently granted within close proximity to the Affected Area which may impact upon traffic associated with the proposed rezoning.

2.3 ADJACENT ROAD NETWORK

2.3.1 KEY ADJACENT ROADS

Adelaide Road is an arterial road under the care and control of the Department for Infrastructure and Transport (DIT). Adjacent the site, Adelaide Road comprises a 7.0 m wide carriageway with a single traffic lane in each direction and adjacent shoulders on each side (comprising sealed and unsealed surfaces). Traffic data obtained from DIT indicates that Adelaide Road has an Annual Average Daily Traffic (AADT) volume in the order of 7,600 vehicles per day (vpd). A 50 km/h speed limit applies on Adelaide Road adjacent the southern portion of the site (extending approximately 80 m north of the southern boundary), while a 60 km/h speed limit applies adjacent the remainder of the site's Adelaide Road boundary.

Hampden Way is a local road under the care and control of Alexandrina Council. Adjacent the site, Hampden Way comprises a 7.5 m wide carriageway (approximate) accommodating two-way vehicle movements. Unsealed shoulders are provided on both sides of Hampden Way side. On-street parking is currently permitted on both sides of Hampden Way. A 50 km/h speed limit applies on Hampden Way.

Braemar Drive is also a local road under the care and control of the Alexandrina Council. Adjacent the site, Braemar Drive comprises a 7.5 m wide carriageway (approximate) with a single traffic lane in each direction and unsealed shoulders on each side. On-street parking is currently permitted on both sides of Braemar Drive. Traffic data collected by CIRQA indicates that Braemar Drive has an AADT volume in the order of 2,100 vpd. A 50 km/h speed limit applies on Braemar Drive.

2.3.2 KEY ADJACENT INTERSECTIONS

Adelaide Road and Braemar Drive intersect at a four-way intersection (with East Terrace) controlled by a single lane roundabout. The roundabout comprises a mountable annulus in order to facilitate commercial vehicle movements (up to 19.0 m in length). All turning movements are permitted at the intersection. Pedestrian crossing movements are facilitated across all approaches.

Hampden Way and Braemar Drive intersect at a single-lane roundabout, with a small mountable annulus. All turning movements are permitted at the intersection.

2.4 WALKING AND CYCLING

A sealed shared path is provided on the eastern side of Adelaide Road, accommodating both pedestrian and cyclist movements. A sealed footpath is also provided on the western side of Hampden Road. No footpaths are provided in the section of Braemar Road immediately adjacent the Affected Area.

No bicycle lanes are provided on Adelaide Road, Hampden Road or Braemar Drive. Cyclists are required to share the carriageway with vehicles or ride on the adjacent footpath (where a footpath is provided).

2.5 PUBLIC TRANSPORT

Public bus services operate on Adelaide Road and North Parade, with stops located within 150 m walking distance of the Affected Area on both sides of North Parade. These stops are serviced by the following bus routes:

- Route 852 – Strathalbyn to Mt Barker; and
- Route 852L – Langhorne Creek to Cornerstone College (school days only).

3. PROPOSED REZONING

3.1 ANTICIPATED DEVELOPMENT YIELDS

The Affected Area is proposed to be rezoned (from 'Hills Neighbourhood Zone' to 'Local Town Centre Zone') to enable retail and commercial development. Specifically, based upon a detailed "*Retail and economic investigations*" report (prepared by Deep End Services), the Affected Area has been identified as being able to be support the land uses and yields identified in Table 1.

Table 1 – Land uses and site areas associated with future development of the Affected Area.

Land use	Gross Floor Area (m^2)	Site Area (m^2)
Supermarket	2,500	
Shops (10-12)	1,500	
Small showrooms (3-5)	1,500	
Office/commercial	800	
	6,300	25,000
Pad sites		
Fast food and drive through	250	2,500
Fuel station and convenience	250	2,500
Separate office (vet, dental)	200	700
Total all uses	**7,000**	**30,700**

It should be noted that the "*Retail and economic investigations*" report has taken into consideration the approved developments identified within Section 2.2 and has identified the Table 1 yields in addition to those already approved.

3.2 ACCESS ARRANGEMENTS AND INFRASTRUCTURE

Given the possible land uses identified within the balance of the Affected Area, it is considered that appropriate primary vehicle access be provided directly via Adelaide Road (relevant to Allotment 20). This will assist in mitigating potential traffic impacts associated with Affected Area traffic using the surrounding local road network.

Generally, a two-way access point on Adelaide Road is regarded to be appropriate as the primary access point for Allotment 20. In addition, a 'left-in only' secondary access point from Adelaide Road would assist in providing additional accessibility to pad site(s) located near the intersection of Adelaide Road and Braemar Drive (on Allotment 20).

An additional secondary access point to Allotment 20 via Hampden Way is also considered appropriate to increase accessibility (provided that the internal site

configuration does not act as a 'cut-through' route between Adelaide Road and Hampden Way). The detailed design of Allotment 20 should ensure a circuitous nature with appropriate traffic control in order to ensure that such a route does not detract from the use of Braemar Drive.

It is considered appropriate that commercial vehicle access to Allotment 20 be provided directly via Adelaide Road, rather than relying upon the use of the surrounding local road network. Adelaide Road access treatments shall therefore be designed appropriately to accommodate such vehicles.

With regard to Allotment 11, as per the approved land division plan, vehicle access should be provided via a two-way access shared with that of the approved development on Allotment 12. This access is located approximately midblock on Braemar Drive, on the outside of a minor curve, thereby maximising separation to adjacent intersections and maximising sightline provisions.

