



# Aged Care Facility Wentworth Avenue, Toongabbie Transport Assessment

<b>Client //</b>	Opal Aged Care
<b>Office //</b>	NSW
<b>Reference //</b>	15S1573100
<b>Date //</b>	04/05/16

Aged Care Facility  
Wentworth Avenue, Toongabbie  
Transport Assessment

Issue: B 04/05/16

Client: Opal Aged Care  
Reference: 15S1573100  
GTA Consultants Office: NSW

Quality Record

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# 1. Introduction

## 1.1 Background

It is understood that Opal Aged Care is to submit a Development Application under the State Environmental Planning Policy Housing for Seniors or People with a Disability (SEPP HSPD) for a proposed 130-bed residential aged care facility located on Cornelia Road, Toongabbie. The SEPP HSPD has a requirement that a Site Compatibility Certificate be approved prior to the submission of the Development Application. The site is located at the rear of Toongabbie Sports and Bowling Club and would also incorporate three existing residential blocks.

Align Projects commissioned GTA Consultants to undertake a transport assessment for the proposed development to accompany the Site Compatibility Certificate application.

## 1.2 Purpose of this Report

This report sets out an assessment of the anticipated transport implications of the proposed development, including consideration of the following:

- i existing traffic and parking conditions surrounding the site
- ii suitability of the proposed parking in terms of supply (quantum) and layout
- iii service vehicle requirements
- iv pedestrian and bicycle requirements
- v the traffic generating characteristics of the proposed development
- vi suitability of the proposed access arrangements for the site
- vii the transport impact of the development proposal on the surrounding road network.

## 1.3 References

In preparing this report, reference has been made to the following:

- o an inspection of the site and its surrounds
- o Parramatta Council Development Control Plan 2011 (DCP)
- o Australian Standard/ New Zealand Standard, Parking Facilities, Part 1: Off-Street Car Parking AS/NZS 2890.1:2004
- o Australian Standard, Parking Facilities, Part 2: Off-Street Commercial Vehicle Facilities AS 2890.2:2002
- o Australian Standard / New Zealand Standard, Parking Facilities, Part 6: Off-Street Parking for People with Disabilities AS/NZS 2890.6:2009
- o Guide to Traffic Generating Developments, Roads and Maritime Services (RMS), 2002
- o traffic and car parking surveys undertaken by GTA Consultants as referenced in the context of this report
- o other documents and data as referenced in this report.



## 2. Existing Conditions

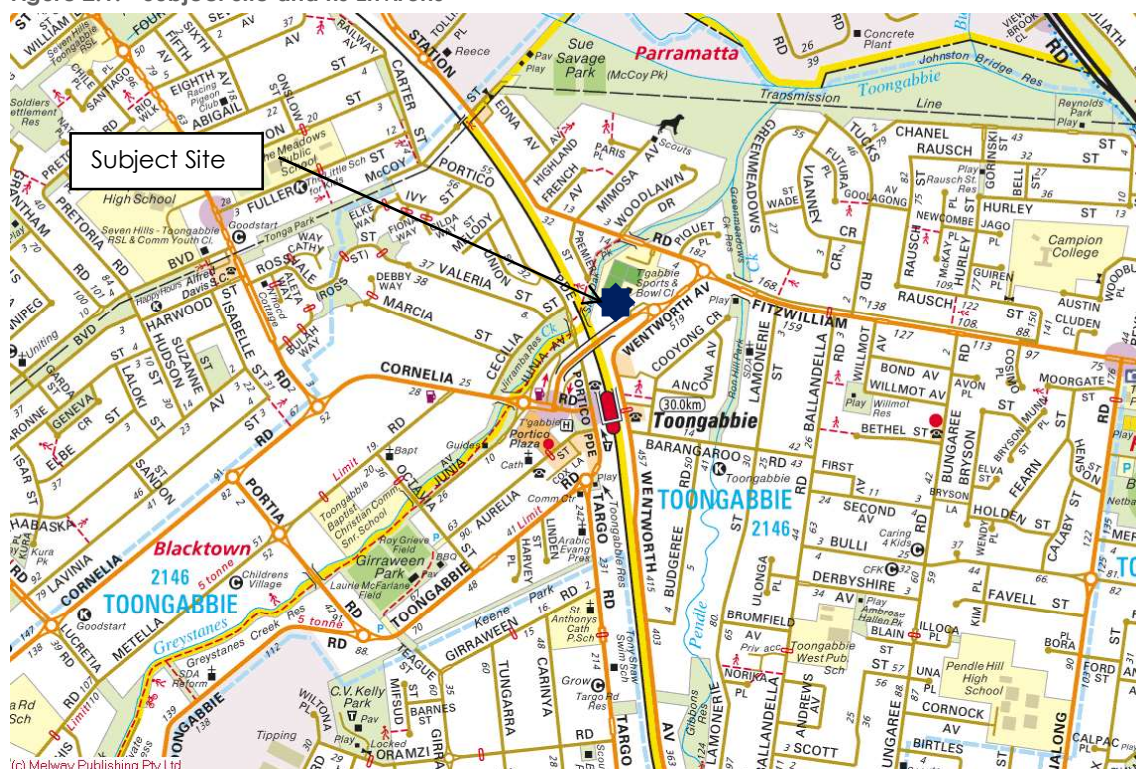
The development site consists of four adjacent lots located at 12 Station Road and 4-8 Wentworth Avenue, Toongabbie. The site of approximately 4900m<sup>2</sup> and has a frontage of approximately 50m to Cornelia Road and right of way access driveway from Station Street.

The site currently has a land use classification as R3 Residential and RE2 Private Recreation, and is occupied by private residential dwellings and the Toongabbie Sports and Bowling Club (the Club).

With the exception of the Club, the surrounding properties predominantly include residential dwellings in a mix of low to medium densities. A high density residential development is located immediately to the west of the site. Toongabbie Town Centre and Railway Station is located within approximately 300m to the south-west of the site.

The location of the subject site and its surrounding environs is shown in Figure 2.1.

**Figure 2.1: Subject Site and Its Environs**



Basemap source: Reproduced with permission from Sydney Publishing Pty Ltd

### 2.1 Road Network

#### 2.1.1 Adjoining Roads

##### Wentworth Avenue

Wentworth Avenue is a classified Regional Road (7279), and in the vicinity of the site is aligned in a north-south direction. The southern extent of Wentworth Avenue links to the Cumberland Highway (State Road 13).

In the vicinity of the site, unrestricted kerbside parking is permitted on both sides of the road. However, due to traffic calming measures (pedestrian refuge islands) parking is restricted on sections of the road. On-site observations indicate that cars park on the verge area within these areas.

Wentworth Avenue is shown in Figure 2.2 and Figure 2.3 and carries approximately 18,000 vehicles per day<sup>1</sup>.

**Figure 2.2: Wentworth Avenue (looking east)**



**Figure 2.3: Wentworth Avenue (looking west)**



## Cornelia Road

Cornelia Road is a classified Regional Road (7256), and in the vicinity of the site is aligned in an east-west direction. The southern extent of Regional Road 7256 links to the Great Western Highway (State Road 5).

It is a two-way road configured with a 2-lane, 7.3 metre wide carriageway. Due to Cornelia Road being a single lane carriageway in each direction, no parking is permitted in the vicinity of the site. Cornelia Road does provide a slip lane for access to underground parking for the residential complex at Lot 2 Wentworth Avenue, adjacent detached dwellings and rear access to the Toongabbie Bowling and Sports Club.

Cornelia Road is shown in Figure 2.4 and Figure 2.5 and carries approximately 18,000 vehicles per day<sup>1</sup>.

<sup>1</sup> Based on the peak hour traffic counts undertaken by GTA in May 2015 and assuming a peak-to-daily ratio of 8% for arterial roads and 10% for local roads.



