

Transport Impact Assessment



Cardinal Gilroy Village Planning Proposal

Prepared for Southern Cross Care
06 September 2019

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1 Introduction

1.1 Background

A Planning Proposal is to be lodged with Cumberland Council (Council) for Cardinal Gilroy Village (CGV) Seniors Living located at 45 Barcom Street, Merrylands West.

This Planning Proposal seeks to modify the permissible maximum height control, maximum floor space ratio control, and permissible non-residential uses.

Southern Cross Care (SCC) has commissioned Taylor Thomson Whitting (TTW) to undertake a transport impact assessment of the proposed development under the Planning Proposal.

1.2 Scope

The Planning Proposal has been prepared to modify the permissible maximum height control, maximum floor space ratio control, and additional permitted uses. This proposal does not seek to modify key traffic-related controls such as car parking rates.

It is noted that a Masterplan and Urban Design Report prepared by Ethos Urban and as referenced below, has been developed to guide future development on the site.

This Transport Impact Assessment report outlines the anticipated traffic and transport impacts of the proposed modifications under the Planning Proposal. This report covers the following areas:

- Site access
- Traffic generation
- Car parking
- Public and active transport.

1.3 Planning Context

1.3.1 Holroyd Development Control Plan

The site is located within the Cumberland Council local government area (LGA) and is within the boundaries of former Holroyd City Council LGA, therefore currently subject to the provision of the Holroyd Development Control Plan (DCP) 2013.

1.3.2 Holroyd Local Environmental Plan

The site is subject to the provision of the Holroyd Local Environmental Plan 2013 and is zoned as R2- Low Density Residential. The land located to the north and east of the site is a mix of R4 High Density Residential and R3 Medium Density Residential, whilst the land to the south and west of the site is zoned as R2 – Low Density Residential.

The site falls within the following key classifications:

- Land zoning R2 Low Density Residential
- Height of buildings 9 metres maximum building height
- FSR Maximum 0.5:1

1.4 References

This report has been prepared in the context of and with knowledge of a variety of relevant documents, standards, and guidelines included but not limited to the following:

- RMS Guide to Traffic Generating Developments
- Holroyd Development Control Plan (DCP) 2013
- Holroyd Local Environmental Plan (LEP) 2013
- SEPP (Housing for Seniors or People with a Disability) 2004

- Cardinal Gilroy Village Masterplan and Urban Design Report (Issue A) August 2019
- Traffic surveys undertaken by TTW on Thursday 25th October 2018, as referenced in the context of this report
- Other documents and data as referenced in this report.

1.5 Related Development

It is noted that a staged DA for a proposed development on the eastern boundary of the site near Barcom Road has been submitted to the Council and is under process of determination. The proposed development includes 17 ILUs and a community building to replace the existing community centre with an internal floor area of 855m².

2 Existing Conditions

2.1 The Site

Southern Cross Care (SCC) Cardinal Gilroy Village is located at 45 Barcom Street, Merrylands West and currently comprises the following:

- 236 – Independent Living Units (ILUs)
- 123 – Supported Living Units in the Residential Age Care Facility (RACF).

The village is spread over 7.4 hectares consists of following land parcels:

- Lot 05 DP 701151
- Lot 08 DP 732058
- Lot 11 DP 1075418

The site has frontages to Kenyons Road to the north, Merrylands High School to the south, residential area to the east and Cerdon College combined with a heritage site called Sherwood Scrubs to the west. The surrounding land uses are predominantly residential.

The site is located within the Cumberland Council local government area (LGA) and is within the boundaries of the former Holroyd City Council LGA, therefore currently subject to the provisions of the Holroyd Development Control Plan (DCP) 2013 and the Holroyd Local Environmental Plan (LEP) 2013.

Access to the site is via Barcom Street which also provides the primary frontage to the site. Figure 2.1 shows the location of the site and its environs.