In relation to Allotment 13, the site has frontage only to Hampden Way. Vehicle access should therefore be provided directly via Hampden Way or, alternatively, via shared arrangements over adjoining allotments (i.e. formalisation of a right-of-way).

Allotment 14 is located on the north-eastern corner of the Braemar Drive/Hampden Way roundabout, thereby restricting available access opportunities. The allotment's Braemar Drive frontage is considered inappropriate to provide a suitable two-way access due to the proximity of the intersection control treatment and the curvature of Braemar Drive. Vehicle access should therefore be provided via Hampden Way adjacent the allotment's northern boundary (i.e. maximising separation from the roundabout).

The location of the access points proposed should ensure that appropriate separation is provided between access points and adjacent intersections (such as the Adelaide Road/Braemar Drive and Braemar Drive/Hampden Way roundabouts) in line with the requirements of the Planning and Design Code and relevant Austroads Guidelines.

Similarly, access points should be designed appropriately to accommodate traffic volumes and composition forecast to be associated with the redevelopment of the Affected Area. This shall include consideration of turn warrants at the various access points in line with the Austroads Guidelines.

As noted in Section 2.1, the Affected Area is currently subject to the 'Urban Transport Routes' and 'Traffic Generating Development' Overlays as identified by the Planning and Design Code. The retention of these Overlay upon rezoning of the subject land is considered appropriate to ensure the safe and efficient

operation of Adelaide Road adjacent the site (Desired Outcome 1 of the Traffic Generating Development' and 'Urban Transport Routes' Overlay). The retention of these overlays will also assist to ensure that the road owner (DIT) is aware of any potential traffic impacts to its operation (i.e. creation of a new access on Adelaide Road will trigger a mandatory referral to the Commissioner of Highways (DIT).

A Concept Plan illustrating the various access provisions to the Affected Area is attached in Appendix A.

The layout of future development within the Affected Area shall accommodate parking and circulation areas in accordance with the requirements of the Australian/New Zealand Standards for *"Parking Facilities Part 1: Off-street car parking"* (AS/NZS 2890.1:2004) and *"Parking Facilities Part 6: Off-street parking for people with disabilities"* (AS/NZS 2890.6:2009). Similarly, consideration shall also be given to DIT's "*Code of Technical Requirements*" when determining an appropriate design.

4. PARKING PROVISIONS

On-site parking should be provided within the Affected Area in line with the requirements of "*Table 1 – General Off-Street Car Parking Requirements*" of the "*Transport, Access and Parking*" section within "*Part 4 – General Development Policies*".

Consideration may also be given to a number of factors which may reduce parking provisions including (but not limited to) shared-use/shared-trips, accessibility of public transport services, surrounding active transport networks and associated connectivity.

5. TRAFFIC ASSESSMENT

5.1 TRAFFIC GENERATION

In order to determine the potential traffic impact of the proposed rezoning on the adjacent road network, traffic volumes associated with potential future development of the Affected Area have been forecast based on the yields specified in Table 1.

Future traffic volumes have typically been forecast using rates adopted from various traffic literature and associated traffic data. Specifically, the following traffic generation rates have been adopted for the purposes of this assessment:

- Supermarket and shops
  - 4.5 am and 9.0 pm peak hour trips per 100 m² of gross floor area;
  - the NSW RTA *"Guide to Traffic Generating Developments"* (the RTA Guide) identifies a peak hour (Thursday) traffic generation of 12.3 peak hour trips per 100 m² of gross leasable floor area for shopping centres with a total floor area between 0 and 10,000 m². However, such a rate is not considered to be appropriate for application to the subject proposal's retail component. In reality, it would be expected that the retail component would generate in the order of 7.5 to 9.0 pm peak hour trips per 100 m² of floor area. Such rates have recently been adopted (and accepted) for various retail shops throughout metropolitan Adelaide; and
  - it should also be noted that the am peak hour generation of 'shops' is typically 50% of that associated with the pm peak hour.
- Retail showrooms/Bulky goods
  - 2.7 am and pm peak hour trips per 100 m² of gross floor area; and
  - as specified by the RMS Guide Technical Direction Update.
- Office
  - 1.6 am and 1.2 pm peak hour trips per 100 m² gross floor area; and
  - as specified by the RMS Guide Technical Direction Update.
- Fast-food restaurant
  - 91.5 am and 183 pm peak hour trips per site;
  - the RTA Guide identifies traffic generation rates for various fast-food restaurants however, such rates are based upon data collected prior to the document being published in 2001. More recently (2016), the RMS commissioned Bitzios Consulting to review the traffic generation rates associated with fast-food restaurants. Bitzios Consulting identified a traffic generation rate of 183 pm network peak hour trips to be applicable to McDonald's fast-food restaurants (the highest traffic generating

fast-food restaurant surveyed). While a specific brand/franchise of fast-food restaurant has not yet been determined, the rate applicable to McDonald's restaurants has been adopted for the purposes of the subject traffic impact assessment as it is the highest rate of all fast-food restaurant franchises. Adoption this rate therefore provides a conservative assessment of a traffic impact assessment;

  - while an am peak hour rate was not identified by Bitzios Consulting, it has been assumed that approximately half of the pm peak hour will be generated during the am peak hour (i.e. 92 am network peak hour trips has also been assumed); and
  - the Bitzios Consulting study also identified an applicable passing trade in the order of 50% of the use's forecast traffic generation (i.e. 50% of the movements forecast are existing movements already using the adjacent road network).