Figure 2.4: Cornelia Road (looking east)



Figure 2.5: Cornelia Road (looking west)



## 2.2 Traffic Volumes

GTA Consultants undertook traffic movement counts at the intersection of Wentworth Avenue and Cornelia Avenue on 21 May 2015 during the following peak periods:

- 7:00am and 9:00am
- 4:00pm and 6:30pm.

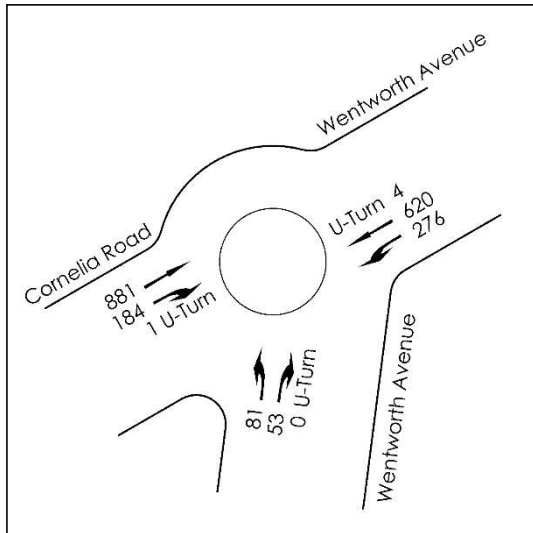
The AM and PM peak hour traffic volumes are summarised in Figure 2.4 and Figure 2.5, with full results contained in Appendix A.

In addition, a week-long tube count was carried out between May 21 and May 27 on the rear access to the Club. This access is currently used as an alternative exit only, with an induction loop automatically opening the gate for exiting vehicles. The average hourly traffic volumes are detailed in Figure 2.6.

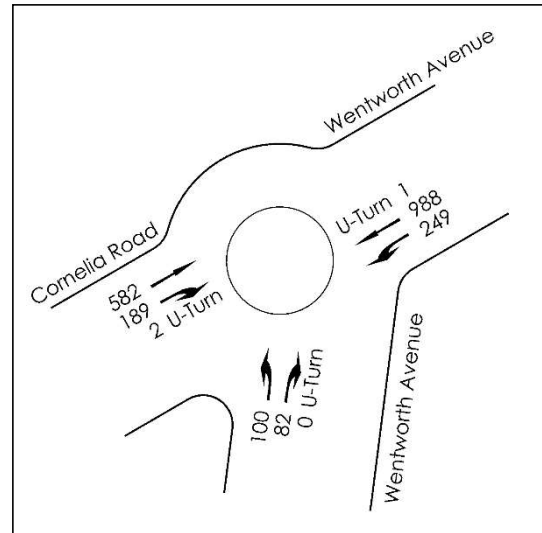
An average of 55 vehicles per day was recorded, with hourly usage skewed to the early afternoon and early evening (consistent with club operation) and typically not exceeding 10 vehicles per hour. The maximum hourly traffic volume for the duration of the tube count occurred between 7pm and 8pm on Friday, with 17 vehicles counted.



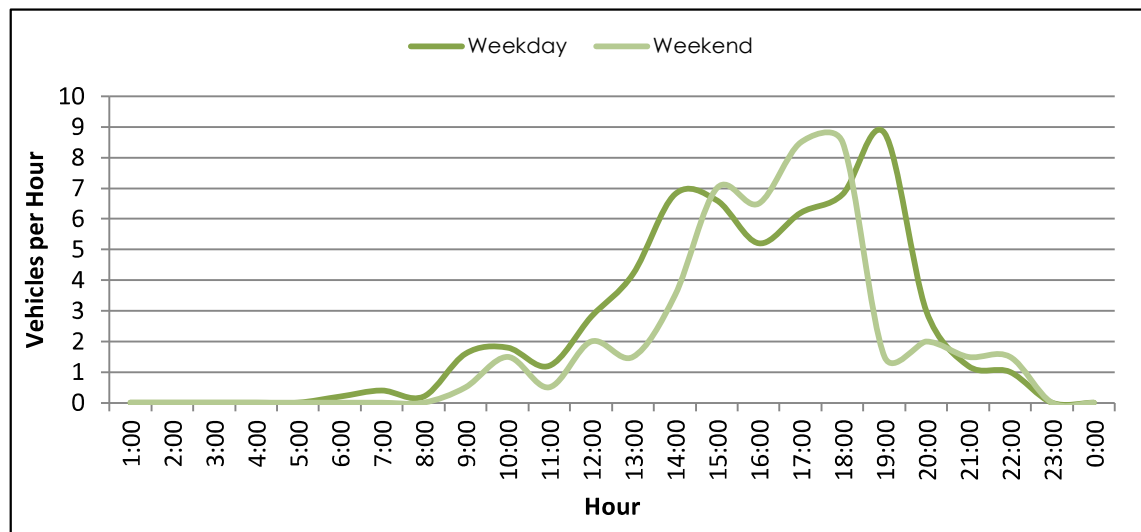
**Figure 2.4: Existing AM Peak Hour Traffic Volumes**



**Figure 2.5: Existing PM Peak Hour Traffic Volumes**



**Figure 2.6: Sports Club Access - Tube Count**



## 2.3 Intersection Operation

The operation of the key intersections within the study area have been assessed using SIDRA INTERSECTION<sup>2</sup>, a computer based modelling package which calculates intersection performance.

The commonly used measure of intersection performance, as defined by the RMS, is vehicle delay. SIDRA INTERSECTION determines the average delay that vehicles encounter and provides a measure of the level of service.

<sup>2</sup> Program used under license from Akcelik & Associates Pty Ltd.

Table 2.1 shows the criteria that SIDRA INTERSECTION adopts in assessing the level of service.

**Table 2.1: SIDRA INTERSECTION Level of Service Criteria**

Level of Service (LOS)	Average Delay per vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Sign
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Near capacity	Near capacity, accident study required
E	57 to 70	At capacity, at signals incidents will cause excessive delays	At capacity, requires other control mode
F	Greater than 70	Extra capacity required	Extreme delay, major treatment required

Table 2.2 presents a summary of the existing operation of the intersection, with full results presented in Appendix B of this report.

**Table 2.2: Wentworth Avenue/ Cornelia Road Roundabout - Existing Operating Conditions**

Peak	Leg	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service (LOS)
AM	Wentworth Avenue (North-east)	0.68	12	55	A
	Cornelia Road	0.72	11	74	A
	Wentworth Avenue (South-west)	0.21	15	10	B
	<b>Overall</b>	<b>0.72</b>	<b>15</b>	<b>74</b>	<b>B</b>
PM	Wentworth Avenue (North-east)	0.88	15	143	B
	Cornelia Road	0.56	11	40	A
	Wentworth Avenue (South-west)	0.57	30	38	C
	<b>Overall</b>	<b>0.88</b>	<b>30</b>	<b>143</b>	<b>C</b>

On the basis of the above assessment, the roundabout located at intersection of Wentworth Avenue and Cornelia Road currently operates satisfactorily, however is approaching capacity during the PM peak. During the PM peak period, queues on Wentworth Avenue (North-east) were observed to extend to Station Road, and Cornelia Road queues extended onto the rail overbridge at times. This is consistent with the modelling, which approximates a 95<sup>th</sup> percentile queue of 143m on Wentworth Avenue.

## 2.4 Car Parking

On-street car parking in the vicinity of the proposed site is unrestricted, and demand was observed to be generally high during the time of the site visits. It is assumed that this is due to the proximity of the site to Toongabbie railway station which is 200 metres south along Wentworth Avenue.

The Toongabbie Bowling and Sports Club has a car park with a capacity of 125 spaces, incorporating disabled parking spaces.