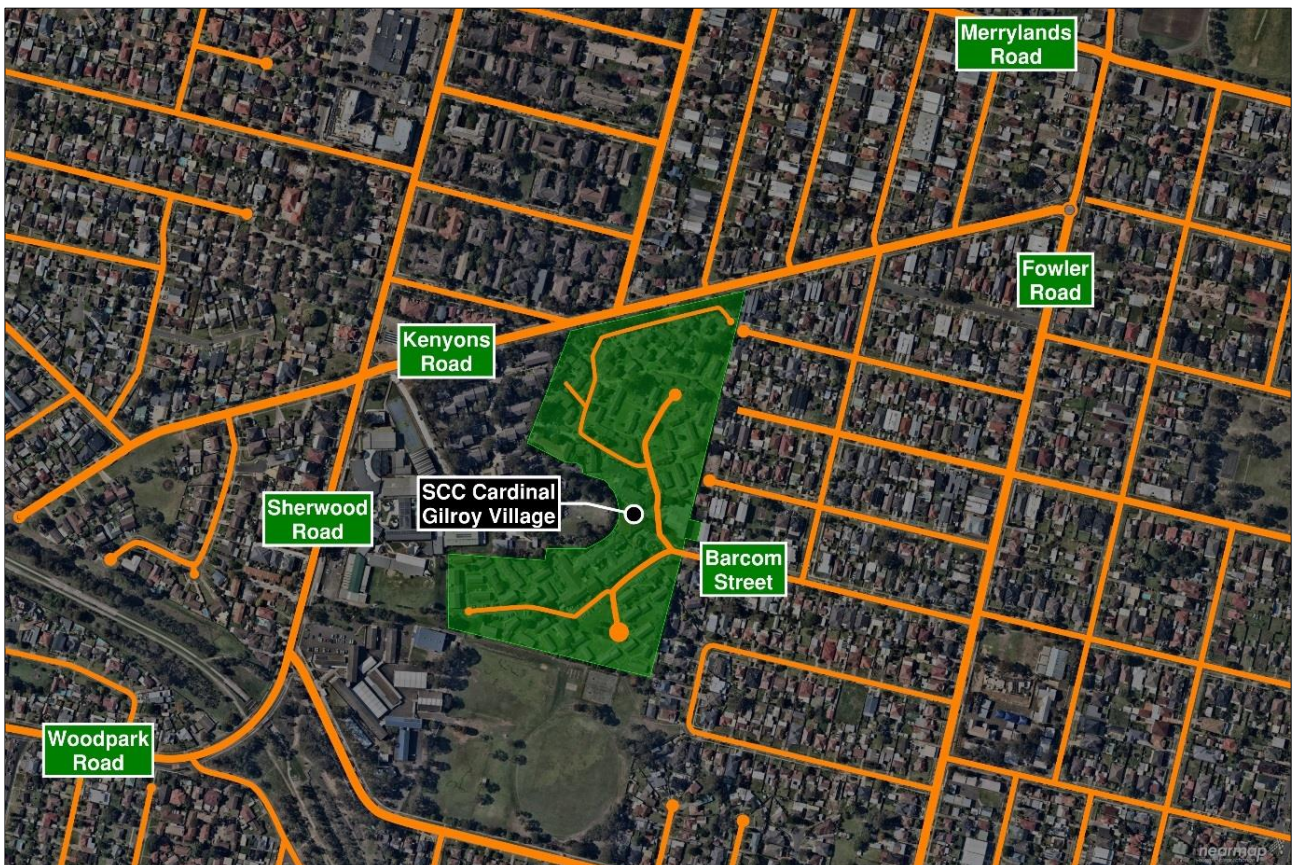


Figure 2.1: Site location and its environs

2.2 Road Network

Barcom Street is a local road operated by the Council. In the vicinity of site, the road is aligned in an east-west direction with one traffic lane in each direction set within an approximately 10-metre wide carriageway. Kerbside parking is permitted on both sides of the Barcom Street. The road provides direct access to the site and runs between the site and Fowler Road. It has a sign-posted speed limit of 50 km/hr. Local bus services also operate along Barcom Street, stopping directly within the site entry.