- Medical Centre/Consulting rooms
  - 10.4 am and 8.8 pm trips per 100 m² gross floor area; and
  - The RTA Guide does not identify traffic generation rates applicable to standard consulting rooms, however does identify rates applicable to medical centres. Accordingly, the associated medical centre traffic generation rates have been applied to both medical and consulting room uses.
- Fuel station and convenience
  - am peak hour trips = $0.2815(X2^2) + 14.047(X2) + 16.715$;
  - pm peak hour trips = $0.0205(X1) + 88.52$;
  - an update to the RTA Guide's petrol filling station traffic generation rates was prepared by TEF Consulting for the RMS in 2013. The updated study identified that the previously recommended rates were based on data from 1979 and that the operation and nature of petrol filling stations has changed significantly since that time. Based on detailed statistical analysis, the update report recommended the above rates for assessment of traffic generation at petrol stations during the road network peak hours (where X1 is the total site area in m² and X2 is the number of service channels); and
  - In addition, it is commonly accepted that in the order of 70% of vehicle trips associated with petrol filling stations are related to passing trade (i.e. vehicles already on the adjacent road network).

On the basis of the development yields identified in Table 1, traffic volumes associated with the future development of the Affected Area have been forecast.

It should be noted that with regard to a petrol filling station, the above traffic generation has been determined assuming a 2,500 m² site and six (6) service channels (i.e. three dual-sided bowsers).

However, as identified in Section 2.2, development (in addition to that identified by Deep End Services) has already been approved, albeit not yet constructed. As such, in order to provide a conservative assessment, consideration has also been given to traffic generated by their future use in conjunction with that generated by additional uses within the Affected Area (Table 1).

Based upon the rates identified above (and an indoor recreation centre traffic generation rate of 3.6 am and pm peak hour trips per 100 m² of floor area), the following traffic volumes are forecast to be generated by the various development sites:

- Allotments 11, 13, 14 & 20 *(Affected Area)* – 457 am and 754 pm peak hour trips (124 am and 189 pm 'passing trade' vehicle movements);
- Allotment 12 *(Affected Area)* – 93 am and 93 pm peak hour trips; and
- Allotment 508 *(OTR Integrated Service Station)*– 148 am and 267 pm peak hour trips (102 am and 185 pm 'passing trade' vehicle movements).

In total, in the order of 697 am and 1,109 pm peak hour trips are forecast upon full development of the Affected Area (as envisaged by Table 1) and Allotment 508. However, of the total development movements, in the order of 226 am and 375 pm peak hour movements are anticipated to be 'passing trade' vehicle movements already utilising the adjacent road network (i.e. not additional vehicle movements).

5.2 TRAFFIC DISTRIBUTION

The distribution of future trips associated with the potential development of the Affected Area has been forecast based on the access provisions outlines in Section 3.2. Consideration has been given to the surrounding local road network and its connectivity to residential areas as well as proximity to the site's broader (regional) commercial and retail centres.

Generally, the same traffic distribution has also been adopted for the purposes of assessment of traffic associated with Allotment 12 and Allotment 508, albeit with consideration to their respective approved access provisions.

Specifically, the following high-level traffic distribution has been adopted for the purposes of this assessment:

- North – 25% of total vehicle movements to/from the north (residential areas, Long Valley Road and/or Strathalbyn Road);
- East – 10% of total vehicle movements to/from the east (residential areas, Callington Road and/or Langhorne Creek Road);
- South – 55% of total vehicle movements to/from the south (residential areas, Millang Road and/or Alexandrina Road); and
- West – 10% of total vehicle movements to/from the west (residential areas, Paris Creek Road and/or Ashbourne Road).

Based upon the above, peak hour vehicle movements have been forecast at each of the Affected Area's access points (inclusive of traffic volumes forecast to be generated by Allotment 12 and Allotment 508). Total traffic volumes forecast are illustrated in Figure 2, Figure 3 and Figure 4.

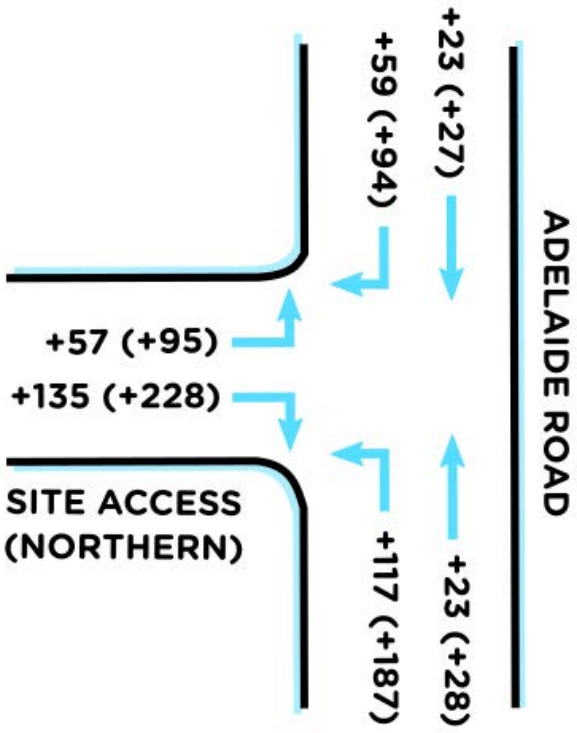

Figure 2 – Additional vehicle movements forecast at the Affected Area's primary Adelaide Road access