## 2.5 Public Transport

### 2.5.1 Trains

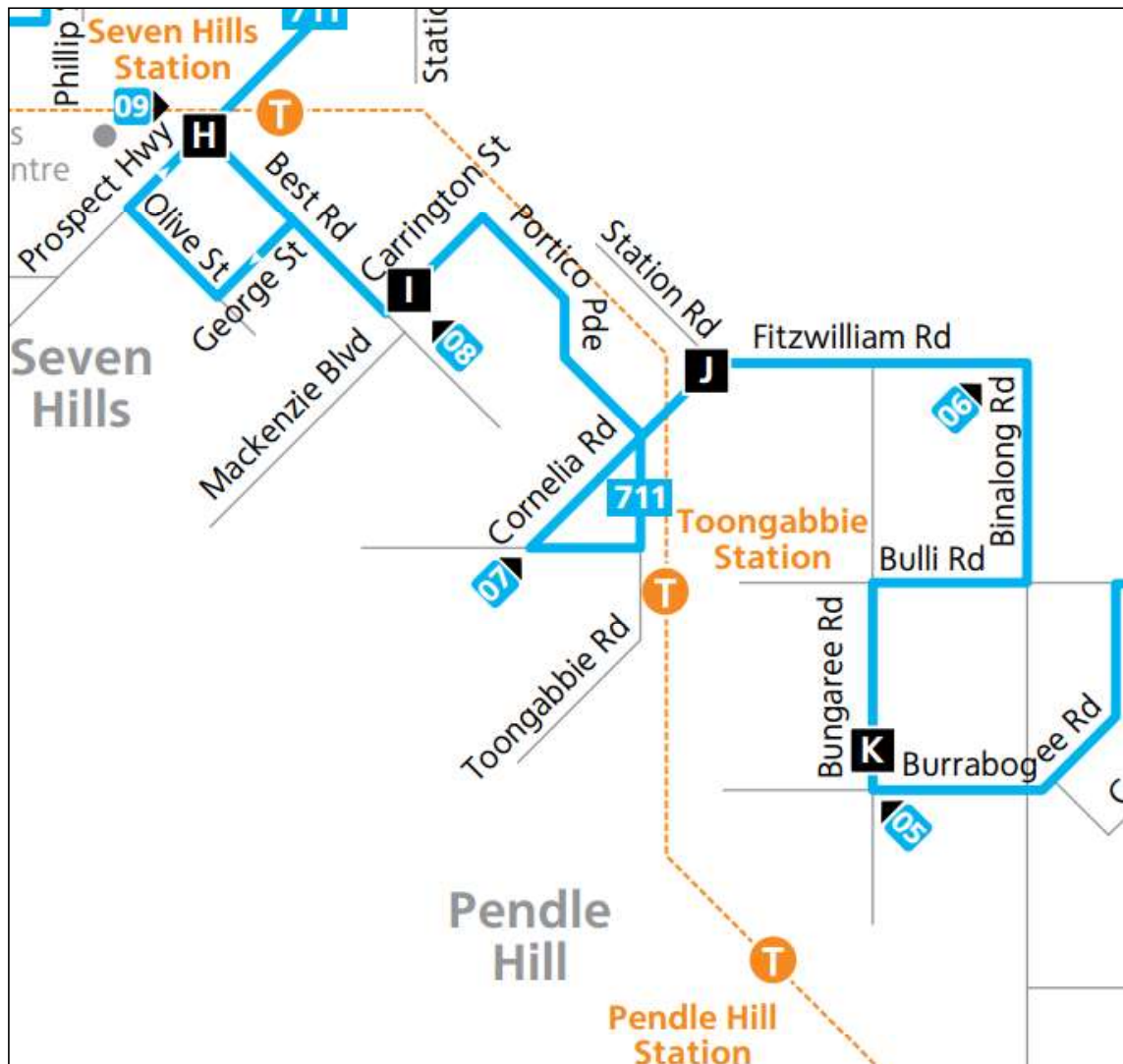
The site is well served by rail, and well within the standard 800 metre catchment radius of a train station. Toongabbie station is primarily serviced by the Western Line (T1), and there are also additional services provided by the Cumberland Line (T5).

### 2.5.2 Buses

The site is serviced by one bus route (route 711) which connects with Blacktown and Parramatta. The majority of 711 buses are timetabled as wheelchair accessible. Bus stops are located on Wentworth Avenue approximately 175 metres north-east of the site.

A review of the public transport available in the vicinity of the site is illustrated in Figure 2.7.

Figure 2.7: Public Transport Map



Source: [http://www.cdcbus.com.au/ignitionSuite/uploads/docs/711\\_timetable\\_1August2014.pdf](http://www.cdcbus.com.au/ignitionSuite/uploads/docs/711_timetable_1August2014.pdf), accessed 22 June 2015

## 2.6 Pedestrian and Cycling Infrastructure

Pedestrian footpaths are located on the southern side of Wentworth Avenue and Cornelia Road. However, there is currently no footpath along the frontage of the subject site.

A pedestrian refuge island is located within Cornelia Avenue, adjacent to the subject site. This allows safe access across Cornelia Avenue and to the Toongabbie Station during higher traffic volume periods.

A shared path runs along the northern bank of Greystanes Creek, north of the site. This provides a connection between Station Road and Portico Parade, and across the rail corridor. The path continues south along the western side of Station Road.

An extract of the Parramatta City Council Bike Map is shown in Figure 2.8.

**Figure 2.8: Parramatta Council Bike Map**



Source: [http://www.parracity.nsw.gov.au/\\_data/assets/pdf\\_file/0004/34843/ParramattaBikePlan.pdf](http://www.parracity.nsw.gov.au/_data/assets/pdf_file/0004/34843/ParramattaBikePlan.pdf), accessed 24 June 2015



## 3. Development Proposal

### 3.1 Land Uses

The Site Compatibility Certificate (SCC) application is required prior to the lodgement of a Development Application to allow for the construction of an aged care facility on land zoned RE2 private recreation.

The SCC is being sought with a view to constructing a 130-bed residential aged care facility, over 3-4 levels on the site. It is anticipated that at full operation the facility would have up to 30 staff on-site during daytime shifts. The proposed development layout is shown in Figure 3.1.

**Figure 3.1: Development Proposal**



Source: Calder Flower Architects – Drawing No. 15280-SCC 09 (Ground Floor Plan) dated 01 May 2016.

### 3.2 Vehicle Access

Vehicle access to the development site is proposed via the construction of a new leg at the Wentworth Avenue/ Cornelia Road roundabout. This will link to the on-site at-grade car parking facility, porte cochère and loading dock areas for both the site and Toongabbie Bowling and Sports Club. This access road would also satisfy planning restrictions on the site that require the provision of a future path of egress for vehicles from Toongabbie Bowling and Sports Club.

The proposed modifications to the roundabout incorporates the following key design features.

- The new leg has been designed in accordance with Austroads and RMS guidelines, providing a 6 metre wide carriageway with barrier kerbs and suitable for access by vehicles up to 12.5m large rigid vehicles.

- The leg has been designed as a road with mountable pedestrian refuge island so as to avoid potential safety risks associated with the provision of driveways within a roundabout, including rear-end crashes as a result of slower exit speeds.
- The alignment of the Cornelia Road approach to the roundabout could be adjusted to reduce approach speeds and provide a standard roundabout entry layout.
- The existing pedestrian refuge island on Cornelia Road would be modified as a result of the realigned approach to the roundabout.
- The existing access road to the north of Cornelia Road would be removed, allowing for a wide verge area.

The proposed access arrangements via the existing roundabout represent an improvement on the existing access arrangements for the site.

### 3.3 Parking Supply

The on-site car parking facility provides 31 car spaces for use by staff and visitors. It is not anticipated that residents would have the need to store a vehicle on-site.

The Parramatta Council DCP has no specifications for parking requirements for an aged care facility. As such, car parking requirements for age care facilities can be determined via application of the rates set out in the Guide to Traffic Generating Developments (RMS, 2002). A review of the car parking rates and the anticipated number of beds and staff results in a parking requirement for the proposal as summarised in Table 3.1. It is noted that the SEPP HSPD also identifies appropriate parking rates, which in some instances are lower the RMS rates. On this basis the RMS rates have been used as a conservative approach.