Kenyons Road is a Council owned local road and runs along the northern frontage of the site. The road is aligned in a north-east, south-west direction. It is a two-way road configured with one traffic lane in each direction, with a 12-metre wide carriageway. Kenyons Road has a posted speed limit of 50 km/hr, whilst near the site the road falls into a school zone and has a time restricted speed limit of 40 km/hr. Unrestricted Kerbside parking is generally permitted on both sides of the road. To its north the road intersects with six local streets and serves as a collector road for surrounding residential traffic.

Merrylands Road between Fowler Road and Sherwood Road is a local road with two lanes in each direction of travel. The sign-posted speed limit is 60 km/hr. No on-street parking is permitted in this segment of Merrylands Road.

Betts Road is a state road segment of Cumberland Highway (A28) connecting Merrylands Road in the north to Sturt Street in the South. It has three lanes in each direction of travel and a divided carriageway. The sign-posted speed limit is 70 km/hr.

2.3 Car Parking

The site provides off-street parking provision to the residents and visitors to the village. Parking is provided along the internal roads within the site. Table 2.1 presents an overview of the parking available on-site.

Table 2.1: Summary of parking provision within SCC Cardinal Gilroy Village

Parking Restriction	Total Spaces
No Restriction	49
Visitors	51
Disabled only	5
Reserved parking for Units	91
Total	196

2.4 Public Transport

Merrylands and Guildford Stations are the nearest train stations to the development and are located at approximately 2.5 kilometres and 2.9 kilometres driving distance from the site respectively. These stations are serviced by the T2 Inner West & Leppington Line and the T5 Cumberland Line. Services on these lines operate approximately every 15 minutes during peak periods and every 30 minutes on a daily average.

Bus route 802 services the site and operates along Barcom Street with a stop located within the site area. Services operate from around 6am to 9pm, with services approximately every 30 minutes. This route provides access to Parramatta Station and suburbs neighbouring Merrylands West, including Liverpool, Green Valley, and Fairfield. This route is operated by Transit Systems.

Public transport is currently adequate to comply with SEPP (Housing for Seniors). Any future development on the site providing housing for seniors or people with a disability will continue to meet these requirements as long as this public transport access is maintained.

Figure 2.2 shows the bus routes in the vicinity of the site.