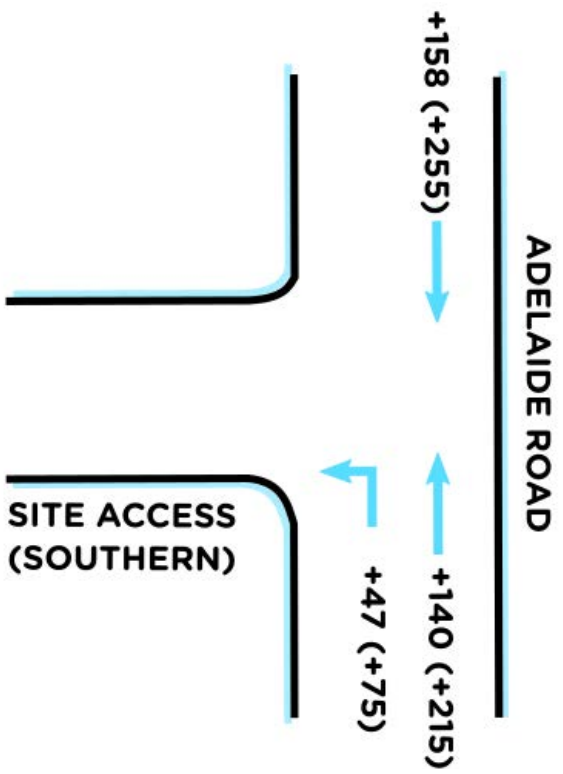

Figure 3 – Additional vehicle movements forecast at the Affected Area's secondary Adelaide Road access

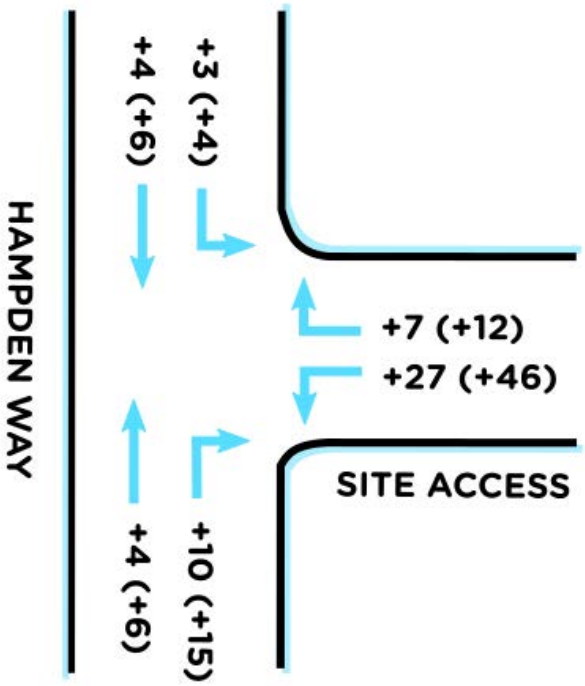

Figure 4 – Additional vehicle movements forecast at the Affected Area's Hampden Way access

It should be noted that the traffic volumes illustrated in Figure 2, Figure 3 and Figure 4 include consideration of volumes associated with realisation of the full Table 1 yield, and Allotment 12 and 508 development volumes (based upon the approved development yields). While volumes associated with Allotments 12 and 508 will not (typically) enter Allotment 20, their associated future volumes have been considered for the purposes of 'through' volumes on Adelaide Road and Hampden Way.

In a similar manner, 'total traffic' volumes (i.e. existing traffic volumes plus forecast volumes associated with the development of the Affected Area, Allotment 12 and Allotment 508) have also been forecast at the Adelaide Road/ Braemar Drive/East Terrace roundabout (illustrated in Figure 5).

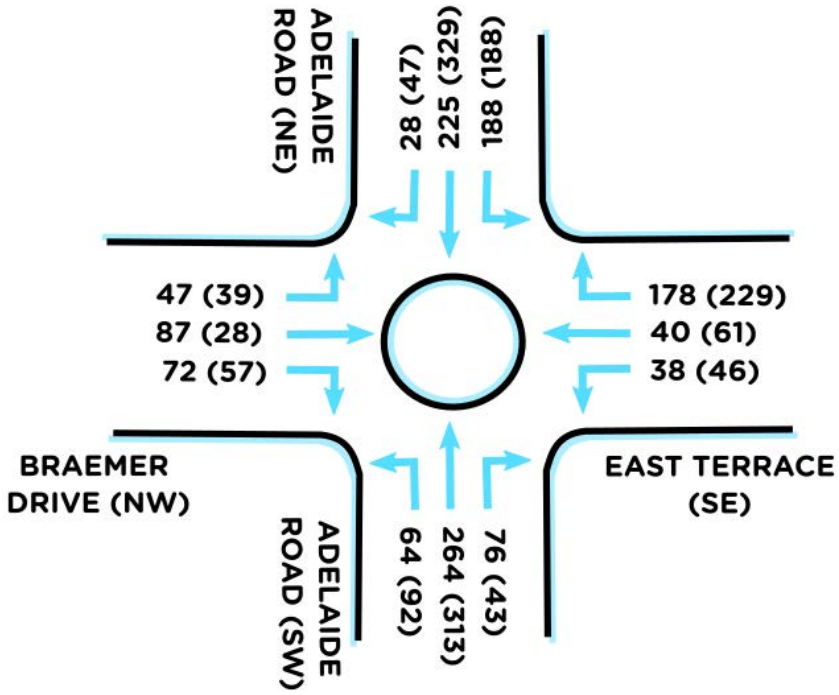

Figure 5 – Total vehicle movements forecast at the Adelaide Road/Braemar Drive/East Terrace roundabout

5.3 TRAFFIC IMPACT

In order to determine the cumulative traffic impact of the proposed Code Amendment and approved developments on Allotment 12 and Allotment 508, SIDRA Intersection modelling analyses have been undertaken. Specifically, SIDRA Intersection modelling has been undertaken at the following locations:

- Adelaide Road/Primary Site Access; and
- Adelaide Road/Braemar Drive/East Terrace Roundabout.