**Table 3.1: Parking Requirement**

Land Use	Type	Quantum	RMS Rate	Parking Requirement
Housing for aged and disabled persons, specifically hostel, nursing and convalescent homes	Beds	130	1 space per 10 beds	13 spaces
	Employees	30	1 space per 2 employees	15 spaces
			1 Ambulance Bay	1 space
<b>Total</b>				<b>29</b>

Table 3.1 indicates that the development requires 28 car parking spaces, with 13 allocated for use by the visitors for the site. In addition, an appropriately designed ambulance bay should also be provided.

In addition, the Building Code of Australia (BCA) 2013 requires 1 disabled space per 100 parking spaces provided for Class 3 (b) residential land use. As such, the disabled parking requirements for the proposal would include 1 disabled space designed in accordance with AS 2890.6:2009. Given the standard disabled parking module and nature of the development, 2 disabled spaces are provided.

As discussed, the proposed development provides 31 car parking spaces, which complies with the RMS requirements. It is recommended that the visitor spaces are marked to ensure appropriate allocation of spaces.

### 3.4 Motorcycle and Bicycle Parking

The Parramatta Council DCP has no specifications for motorcycle or bicycle parking requirements for an aged care facility. However in acknowledgement of general changing travel

patterns and the increased use of active modes of travel, the potential to incorporate these facilities should be reviewed at the Development Application stage.

### 3.5 Loading Areas

The Parramatta Council DCP has no specifications for loading facility requirements for an aged care facility. It is anticipated that the development would require the regular delivery of supplies (food/ medicines/ goods) and linen. As such, a dedicated loading area is provided that consists of one loading bay, designed for use by vehicles up to and including a 9.8m rear lift waste collection vehicle.

### 3.6 Site Layout Review

The car parks and loading dock layout has been reviewed against the requirements of the Australian Standard for Off Street Car Parking and Commercial Vehicle Facilities (AS2890.1:2004, AS2890.2:2002 and AS2890.6:2009). This assessment included a review of the following:

- bay and aisle width
- circulation roads
- internal queuing
- parking for persons with disabilities
- loading vehicle access and facilities.

It is noted that the car parking spaces will be provided in accordance with the Australian Standards requirements. These spaces are accessed from 5.8m wide two-way aisles.

The porte cochère has been designed to allow a mini bus to park, without impacting on the movement of a 99<sup>th</sup> percentile vehicle to pass by.

## 4. Traffic Impact Assessment

### 4.1 Traffic Generation

Traffic generation estimates for the planning proposal have been sourced from the *Guide to Traffic Generating Developments* (RMS, 2002).

Estimates of peak hour and daily traffic volumes resulting from the proposal are set out in Table 4.1.

**Table 4.1: Traffic Generation Estimates**

Land Use	Quantum	Peak Hour Traffic Generation Rate	Peak Hour Traffic Generation Estimate (vehicles)
Housing for aged and disabled persons	130-beds	0.1-0.2 per dwelling (bed)	13-26
<b>Total</b>			<b>26 vehicle movements/ hour</b>

Table 4.1 indicates that the site could potentially generate up to 26 vehicle movements in a peak hour.

### 4.2 Distribution and Assignment

The directional distribution and assignment of traffic generated by the proposed development will be influenced by a number of factors, including the:

- i configuration of the arterial road network in the immediate vicinity of the site
- ii existing operation of intersections providing access between the local and arterial road network
- iii distribution of households in the vicinity of the site
- iv likely distribution of employee's residences in relation to the site
- v configuration of access points to the site.

Having consideration for the above, for the purposes of estimating vehicle movements, the following directional distributions have been assumed:

- o Cornelia Road: 45%
- o Wentworth Avenue (north-east): 45%
- o Wentworth Avenue (south-west): 10%

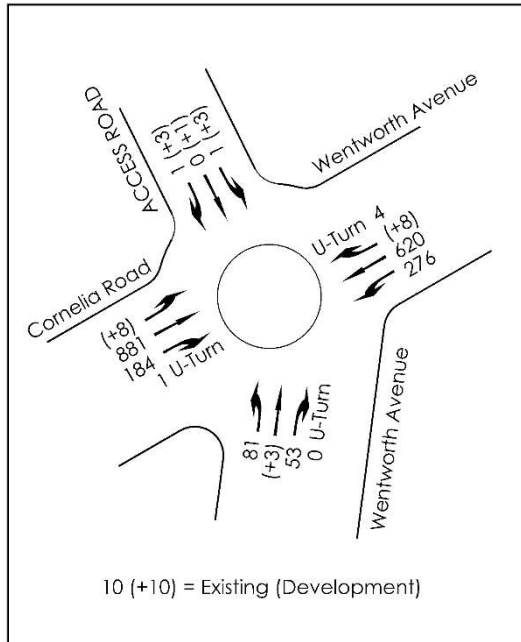
In addition, the directional split of traffic (i.e. the ratio between the inbound and outbound traffic movements) is assumed to be 75/25 with key traffic movements associated with the arrival of staff/ visitors in the morning and departure in the afternoon.

Based on the above, Figure 4.1 and Figure 4.2 have been prepared to show the estimated marginal increase in turning movements in the vicinity of the subject property following full site development.

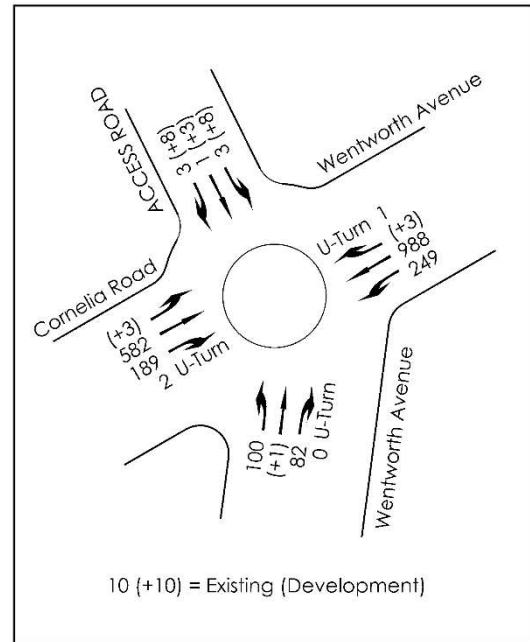
It is noted that as the access road would continue to provide a secondary egress path for the Toongabbie Bowling and Sports Club. Vehicles exiting the site have been considered as part of this assessment.



**Figure 4.1: AM Peak Hour Post Development Traffic Volumes**



**Figure 4.2: PM Peak Hour Post Development Traffic Volumes**



### 4.3 Traffic Impact

An assessment of the impacts that future traffic would have on the surrounding road network can be made by comparing intersection performance prior to and following full site development assuming planning approvals.

The impact of this additional traffic on the intersections in the vicinity of the site has been assessed using SIDRA INTERSECTION. Table 4.2 presents a summary of the anticipated future operation of the intersections following the development of the site, with full results included in Appendix B.

**Table 4.2: Wentworth Avenue/ Cornelia Road Roundabout - Future Operating Conditions**

Peak	Leg	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service (LOS)
AM	Wentworth Avenue (North-east)	0.69	22	58	B
	Access Road	0.02	17	2	B
	Cornelia Road	0.79	12	96	A
	Wentworth Avenue (South-west)	0.22	15	11	B
	<b>Overall</b>	<b>0.79</b>	<b>22</b>	<b>96</b>	<b>B</b>
PM	Wentworth Avenue (North-east)	0.90	27	161	B
	Access Road	0.05	8	3	A
	Cornelia Road	0.61	11	47	A
	Wentworth Avenue (South-west)	0.60	32	42	C
	<b>Overall</b>	<b>0.90</b>	<b>32</b>	<b>161</b>	<b>C</b>

Against existing traffic volumes in the vicinity of the site, the additional traffic generated by the proposal could not be expected to compromise the safety or function of the surrounding road network. Overall, the intersection would continue to operate at the same levels of service as existing conditions with the introduction of the new leg.