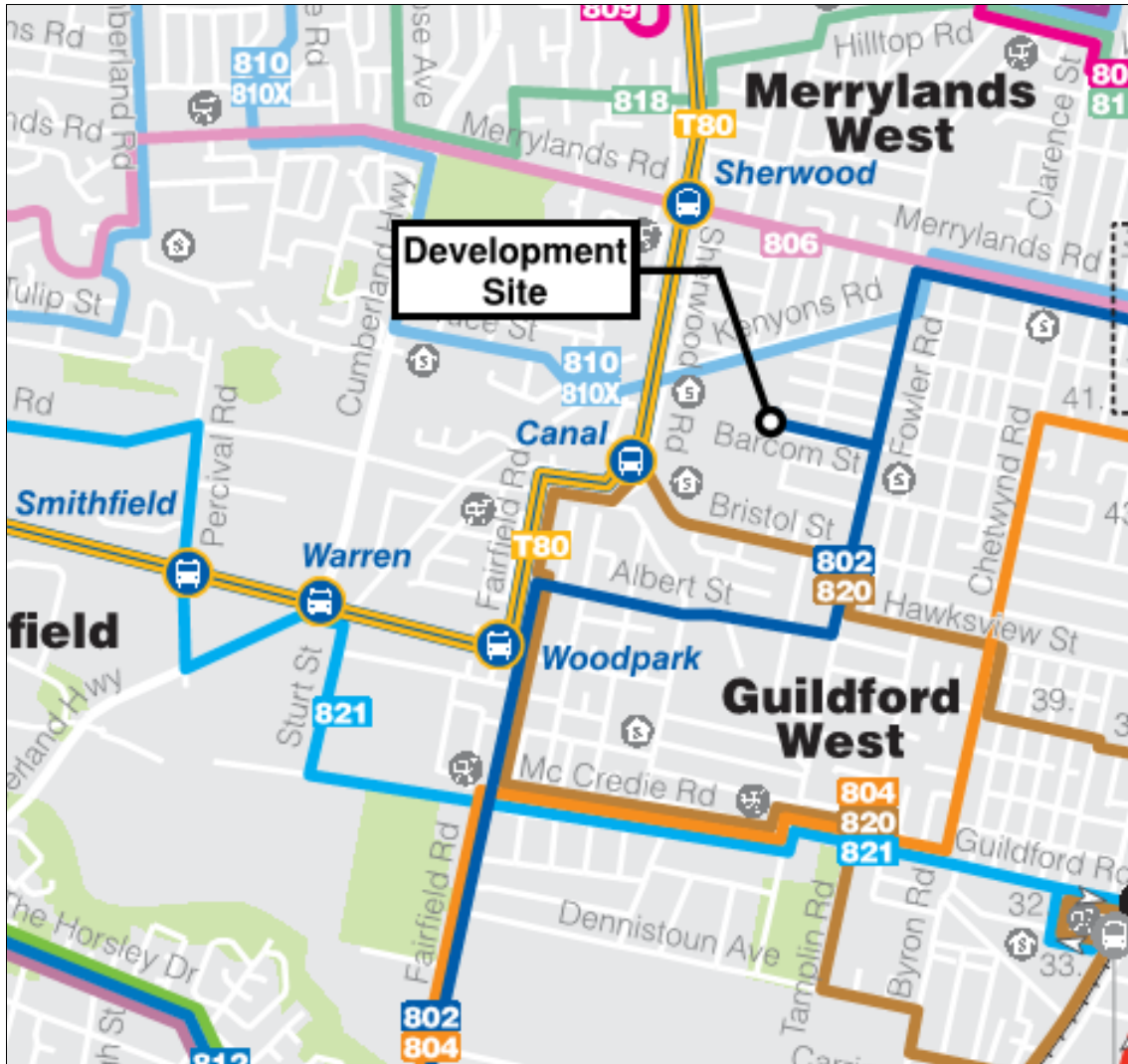


Figure 2.2: Bus services near the development site
Source: Transit Systems

2.4.1 Pedestrian and Cycling Facilities

The surrounding area to the site is predominantly residential land use with pedestrian footpaths generally available along all of the surrounding streets. Pedestrian footpath is available on both sides of the Kenyons Road combined with pedestrian refuges on roundabout controlled intersection of Kenyons Road and Arcadia Street. Two pedestrian gates along the northern frontage of the village connect the site with footpaths along Kenyons Road.

Bicycling facilities are limited with no dedicated cycling track available near to the site. Cyclist usually share surrounding local roads and streets with the local traffic. The nearest dedicated cycleway is 2.7 kilometres to the east of site that runs along railway line and connects Merrylands to Liverpool.

2.5 Traffic Conditions

2.5.1 Traffic Volumes

Intersection turning movement counts were undertaken to assess the existing performance of the local road network. Turning movement counts were completed on the following intersections:

- Barcom Street / Fowler Road (priority controlled)
- Kenyons Road / Arcadia Street (roundabout).

The traffic movement surveys at the nominated study intersections were completed Thursday 25th October 2018 and Saturday 27th October 2018 during the following peak periods:

- Thursday 6:00am and 9:00am
- Thursday 4:00pm and 7:00pm
- Saturday 10:00am and 3:30pm

The traffic movements to and from the site were also recorded during the following peak activity period:

- Thursday 8:00am and 9:00am 42 inbound and 31 outbound trips (73 total trips)
- Thursday 4:00pm and 5:00pm 22 inbound and 35 outbound trips (57 total trips)
- Saturday 2:30pm and 3:30pm 31 inbound and 37 outbound trips (68 total trips)

Figure 2.3: Nominated study intersections. Figure 2.3 shows the location of nominated intersections in the context of site. Traffic counts are included in **Appendix A**.