It should be noted that SIDRA modelling has not been undertaken for the envisaged Adelaide Road secondary access, nor the Hampden Way secondary access. This is due to future traffic volumes (upon realisation of all development) being very low (as illustrated in Figure 3 and Figure 4).

Similarly, SIDRA modelling has not been undertaken for access points associated with Allotment 12, nor the access points associated with Allotment 508. This is due to their access provisions already having been approved as part of their planning approval process, with respective traffic impact assessments already having been undertaken.

5.3.1 ADELAIDE ROAD/PRIMARY SITE ACCESS

The Adelaide Road and Affected Area's primary site access has been modelled adopting channelised left-turn and channelised right-turn treatments (i.e. separated lanes) on Adelaide Road. Similarly within the site, separated left and right-turn lanes have been nominated at the access (via a high-angle left-turn lane from the site onto Adelaide Road).

While a separated turn treatment access has been modelled for the purposes of this assessment, in the event that lesser yields are proposed as part of a later development application, a lesser access treatment may be determined to be suitable (via an accompanying traffic impact assessment). Notwithstanding, for the proposes of the subject Code Amendment, the aforementioned intersection has been adopted.

Key SIDRA output derived from modelling of Allotment 20's primary Adelaide Road access is identified in Table 2, with detailed SIDRA output (for both the am and pm peak hour scenarios) attached in Appendix B.

Table 2 – Key SIDRA results for the Adelaide Road primary access during the am and (pm) peak hours

Approach	Movement	Degree of Saturation	Ave. Delay (s)
Adelaide Rd (NE)	T	0.191 (0.218)	0.1 (0.1)
	R	0.051 (0.084)	6.0 (6.2)
Site Access (NW)	L	0.054 (0.092)	6.0 (6.1)
	R	0.387 (0.824)	16.4 (31.7)
Adelaide Road (SW)	L	0.080 (0.133)	4.7 (4.9)
	T	0.203 (0.213)	0.1 (0.1)

As illustrated in Table 2, Allotment 20's primary Adelaide Road access will operate satisfactorily upon realisation of the full Affected Area development yield (Table 1), plus development of Allotments 12 and 508 (as approved).

Specifically, the access will readily accommodate envisaged traffic volumes, with minimal impacts upon the operation of Adelaide Road. While minor delays may occur (during peak periods) for drivers undertaking a right-turn from the site, queues will be accommodated entirely within the Affected Area, thereby limiting the site's potential impact.

5.3.2 ADELAIDE ROAD/BRAEMAR DRIVE/EAST TERRACE ROUNDABOUT

The Adelaide Road, Braemar Drive and East Terrace roundabout has been modelled in SIDRA using its existing configuration (i.e. a single lane roundabout, with no upgrades proposed). However, in order to determine the cumulative impacts of the proposal, modelling has been undertaken solely using existing traffic volumes in order to provide a 'base case' scenario. A 'total traffic' scenario has then been modelled based upon traffic volumes associated with the full realisation of the Affected Area yields (Table 1) and development of Allotments 12 and 508 (as approved). This approach allows a comparison between the roundabout's existing operation and future options.

Key SIDRA output derived from modelling of the 'base case' and 'total traffic' scenarios is illustrated in Table 3, with detailed SIDRA output (for both the am and pm peak hour scenarios) attached in Appendix C.

Table 3 – Key SIDRA results for the Adelaide Road, Braemar Drive and East Terrace roundabout during the am and (pm) peak hours

Approach	Movement	Base Case		Total Traffic	
		Degree of Saturation	Ave. Delay (s)	Degree of Saturation	Ave. Delay (s)
East Tce (SE)	L	0.179 (0.231)	3.8 (4.2)	0.256 (0.365)	4.5 (5.5)
	T	0.179 (0.231)	3.6 (4.0)	0.256 (0.365)	4.3 (5.2)
	R	0.179 (0.231)	8.7 (9.0)	0.256 (0.365)	9.3 (10.2)
Adelaide Rd (NE)	L	0.290 (0.281)	3.9 (3.1)	0.404 (0.444)	4.2 (3.5)
	T	0.290 (0.281)	3.7 (3.0)	0.404 (0.444)	4.0 (3.3)
	R	0.290 (0.281)	8.5 (7.9)	0.404 (0.444)	8.9 (8.2)
Braemar Dr (NW)	L	0.157 (0.064)	4.7 (4.5)	0.237 (0.153)	5.7 (6.0)
	T	0.157 (0.064)	4.6 (4.3)	0.237 (0.153)	5.6 (5.8)
	R	0.157 (0.064)	9.5 (9.3)	0.237 (0.153)	10.5 (10.8)
Adelaide Rd (SW)	L	0.267 (0.278)	3.5 (3.9)	0.373 (0.454)	4.2 (5.0)
	T	0.267 (0.278)	3.4 (3.8)	0.373 (0.454)	4.1 (4.8)
	R	0.267 (0.278)	8.3 (8.6)	0.373 (0.454)	9.0 (9.7)

Modelling of the Adelaide Road/Braemar Drive/East Terrace roundabout indicates that existing traffic volumes are readily accommodated at the intersection, with negligible delays for all turning movements.