## 5. Conclusion

Based on the analysis and discussions presented within this report, the following conclusions are made:

- i The development of a 130-bed residential aged care facility is proposed on Cornelia Road, Toongabbie under the *State Environment Planning Policy Housing for Seniors or People with a Disability*.
- ii The provision of bicycle and motorcycle facilities is not required for this development.
- iii A loading dock would be provided to accommodate up to and including a 9.8m rear lift waste collection vehicle.
- iv The proposed development generates a RMS parking requirement of up to 28 car spaces, including 13 car parking spaces for visitors and 1 disabled parking space.
- v The Planning Proposal includes on-site car parking for 31 car spaces within an at-grade car park upon entry to the site, which complies with the above requirements.
- vi Based on the RMS Guide, the site would be expected to generate in the order of 26 vehicle movements during a typical weekday peak hour, including some minor additional traffic (less than 10 vehicle movements) associated with the path of egress for vehicles from Toongabbie Bowling and Sports Club (required by site planning restrictions and largely consistent with existing arrangements).
- vii Vehicle access to the development site is proposed via the construction of a new leg at the Wentworth Avenue/ Cornelia Road roundabout. This will link to the on-site at-grade car parking facility, porte cochère and loading dock areas for both the site and Toongabbie Bowling and Sports Club, representing an improvement on the existing access arrangements for the site.
- viii SIDRA INTERSECTION analysis indicates that there is adequate capacity in the surrounding road network to cater for the traffic generated by the proposed development, with the intersection of Cornelia Road and Wentworth Avenue continuing to operate at a similar Level of Service, although approaching capacity.

# Appendix A

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## Survey Results



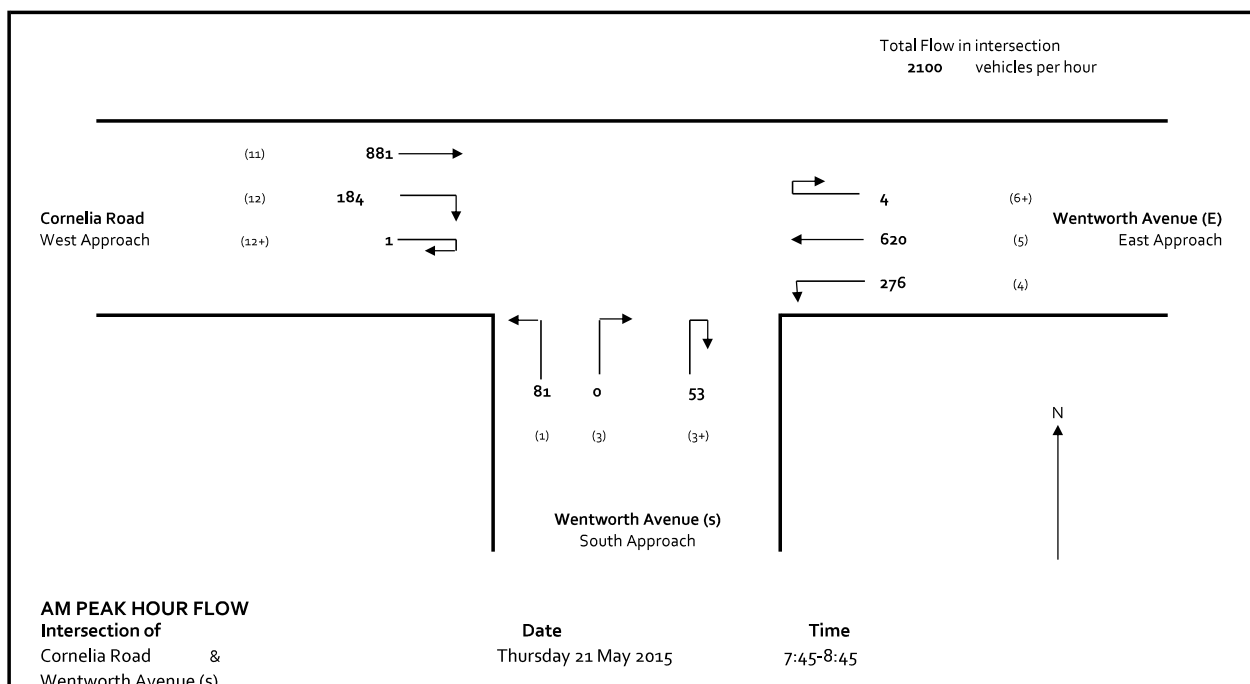
## TURNING MOVEMENT SURVEY

Intersection of Wentworth Avenue (s) & Wentworth Avenue (E),

Date: Thursday 21 May 2015

15 minute Data										
Time	Movement									Total
	Wentworth Avenue (s) South Approach			Wentworth Avenue (E) East Approach			Cornelia Road West Approach			
	Left 1	Right 3	U Turn 3+	Left 4	Through 5	U Turn 6+	Through 11	Right 12	U Turn 12+	
6:00-6:15										
6:15-6:30										
6:30-6:45										
6:45-7:00										
7:00-7:15	6	0	13	67	97	3	232	39	0	457
7:15-7:30	15	0	18	79	105	1	187	35	0	440
7:30-7:45	20	0	19	74	98	0	199	33	1	444
7:45-8:00	15	0	13	94	138	1	207	41	1	510
8:00-8:15	16	0	17	80	150	0	223	49	0	535
8:15-8:30	25	0	14	46	171	1	224	49	0	530
8:30-8:45	25	0	9	56	161	2	227	45	0	525
8:45-9:00	21	0	8	34	128	0	202	35	0	428
9:00-9:15										
9:15-9:30										
9:30-9:45										
9:45-10:00										
Total	143	0	111	530	1048	8	1701	326	2	3869

Hourly flows										
Time	Movement									Total
	Wentworth Avenue (S) South Approach			Wentworth Avenue (E) East Approach			Cornelia Road West Approach			
	Left 1	Right 3	U Turn 3+	Left 4	Through 5	U Turn 6+	Through 11	Right 12	U Turn 12+	
6:00-7:00										
6:15-7:15										
6:30-7:30										
6:45-7:45										
7:00-8:00	56	0	63	314	438	5	825	148	2	1851
7:15-8:15	66	0	67	327	491	2	816	158	2	1929
7:30-8:30	76	0	63	294	557	2	853	172	2	2019
7:45-8:45	81	0	53	276	620	4	881	184	1	2100
8:00-9:00	87	0	48	216	610	3	876	178	0	2018
8:15-9:15										
8:30-9:30										
8:45-9:45										
9:00-10:00										
Peak Hour	81	0	53	276	620	4	881	184	1	2100