Figure 2.3: Nominated study intersections

2.5.2 Intersection Analysis

The intersection operation assessment of the nominated study intersections has been undertaken using SIDRA INTERSECTION (SIDRA) modelling software. The Roads and Maritime Services (Roads and Maritime) identifies vehicle delay as a commonly used measure to assess intersection performance.

Table 2.2 shows the criterion recommended by Roads and Maritime and adopted by SIDRA software to assess the level of service.

Table 2.2: Level of service criteria for intersections

Source: RMS guide to Traffic Generating Development

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way and Stop Signs
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	Operating near capacity	Near capacity, accident study required
E	57 to 70	At capacity, at signals incidents will cause extensive delays Roundabouts require other control mode	At capacity, requires other control mode
F	Greater than 70	Additional capacity required	Extreme delay, additional capacity required

A summary of the existing intersection operation is shown in Table 2.3. Based on the assessment the nominated study intersections perform well at an acceptable LOS. The right turn movement out of Barcom Street during PM peak period shows a slightly higher delay of up to 31 seconds, which is still within satisfactory operational limits. Detailed analysis results are provided in **Appendix B**.

Table 2.3: Existing operation conditions

Intersection	Peak	Degree of Saturation	Average Delay (sec)	Level of Service
Barcom Street / Fowler Road (Priority controlled intersection)	AM	0.411	23	B
	PM	0.391	31	C
Kenyons Road / Arcadia Street (Roundabout controlled intersection)	AM	0.347	10	A
	PM	0.479	10	A

3 Planning Proposal

3.1 Overview

The Planning Proposal seeks to amend the Statutory Development Controls of the Holroyd Local Environmental Plan 2013 (HLEP) to facilitate a masterplan development that offers maximum yield. The proposal aims to lift the permissible maximum height control to 20 metres, maximise floor space ratio control to 0.85:1 and rezone the site as R4 high-density residential for the redevelopment of SCC Cardinal Gilroy Village.

A draft concept masterplan for the proposed redevelopment includes the following buildings and facilities:

- New residential aged care facilities (RACF) with a capacity for 153 beds;
- 460 Independent Living Units (ILUs)
 - 1-Bedroom ILUs – 93
 - 2-bedroom ILUs – 348
 - 3-bedroom ILUs – 19;
- 1,311 sqm of community facilities such as a gym, library and a community centre (excluding community centre proposed in staged DA as discussed above in section 1.5.)
- 1,480 sqm of neighbourhood shops.

The masterplan concept splits the site in northern and southern precincts with a central precinct that include a proposed community facility building and public green space ideally located in the centre of the site along the eastern frontage. Northern and southern precinct comprise of eight and nine buildings respectively, that ranges between two to five storeys in height.

The northern precinct also includes a three storey RACF building located to the north along Kenyons Road frontage. The RACF is located adjacent to the proposed main entrance from Kenyons Road and is easily accessible by public transport, cars and pedestrians. The precinct also includes permissible non-residential land uses located on the ground floor of ILU Building A and RACF Building B.

Southern Precinct consists of eight ILU buildings with a park located in the centre of the precinct and a community facility building to its north.

The draft masterplan concept is shown in Figure 3.1 below.