Similarly, modelling of the future 'total traffic' scenario also identifies that the volumes will be readily accommodated, with the Degree of Saturation (DoS) associated with any given turning movement, well below acceptable limits.

Comparing the 'base case' and 'total traffic' scenarios, the data identified in Table 3 indicates negligible increases to delays experienced at the Adelaide Road, Braemar Drive and East Terrace roundabout. Specifically, delays are not forecast to increase by more than two (2) seconds for any turning movement. As such, it is expected that the roundabout will continue to operate satisfactorily in the event that full development yields of the Affected Area are realised (in conjunction with the development of Allotments 12 and 508).

6. SUMMARY

The proposed rezoning of the Affected Area will facilitate the future development of retail and commercial uses. Development yields anticipated to be supported within Strathalbyn and surrounding areas have been identified by Deep End Services as part of a detailed "*Retail and economic investigations*" report. Based upon their investigations, it is anticipated that in the order of 7,000 m² of gross floor area could ultimately be accommodated throughout the Affected Area.

It is anticipated that vehicle access to the Affected Area would be appropriate via a primary all-movement and a secondary left-in only access on Adelaide Road, and a secondary all-movement access on Hampden Way. Such provisions are considered generally appropriate to accommodate traffic volumes forecast to be associated with development yields envisaged by Deep End Services.

Access provisions should be designed as part of future development applications, taking into consideration proposed development yields, relevant Australian Standards and Austroads Guidelines. This includes consideration and installation of separated turn lanes associated with a given site access where warranted.

In addition, it is considered appropriate to provide commercial vehicle access directly via Adelaide Road, such as to minimise such vehicle movements on the surrounding local road network.

On-site parking should generally be provided in accordance the "*General Off-Street Car Parking Requirements*" identified by the Planning and Design Code. Consideration may however, where appropriate, be given to reduced parking provision based upon shared-trip/shared-parking principles and surrounding alternate transport modes (i.e. public and active transport).

A traffic impact assessment has been undertaken based upon full development of the Affected Area as envisaged by Deep End Services. Consideration has also been given to approved development proposals on Allotment 12 Braemar Drive (within the Affected Area) and Allotment 508 Braemar Drive (immediately south of the Affected Area) in order to determine the cumulative impact of their potential realisation.

The traffic forecasts identify that in the order of 471 am and 734 pm additional peak hour movements could be generated by the various developments, inclusive of the Affected Area. The vast majority of vehicle movements will be distributed via Adelaide Road (both north and south of the Affected Area) and through the Adelaide Road/Braemar Drive/East Terrace roundabout.

SIDRA Intersection modelling of the Affected Area's primary Adelaide Road access identifies that future 'total traffic' volumes will be readily accommodated at the intersection, with negligible impact upon its operation. Similarly, the existing Adelaide Road/Braemar Drive/East Terrace roundabout will continue to operate satisfactorily upon full realisation of the Affected Area's development potential (in conjunction with development of Allotments 12 and 508).

APPENDIX A

CONCEPT PLAN OF ACCESS PROVISIONS TO THE AFFECTED AREA

Concept Plan Boundary
Activity Centre
Open Space / Stormwater Management
Existing Traffic Management Device
Primary Vehicle Access Point
Secondary Vehicle Access Point

N

1:3,000

0 30 60 90 120 150 metres

Concept Plan X

STRATHALBYN NORTH LOCAL ACTIVITY CENTRE

APPENDIX B

DETAILED SIDRA OUTPUT FOR THE ADELAIDE ROAD/PRIMARY SITE ACCESS

MOVEMENT SUMMARY

Site: 101 [FUAM Adel/Site (Site Folder: Lot 10, 12 & 508)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
NorthEast: Adelaide Rd (NE)														
8	T1	344	3.0	362	3.0	0.191	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
9	R2	59	2.5	62	2.5	0.051	6.0	LOS A	0.2	1.6	0.45	0.60	0.45	45.4
Approach		403	2.9	424	2.9	0.191	0.9	NA	0.2	1.6	0.07	0.09	0.07	49.2
NorthWest: Site Access (NW)														
10	L2	57	2.5	60	2.5	0.054	6.0	LOS A	0.2	1.5	0.42	0.59	0.42	46.1
12	R2	135	2.5	142	2.5	0.387	16.4	LOS C	1.7	12.4	0.78	0.98	1.03	40.3
Approach		192	2.5	202	2.5	0.387	13.3	LOS B	1.7	12.4	0.68	0.87	0.85	41.9
SouthWest: Adelaide Rd (SW)														
1	L2	117	2.5	123	2.5	0.080	4.7	LOS A	0.3	2.4	0.15	0.47	0.15	46.8
2	T1	368	3.3	387	3.3	0.203	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
Approach		485	3.1	511	3.1	0.203	1.2	LOS A	0.3	2.4	0.04	0.11	0.04	49.1
All Vehicles		1080	2.9	1137	2.9	0.387	3.2	NA	1.7	12.4	0.16	0.24	0.19	47.7