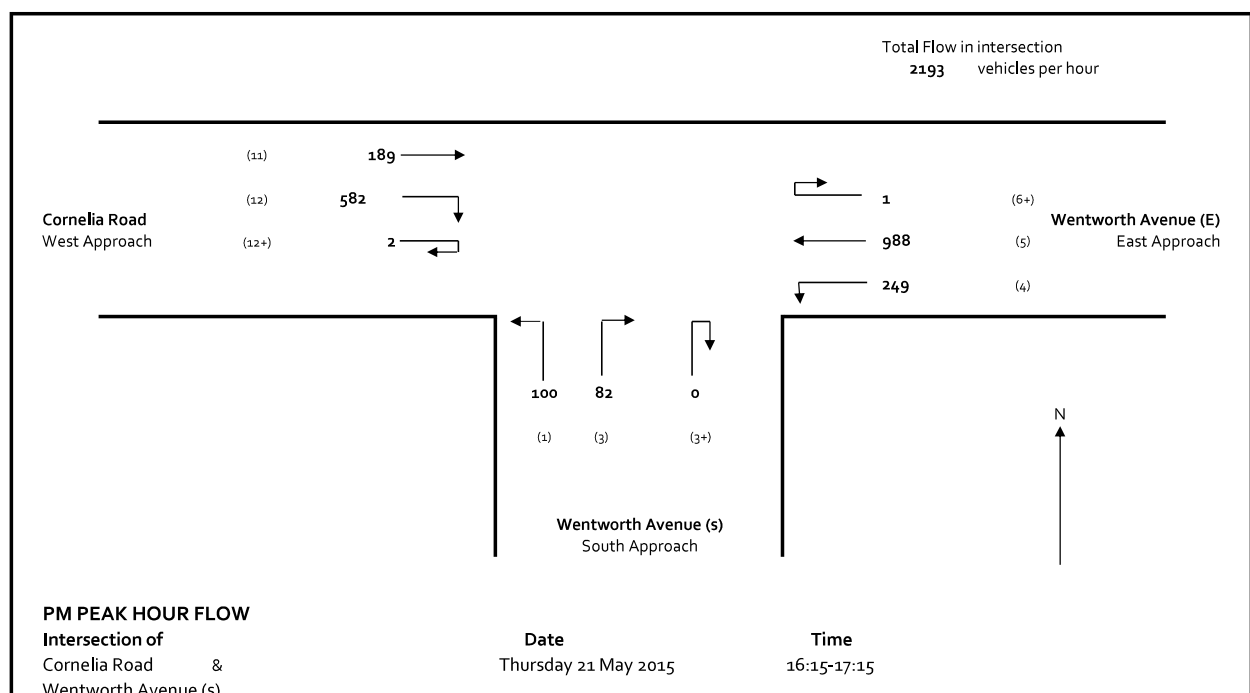
## TURNING MOVEMENT SURVEY

Intersection of Wentworth Avenue (s) & Wentworth Avenue (E),

Date: Thursday 21 May 2015

15 minute Data										
Time	Movement									
	Wentworth Avenue (S) South Approach			Wentworth Avenue (E) East Approach			Cornelia Road West Approach			
	Left 1	Right 3	U Turn 3+	Left 4	Through 5	U Turn 6+	Through 11	Right 12	U Turn 12+	
15:00-15:15										
15:15-15:30										
15:30-15:45										
15:45-16:00	0	0	0	0	0	0	0	0	0	
16:00-16:15	17	8	1	76	220	2	37	133	0	494
16:15-16:30	27	19	0	70	231	0	48	139	1	535
16:30-16:45	14	25	0	56	234	1	29	133	0	492
16:45-17:00	36	20	0	53	253	0	66	131	0	559
17:00-17:15	23	18	0	70	270	0	46	179	1	607
17:15-17:30	29	19	0	31	172	0	36	140	0	427
17:30-17:45	34	30	0	46	214	0	42	148	0	514
17:45-18:00	22	26	0	46	217	0	34	148	1	494
18:00-18:15	36	41	0	41	193	0	43	121	0	475
18:15-18:30	45	48	0	39	174	0	42	136	0	484
18:30-18:45										
18:45-19:00										
Total	283	254	1	528	2178	3	423	1408	3	5081

Hourly flows										
Time	Movement									Total
	Wentworth Avenue (s) South Approach			Wentworth Avenue (E) East Approach			Cornelia Road West Approach			
	Left 1	Right 3	U Turn 3+	Left 4	Through 5	U Turn 6+	Through 11	Right 12	U Turn 12+	
15:00-16:00										
15:15-16:15										
15:30-16:30										
15:45-16:45	58	52	1	202	685	3	114	405	1	1521
16:00-17:00	94	72	1	255	938	3	180	536	1	2080
16:15-17:15	100	82	0	249	988	1	189	582	2	2193
16:30-17:30	102	82	0	210	929	1	177	583	1	2085
16:45-17:45	122	87	0	200	909	0	190	598	1	2107
17:00-18:00	108	93	0	193	873	0	158	615	2	2042
17:15-18:15	121	116	0	164	796	0	155	557	1	1910
17:30-18:30	137	145	0	172	798	0	161	553	1	1967
17:45-18:45										
18:00-19:00										
Peak Hour	100	82	0	249	988	1	189	582	2	2193



Count Number2130

StreetCORNELIA ROAD, TOONBABBIE : From ELLAM DRIVE to FITZWILLAM ROAD : NORTH BOUND

LocationOn service road to Club, on Integral Energy Power Box 13881

Ref : GTA

Lat/Long : S33 47.094 / E150 57.106

UBD 189 P-6

Carriageway

Weekly 50th Percentile Speed16  
Weekly 85th Percentile Speed20  
Five Day AADT58  
Seven Day AADT55

Start Date21-MAY-15  
Start Time100  
Duration7 DAYS  
Interval1 HOUR

TOTAL COUNT MATRIX

	MON 25TH	TUE 26TH	WED 27TH	THU 21ST	FRI 22ND	SAT 23RD	SUN 24TH	5 Day		7 Day	
								Total	Average	Total	Average
Midnight - 1am	0	0	0	0	0	0	0	0	0	0	0
1am - 2am	0	0	0	0	0	0	0	0	0	0	0
2am - 3am	0	0	0	0	0	0	0	0	0	0	0
3am - 4am	0	0	0	0	0	0	0	0	0	0	0
4am - 5am	0	0	0	0	0	0	0	0	0	0	0
5am - 6am	0	0	0	0	1	0	0	1	0	1	0
6am - 7am	1	1	0	0	0	0	0	2	0	2	0
7am - 8am	0	1	0	0	0	0	0	1	0	1	0
8am - 9am	2	1	2	1	2	1	0	8	2	9	1
9am - 10am	3	2	2	0	2	2	1	9	2	12	2
10am - 11am	1	0	4	0	1	1	0	6	1	7	1
11am - Midday	2	1	1	6	4	1	3	14	3	18	3
Midday - 1pm	5	2	5	6	3	0	3	21	4	24	3
1pm - 2pm	3	5	7	13	6	2	5	34	7	41	6
2pm - 3pm	4	4	6	14	5	6	8	33	7	47	7
3pm - 4pm	2	6	4	8	6	7	6	26	5	39	6
4pm - 5pm	5	5	7	6	8	9	8	31	6	48	7
5pm - 6pm	5	7	5	8	9	8	9	34	7	51	7
6pm - 7pm	6	9	5	7	17	1	2	44	9	47	7
7pm - 8pm	2	2	6	1	4	1	3	15	3	19	3
8pm - 9pm	0	0	1	3	2	1	2	6	1	9	1
9pm - 10pm	1	1		0	3	3	0	5	1	8	1
10pm - 11pm	0	0		0	0	0	0	0	0	0	0
11pm - Midnight	0	0		0	0	0	0	0	0	0	0
Total	42	47	55	73	73	43	50	290	58	383	54

Count Number    2130

Street    CORNELIA ROAD, TOONBABBIE : Between ELLAM DRIVE & FITZWILLAM ROAD (bidirectional)