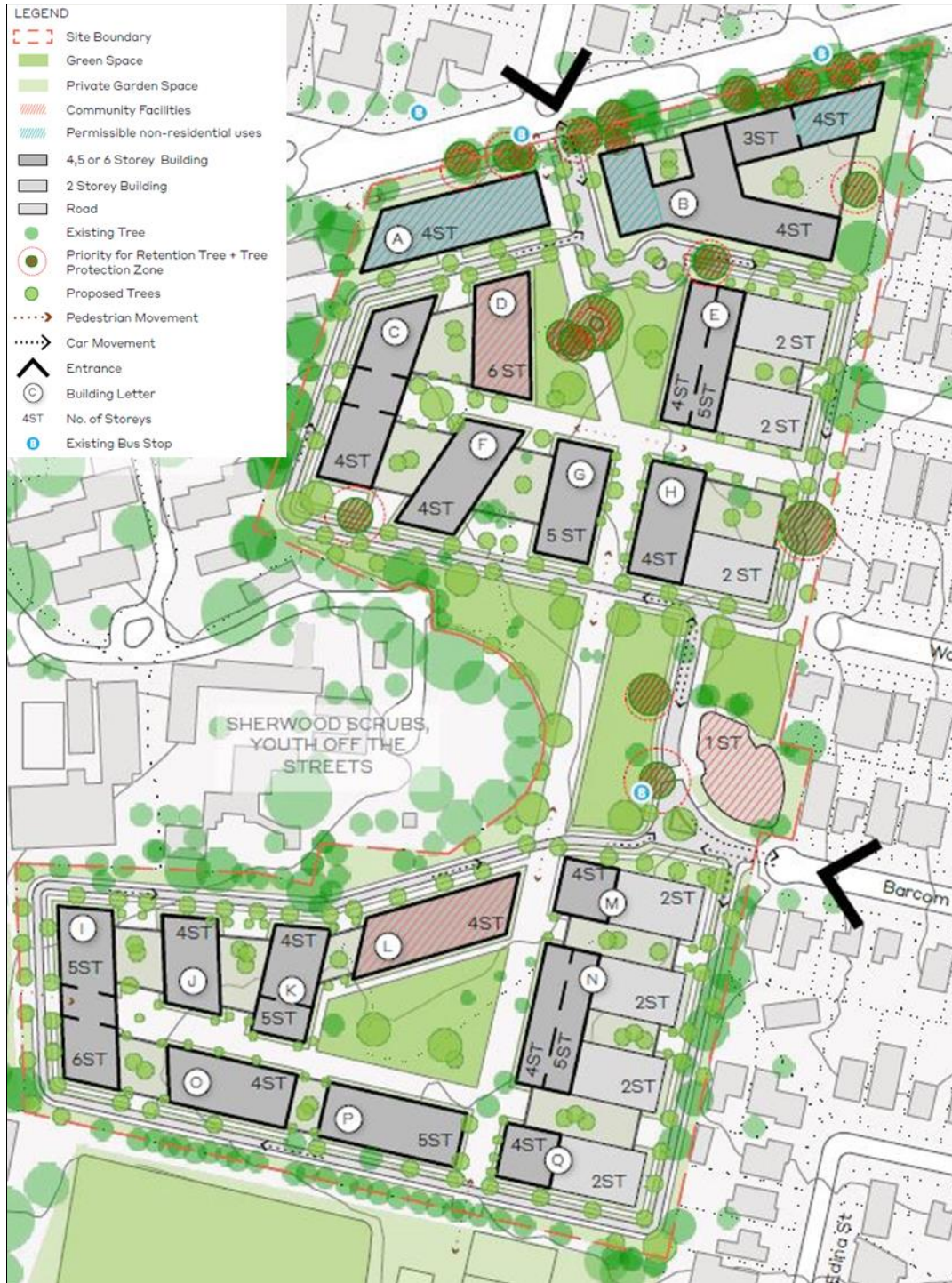


Figure 3.1: Masterplan concept for SCC Cardinal Gilroy Village Redevelopment

Source: Ethos Urban, Urban Design Report – August 2019

3.2 Internal Road Network

The draft masterplan concept includes adjustment to the internal road network and propose a new access to the site off the roundabout intersection of Kenyons Road and Arcadia Street.