Site Level of Service (LOS) Method: Delay (SIDRA). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [FUPM Adel/Site (Site Folder: Lot 10, 12 & 508)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
NorthEast: Adelaide Rd (NE)														
8	T1	394	3.0	415	3.0	0.218	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
9	R2	94	2.5	99	2.5	0.084	6.2	LOS A	0.4	2.6	0.46	0.63	0.46	45.3
Approach		488	2.9	514	2.9	0.218	1.2	NA	0.4	2.6	0.09	0.12	0.09	49.0
NorthWest: Site Access (NW)														
10	L2	95	2.5	100	2.5	0.092	6.1	LOS A	0.4	2.6	0.44	0.61	0.44	46.0
12	R2	228	2.5	240	2.5	0.824	37.1	LOS E	6.3	44.9	0.95	1.46	2.51	32.8
Approach		323	2.5	340	2.5	0.824	28.0	LOS D	6.3	44.9	0.80	1.21	1.90	35.9
SouthWest: Adelaide Rd (SW)														
1	L2	187	2.5	197	2.5	0.133	4.9	LOS A	0.6	4.1	0.21	0.48	0.21	46.7
2	T1	386	3.3	406	3.3	0.213	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
Approach		573	3.1	603	3.1	0.213	1.6	LOS A	0.6	4.1	0.07	0.16	0.07	48.8
All Vehicles		1384	2.9	1457	2.9	0.824	7.6	NA	6.3	44.9	0.25	0.39	0.50	45.1

Site Level of Service (LOS) Method: Delay (SIDRA). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