Location    On service road to Club, on Integral Energy Power Box 13881

Lat/Long : S33 47.094 / E150 57.106

UBD 189 P-6

Start Date    21-MAY-15

Start Time    100

Duration    7 DAYS

Interval    1 HOUR

Speed Limit    0

Weekly 50th Percentile Speed    16

Weekly 85th Percentile Speed    20

Five Day AADT    58

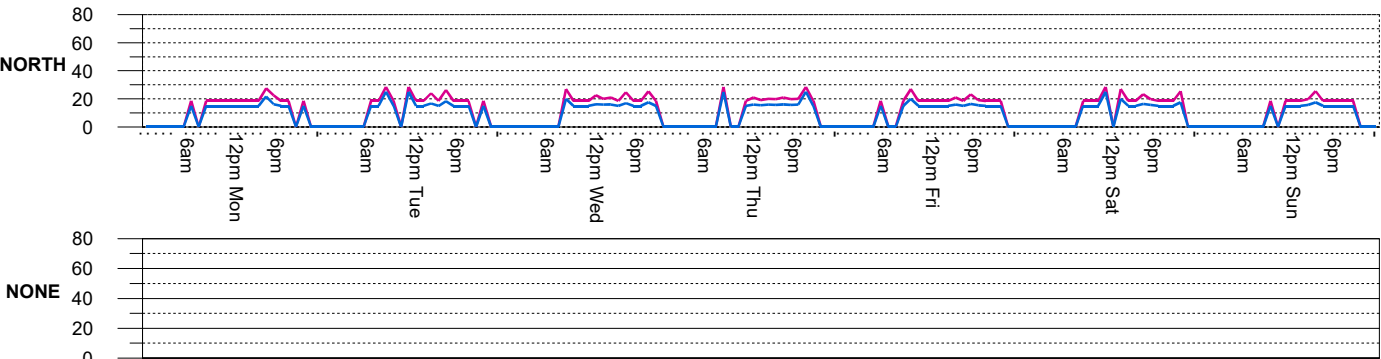
Seven Day AADT    55

NORTH

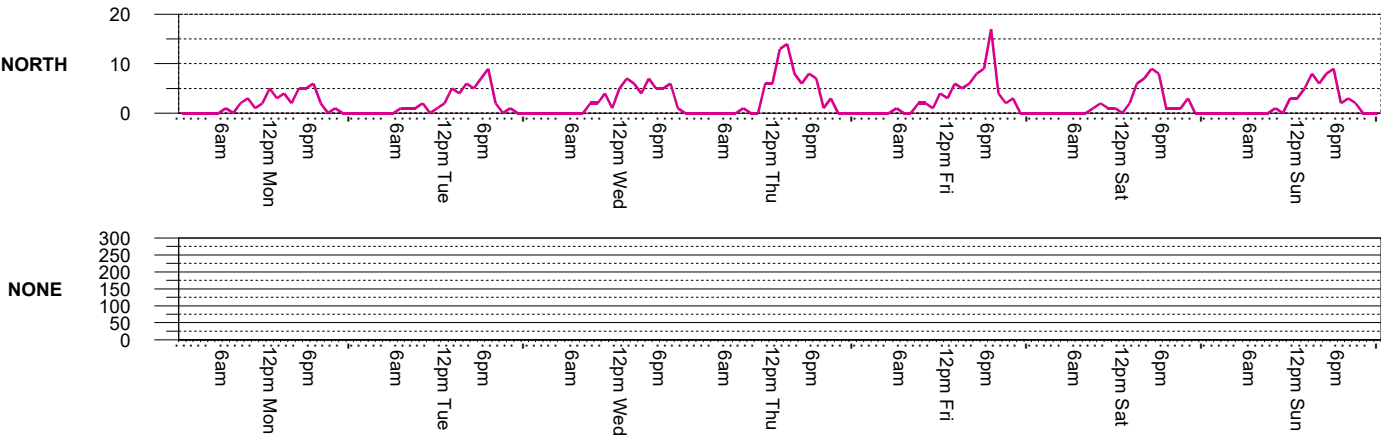
NONE

COMBINED

	MON 25-MAY-15			TUE 26-MAY-15			WED 27-MAY-15			THU 21-MAY-15			FRI 22-MAY-15			SAT 23-MAY-15			SUN 24-MAY-15			SEVENDAY AVERAGE		
	NORTH	NONE	BiDir	NORTH	NONE	BiDir	NORTH	NONE	BiDir	NORTH	NONE	BiDir	NORTH	NONE	BiDir	NORTH	NONE	BiDir	NORTH	NONE	BiDir	NORTH	NONE	BiDir
85%ile	19.4		19.4	19.5		19.5	19.9		19.9	19.8		19.8	19.1		19.1	19.9		19.9	19.0		19.0	19.5		19.5
50%ile	15.5		15.5	15.6		15.6	15.9		15.9	15.8		15.8	15.4		15.4	15.8		15.8	15.3		15.3	15.6		15.6
> 10 k	42		42	47		47	55		55	73		73	73		73	43		43	50		50	54.71		54.71
%age	99.4		99.4	99.5		99.5	99.6		99.6	99.7		99.7	99.7		99.7	99.4		99.4	99.5		99.5	99.6		99.6
> 20 k	4		4	5		5	8		8	10		10	5		5	6		6	3		3	5.857		5.857
%age	9.5		9.5	10.6		10.6	14.5		14.5	13.7		13.7	6.8		6.8	13.9		13.9	6.0		6.0	10.7		10.7



Short %	92.9		92.9	95.7		95.7	92.7		92.7	93.2		93.2	91.8		91.8	97.7		97.7	98.0		98.0	94.3		94.3
Med %	7.1		7.1	4.3		4.3	7.3		7.3	6.8		6.8	8.2		8.2	2.3		2.3	2.0		2.0	5.7		5.7
Long %	.0		.0	.0		.0	.0		.0	.0		.0	.0		.0	.0		.0	.0		.0	.0		.0
AM Pk Vo	3		3	2		2	4		4	6		6	4		4	2		2	3		3	3		3
PM Pk Vo	6		6	9		9	7		7	14		14	17		17	9		9	9		9	10		10
7-7pm	38		38	43		43	48		48	69		69	63		63	38		38	45		45	49		49
24Hr Tot	42		42	47		47	55		55	73		73	73		73	43		43	50		50	55		55
Class 0	2		2	0		0	3		3	1		1	1		1	2		2	1		1	1		1
Class 1	37		37	45		45	46		46	67		67	66		66	40		40	48		48	50		50
Class 2	0		0	0		0	2		2	0		0	0		0	0		0	0		0	0		0
Class 3	2		2	1		1	0		0	5		5	4		4	1		1	0		0	2		2
Class 4	1		1	0		0	0		0	0		0	2		2	0		0	0		0	1		1
Class 5	0		0	0		0	1		1	0		0	0		0	0		0	0		0	0		0
Class 6	0		0	0		0	0		0	0		0	0		0	0		0	0		0	0		0
Class 7	0		0	0		0	0		0	0		0	0		0	0		0	0		0	0		0
Class 8	0		0	0		0	0		0	0		0	0		0	0		0	0		0	0		0
Class 9	0		0	0		0	0		0	0		0	0		0	0		0	0		0	0		0
Class 10	0		0	0		0	0		0	0		0	0		0	0		0	0		0	0		0
Class 11	0		0	0		0	0		0	0		0	0		0	0		0	0		0	0		0
Class 12	0		0	0		0	0		0	0		0	0		0	0		0	0		0	0		0
Class 13	0		0	0		0	0		0	0		0	0		0	0		0	0		0	0		0



## Appendix B

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### SIDRA INTERSECTION Results



# MOVEMENT SUMMARY

 **Site: Wentworth Ave/ Cornelia Road - Existing AM Peak**

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
NorthEast: Wentworth Ave											
25	T1	291	5.0	0.675	5.9	LOS A	7.6	55.1	0.66	0.62	52.3
26a	R1	653	5.0	0.675	9.3	LOS A	7.6	55.1	0.66	0.62	51.7
26u	U	4	5.0	0.675	12.2	LOS A	7.6	55.1	0.66	0.62	52.9
Approach		947	5.0	0.675	8.2	LOS A	7.6	55.1	0.66	0.62	51.9
West: Cornelia Rd											
10a	L1	927	5.0	0.719	4.5	LOS A	10.2	74.3	0.39	0.47	54.1
12b	R3	194	5.0	0.719	10.2	LOS A	10.2	74.3	0.39	0.47	54.7
12u	U	1	5.0	0.719	11.2	LOS A	10.2	74.3	0.39	0.47	55.1
Approach		1122	5.0	0.719	5.5	LOS A	10.2	74.3	0.39	0.47	54.2
SouthWest: Wentworth Ave											
30b	L3	85	5.0	0.210	8.8	LOS A	1.3	9.8	0.77	0.79	51.2
31	T1	56	5.0	0.210	8.6	LOS A	1.3	9.8	0.77	0.79	52.7
32u	U	1	5.0	0.210	15.0	LOS B	1.3	9.8	0.77	0.79	53.3
Approach		142	5.0	0.210	8.8	LOS A	1.3	9.8	0.77	0.79	51.8
All Vehicles		2212	5.0	0.719	6.9	LOS A	10.2	74.3	0.53	0.55	53.0

Level of Service (LOS) Method: Delay (RTA NSW).