The internal road system is proposed to work in a one-way loop arrangement, such that the internal roads will run along the boundary of each precinct and connect northern precinct with southern precinct via a small link road through central precinct adjacent to the Barcom Street access. The loop road system allows

adequate space between the proposed ILU buildings to create undisturbed pedestrian networks and minimises possibilities of clashes between pedestrians and cars. The proposed loop road will be landscaped to provide amenity to pedestrians and visitors.

The masterplan concept includes an adjustment to the road network where a second access to the site is proposed off the roundabout intersection of Kenyons Road and Arcadia Street. The proposed access will allow to distribute the site traffic more efficiently within the surrounding road network while easing access for ambulances and other emergency vehicles to the RACF.

The existing access to site and the proposed access off the roundabout intersection will accommodate two-way movements. Figure 3.2 shows the proposed one-way loop roads and two-way roads for traffic circulation within the village.

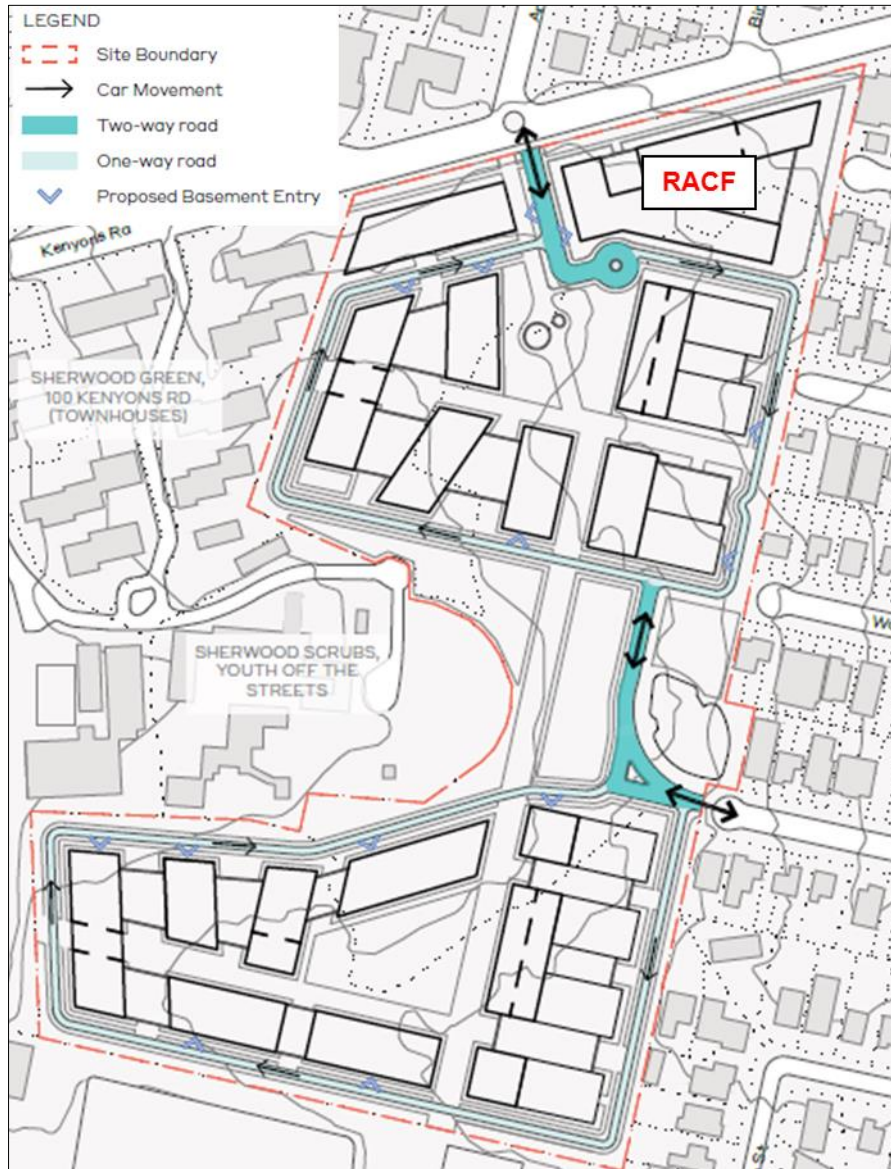


Figure 3.2: Proposed circulation roads

Source: Ethos Urban, Urban Design Report – August 2019

3.3 Proposed Parking Provision

The proposed ILU building will provide basement parking under different groupings, whilst the entry and exit to the basements will be off the one-way loop roads. These basement entries would not clash with the pedestrian entries into the blocks. Visitor parking will also be provided within the basement parking provision. Along the loop roads at least two on-street parking spaces per building are proposed for easy and quick drop-offs for residents and visitors. Parking for neighbourhood shops will be provided along two-way roads and in the basement car park.

3.4 Modification Outcomes

The proposed modification to the HLEP statutory controls stated above would allow for an increase in the number of dwellings on-site from 236 ILUs to 460 ILUs and 123 supported living units to 153 supported living units in the RACF. The Planning Proposal also includes provision of 1,480 sqm of neighbourhood shops that will provide services to the residents and public.

4 Transport Impact Assessment

4.1 Trip Generation

The traffic generation estimates for the proposed development have been sourced from the following:

- Guide to Traffic Generating Development, Roads and Maritime, 2002
- Technical Direction TDT 2013/04: Updated traffic surveys, Roads and Maritime, 2013