APPENDIX C

DETAILED SIDRA OUTPUT FOR THE ADELAIDE ROAD/BRAEMAR DRIVE/EAST TERRACE ROUNDABOUT

MOVEMENT SUMMARY

Site: 101 [EXAM Adel/Braemar (Site Folder: Existing)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: East Tce (SE)														
4	L2	35	0	37	0.0	0.179	3.8	LOS A	1.0	7.3	0.44	0.59	0.44	45.6
5	T1	29	0	31	0.0	0.179	3.6	LOS A	1.0	7.3	0.44	0.59	0.44	46.7
6	R2	130	7	137	5.4	0.179	8.7	LOS A	1.0	7.3	0.44	0.59	0.44	47.0
Approach		194	7	204	3.6	0.179	7.0	LOS A	1.0	7.3	0.44	0.59	0.44	46.7
NorthEast: Adelaide Rd (NE)														
7	L2	149	11	157	7.4	0.290	3.9	LOS A	1.8	13.3	0.46	0.47	0.46	46.9
8	T1	167	9	176	5.4	0.290	3.7	LOS A	1.8	13.3	0.46	0.47	0.46	48.2
9	R2	5	0	5	0.0	0.290	8.5	LOS A	1.8	13.3	0.46	0.47	0.46	48.6
Approach		321	20	338	6.2	0.290	3.9	LOS A	1.8	13.3	0.46	0.47	0.46	47.6
NorthWest: Braemar Dr (NW)														
10	L2	22	0	23	0.0	0.157	4.7	LOS A	0.9	6.2	0.55	0.61	0.55	45.8
11	T1	75	0	79	0.0	0.157	4.6	LOS A	0.9	6.2	0.55	0.61	0.55	47.0
12	R2	56	0	59	0.0	0.157	9.5	LOS A	0.9	6.2	0.55	0.61	0.55	47.3
Approach		153	0	161	0.0	0.157	6.4	LOS A	0.9	6.2	0.55	0.61	0.55	46.9
SouthWest: Adelaide Rd (SW)														
1	L2	45	0	47	0.0	0.267	3.5	LOS A	1.7	12.0	0.41	0.47	0.41	46.6
2	T1	194	8	204	4.1	0.267	3.4	LOS A	1.7	12.0	0.41	0.47	0.41	47.8
3	R2	74	2	78	2.7	0.267	8.3	LOS A	1.7	12.0	0.41	0.47	0.41	48.1
Approach		313	10	329	3.2	0.267	4.6	LOS A	1.7	12.0	0.41	0.47	0.41	47.7
All Vehicles		981	37	1033	3.8	0.290	5.1	LOS A	1.8	13.3	0.45	0.51	0.45	47.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
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 (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [EXPM Adel/Braemar (Site Folder: Existing)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: East Tce (SE)														
4	L2	42	1	44	2.4	0.231	4.2	LOS A	1.3	9.6	0.50	0.62	0.50	45.5
5	T1	49	0	52	0.0	0.231	4.0	LOS A	1.3	9.6	0.50	0.62	0.50	46.7
6	R2	151	6	159	4.0	0.231	9.0	LOS A	1.3	9.6	0.50	0.62	0.50	46.9
Approach		242	7	255	2.9	0.231	7.2	LOS A	1.3	9.6	0.50	0.62	0.50	46.6
NorthEast: Adelaide Rd (NE)														
7	L2	120	6	126	5.0	0.281	3.1	LOS A	1.8	12.7	0.30	0.38	0.30	47.4
8	T1	228	4	240	1.8	0.281	3.0	LOS A	1.8	12.7	0.30	0.38	0.30	48.6
9	R2	19	1	20	5.3	0.281	7.9	LOS A	1.8	12.7	0.30	0.38	0.30	48.9
Approach		367	11	386	3.0	0.281	3.3	LOS A	1.8	12.7	0.30	0.38	0.30	48.2
NorthWest: Braemar Dr (NW)														
10	L2	9	0	9	0.0	0.064	4.5	LOS A	0.3	2.4	0.52	0.61	0.52	45.5
11	T1	15	0	16	0.0	0.064	4.3	LOS A	0.3	2.4	0.52	0.61	0.52	46.6
12	R2	39	0	41	0.0	0.064	9.3	LOS A	0.3	2.4	0.52	0.61	0.52	46.9
Approach		63	0	66	0.0	0.064	7.4	LOS A	0.3	2.4	0.52	0.61	0.52	46.6
SouthWest: Adelaide Rd (SW)														
1	L2	70	1	74	1.4	0.278	3.9	LOS A	1.8	12.6	0.48	0.48	0.48	46.6
2	T1	199	6	209	3.0	0.278	3.8	LOS A	1.8	12.6	0.48	0.48	0.48	47.8
3	R2	39	0	41	0.0	0.278	8.6	LOS A	1.8	12.6	0.48	0.48	0.48	48.2
Approach		308	7	324	2.3	0.278	4.4	LOS A	1.8	12.6	0.48	0.48	0.48	47.6
All Vehicles		980	25	1032	2.6	0.281	4.9	LOS A	1.8	12.7	0.42	0.49	0.42	47.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
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 (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [FUAM Adel/Braemar (Site Folder: Lot 10, 12 & 508)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: East Tce (SE)														
4	L2	38	0	40	0.0	0.256	4.5	LOS A	1.6	11.3	0.55	0.65	0.55	45.2
5	T1	40	0	42	0.0	0.256	4.3	LOS A	1.6	11.3	0.55	0.65	0.55	46.3
6	R2	178	7	187	3.9	0.256	9.3	LOS A	1.6	11.3	0.55	0.65	0.55	46.6
Approach		256	7	269	2.7	0.256	7.8	LOS A	1.6	11.3	0.55	0.65	0.55	46.4
NorthEast: Adelaide Rd (NE)														
7	L2	188	11	198	5.9	0.404	4.2	LOS A	2.9	20.7	0.54	0.52	0.54	46.6
8	T1	225	9	237	4.0	0.404	4.0	LOS A	2.9	20.7	0.54	0.52	0.54	47.8
9	R2	28	0	29	0.0	0.404	8.9	LOS A	2.9	20.7	0.54	0.52	0.54	48.1
Approach		441	20	464	4.5	0.404	4.4	LOS A	2.9	20.7	0.54	0.52	0.54	47.3
NorthWest: Braemar Dr (NW)														
10	L2	47	0	49	0.0	0.237	5.7	LOS A	1.5	10.3	0.67	0.70	0.67	45.5
11	T1	87	0	92	0.0	0.237	5.6	LOS A	1.5	10.3	0.67	0.70	0.67	46.6
12	R2	72	0	76	0.0	0.237	10.5	LOS B	1.5	10.3	0.67	0.70	0.67	46.9
Approach		206	0	217	0.0	0.237	7.3	LOS A	1.5	10.3	0.67	0.70	0.67	46.4
SouthWest: Adelaide Rd (SW)														
1	L2	64	0	67	0.0	0.373	4.2	LOS A	2.6	18.5	0.55	0.53	0.55	46.3
2	T1	264	8	278	3.0	0.373	4.1	LOS A	2.6	18.5	0.55	0.53	0.55	47.4
3	R2	76	2	80	2.6	0.373	9.0	LOS A	2.6	18.5	0.55	0.53	0.55	47.7
Approach		404	10	425	2.5	0.373	5.0	LOS A	2.6	18.5	0.55	0.53	0.55	47.3
All Vehicles		1307	37	1376	2.8	0.404	5.7	LOS A	2.9	20.7	0.57	0.58	0.57	47.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
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 (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [FUPM Adel/Braemar (Site Folder: Lot 10, 12 & 508)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: East Tce (SE)														
4	L2	46	1	48	2.2	0.365	5.5	LOS A	2.4	17.2	0.67	0.73	0.67	44.9
5	T1	61	0	64	0.0	0.365	5.2	LOS A	2.4	17.2	0.67	0.73	0.67	46.0
6	R2	229	6	241	2.6	0.365	10.2	LOS B	2.4	17.2	0.67	0.73	0.67	46.3
Approach		336	7	354	2.1	0.365	8.7	LOS A	2.4	17.2	0.67	0.73	0.67	46.0
NorthEast: Adelaide Rd (NE)														
7	L2	188	6	198	3.2	0.444	3.5	LOS A	3.4	24.5	0.43	0.43	0.43	46.9
8	T1	329	4	346	1.2	0.444	3.3	LOS A	3.4	24.5	0.43	0.43	0.43	48.1
9	R2	47	1	49	2.1	0.444	8.2	LOS A	3.4	24.5	0.43	0.43	0.43	48.4
Approach		564	11	594	2.0	0.444	3.8	LOS A	3.4	24.5	0.43	0.43	0.43	47.7
NorthWest: Braemar Dr (NW)														
10	L2	39	0	41	0.0	0.153	6.0	LOS A	0.9	6.5	0.68	0.71	0.68	45.1
11	T1	28	0	29	0.0	0.153	5.8	LOS A	0.9	6.5	0.68	0.71	0.68	46.2
12	R2	57	0	60	0.0	0.153	10.8	LOS B	0.9	6.5	0.68	0.71	0.68	46.6
Approach		124	0	131	0.0	0.153	8.1	LOS A	0.9	6.5	0.68	0.71	0.68	46.0
SouthWest: Adelaide Rd (SW)														
1	L2	92	1	97	1.1	0.454	5.0	LOS A	3.4	23.9	0.67	0.60	0.67	46.0
2	T1	313	6	329	1.9	0.454	4.8	LOS A	3.4	23.9	0.67	0.60	0.67	47.2
3	R2	43	0	45	0.0	0.454	9.7	LOS A	3.4	23.9	0.67	0.60	0.67	47.5
Approach		448	7	472	1.6	0.454	5.3	LOS A	3.4	23.9	0.67	0.60	0.67	47.0
All Vehicles		1472	25	1549	1.7	0.454	5.7	LOS A	3.4	24.5	0.58	0.57	0.58	46.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
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 (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.