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.

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

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

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

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Project: X:\15S1500-1599\15S1573100 - Opal Aged Care, Toongabbie - TIA\Modelling\160420-15S1573100-Wentworth-Cornelia.sip6

# MOVEMENT SUMMARY

 **Site: Wentworth Ave/ Cornelia Road - Existing PM Peak**

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
NorthEast: Wentworth Ave											
25	T1	262	5.0	0.882	8.7	LOS A	19.6	142.7	0.95	0.68	50.8
26a	R1	1040	5.0	0.882	12.1	LOS A	19.6	142.7	0.95	0.68	50.2
26u	U	1	5.0	0.882	15.1	LOS B	19.6	142.7	0.95	0.68	51.3
Approach		1303	5.0	0.882	11.4	LOS A	19.6	142.7	0.95	0.68	50.3
West: Cornelia Rd											
10a	L1	613	5.0	0.555	4.5	LOS A	5.5	39.9	0.38	0.51	53.9
12b	R3	199	5.0	0.555	10.2	LOS A	5.5	39.9	0.38	0.51	54.5
12u	U	2	5.0	0.555	11.2	LOS A	5.5	39.9	0.38	0.51	54.9
Approach		814	5.0	0.555	5.9	LOS A	5.5	39.9	0.38	0.51	54.0
SouthWest: Wentworth Ave											
30b	L3	105	5.0	0.572	23.3	LOS B	5.3	38.4	1.00	1.12	42.6
31	T1	86	5.0	0.572	23.1	LOS B	5.3	38.4	1.00	1.12	43.6
32u	U	1	5.0	0.572	29.5	LOS C	5.3	38.4	1.00	1.12	44.1
Approach		193	5.0	0.572	23.2	LOS B	5.3	38.4	1.00	1.12	43.0
All Vehicles		2309	5.0	0.882	10.5	LOS A	19.6	142.7	0.75	0.66	50.8

Level of Service (LOS) Method: Delay (RTA NSW).

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.

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

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

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

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# MOVEMENT SUMMARY

 **Site: Wentworth Ave/ Cornelia Road - PD AM Peak**

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
NorthEast: Wentworth Ave											
25	T1	291	5.0	0.689	5.9	LOS A	7.9	57.4	0.69	0.63	52.1
26a	R1	653	5.0	0.689	9.3	LOS A	7.9	57.4	0.69	0.63	51.5
26b	R3	8	0.0	0.689	22.3	LOS B	7.9	57.4	0.69	0.63	16.8
26u	U	4	5.0	0.689	12.3	LOS A	7.9	57.4	0.69	0.63	52.7
Approach		956	5.0	0.689	8.4	LOS A	7.9	57.4	0.69	0.63	50.8
North: Site Access											
7b	L3	4	0.0	0.024	16.8	LOS B	0.2	1.7	1.00	0.65	15.4
9a	R1	1	0.0	0.024	16.8	LOS B	0.2	1.7	1.00	0.65	15.5
9	R2	4	0.0	0.024	16.8	LOS B	0.2	1.7	1.00	0.65	15.6
Approach		9	0.0	0.024	16.8	LOS B	0.2	1.7	1.00	0.65	15.5
West: Cornelia Rd											
10	L2	8	0.0	0.793	8.9	LOS A	13.1	95.9	0.52	0.49	16.9
10a	L1	927	5.0	0.793	4.9	LOS A	13.1	95.9	0.52	0.49	53.6
12b	R3	194	5.0	0.793	10.7	LOS A	13.1	95.9	0.52	0.49	54.2
12u	U	1	5.0	0.793	11.6	LOS A	13.1	95.9	0.52	0.49	54.6
Approach		1131	5.0	0.793	5.9	LOS A	13.1	95.9	0.52	0.49	52.9
SouthWest: Wentworth Ave											
30b	L3	85	5.0	0.220	8.9	LOS A	1.4	10.4	0.78	0.80	51.0
30a	L1	3	0.0	0.220	15.1	LOS B	1.4	10.4	0.78	0.80	16.7
31	T1	56	5.0	0.220	8.8	LOS A	1.4	10.4	0.78	0.80	52.5
32u	U	1	5.0	0.220	15.2	LOS B	1.4	10.4	0.78	0.80	53.1
Approach		145	4.9	0.220	9.0	LOS A	1.4	10.4	0.78	0.80	49.3
All Vehicles		2241	4.9	0.793	7.2	LOS A	13.1	95.9	0.61	0.57	51.2

Level of Service (LOS) Method: Delay (RTA NSW).

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.

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

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

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

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# MOVEMENT SUMMARY

 **Site: Wentworth Ave/ Cornelia Road - PD PM Peak**

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
NorthEast: Wentworth Ave											
25	T1	262	5.0	0.898	10.1	LOS A	22.0	160.9	0.99	0.73	49.9
26a	R1	1040	5.0	0.898	13.5	LOS A	22.0	160.9	0.99	0.73	49.3
26b	R3	3	0.0	0.898	26.5	LOS B	22.0	160.9	0.99	0.73	49.4
26u	U	1	5.0	0.898	16.5	LOS B	22.0	160.9	0.99	0.73	50.4
Approach		1306	5.0	0.898	12.9	LOS A	22.0	160.9	0.99	0.73	49.4
North: Site Access											
7b	L3	12	0.0	0.045	7.5	LOS A	0.4	2.5	0.87	0.62	16.0
9a	R1	4	0.0	0.045	7.5	LOS A	0.4	2.5	0.87	0.62	16.1
9	R2	12	0.0	0.045	7.5	LOS A	0.4	2.5	0.87	0.62	16.2
Approach		27	0.0	0.045	7.5	LOS A	0.4	2.5	0.87	0.62	16.1
West: Cornelia Rd											
10	L2	3	0.0	0.610	8.7	LOS A	6.4	46.5	0.43	0.52	51.6
10a	L1	613	5.0	0.610	4.7	LOS A	6.4	46.5	0.43	0.52	53.6
12b	R3	199	5.0	0.610	10.4	LOS A	6.4	46.5	0.43	0.52	54.2
12u	U	2	5.0	0.610	11.4	LOS A	6.4	46.5	0.43	0.52	54.6
Approach		817	5.0	0.610	6.1	LOS A	6.4	46.5	0.43	0.52	53.8
SouthWest: Wentworth Ave											
30b	L3	105	5.0	0.604	26.1	LOS B	5.7	41.7	1.00	1.13	41.1
30a	L1	1	0.0	0.604	32.2	LOS C	5.7	41.7	1.00	1.13	40.9
31	T1	86	5.0	0.604	26.0	LOS B	5.7	41.7	1.00	1.13	42.1
32u	U	1	5.0	0.604	32.4	LOS C	5.7	41.7	1.00	1.13	42.5
Approach		194	5.0	0.604	26.2	LOS B	5.7	41.7	1.00	1.13	41.5
All Vehicles		2344	4.9	0.898	11.5	LOS A	22.0	160.9	0.80	0.69	48.9

Level of Service (LOS) Method: Delay (RTA NSW).

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.

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

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

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

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