Guide RMS Guide to Traffic Generating Developments (2013 Supplement) summarises trip generation rates for housing.
- Site specific traffic generation rate derived from the existing site generated traffic.

Based on the proposed land uses discussed above in section 3, the traffic generation for the proposal would be a net addition to the existing traffic generation of the site.

It is noted that the morning peak hour of the site does not generally coincide with the network peak hour.

Traffic Generation based on RMS rates

Table 4.1 shows the net trip generation for the site when compared with the existing approved development and proposed development based on the RMS traffic generation rates.

Table 4.1: Summary of traffic generation of existing and proposed land use based on RMS rates

Land Use	Dwelling Type	Dwelling Number / Area	Traffic Generation Rate	Traffic Generation	Total Peak Trip	
Existing Senior Housing	ILUs	236	0.4 trips per dwelling	94	143	
	RACF	123		49		
Proposed Senior Housing	ILUs	460	0.4 trips per dwelling	184	276	
	RACF	153		62		
Proposed Neighbourhood shops/ Commercial	-	1,480	2 per 100 sqm of GFA	30		
Net Additional Trip Generation in comparison to existing housing						(+133)

The RMS guide to traffic generating developments, does not provide a traffic generation rate for the neighbourhood shops. Assuming the proposed shops could be rented by small scale businesses, a traffic generation rate for commercial land use has been implemented, to ascertain future trip generation of the proposed neighbourhood shops.

Based on the above, the traffic generation estimates indicate that the proposed development could generate an additional 133 trips during peak hour when compared with existing conditions.

Traffic Generation based on site-specific trip rates

The traffic counts at the existing development access (see Table 4.2), shows that the existing development only generates up to 50% of the trips when compared with existing traffic generation based on RMS traffic generation rates.

Table 4.2: Existing peak hour traffic generation

Land Use	Day	Peak Hour	In	Out	Total
Existing development	Thursday	8:00am – 9:00am	42	31	73
		4:00pm – 5:00pm	22	35	57
	Saturday	2:30pm – 3:30pm	31	37	68

Based on the existing traffic generation pattern, site-specific traffic generation rates are derived for the morning and evening peak hours and outlined in Table 4.3. Given the planning proposal seeks to mainly uplift the development controls, it is assumed that a site-specific traffic generation rate of 0.2 trips per dwelling would give rational traffic generation estimates for the senior housing element of the proposal.

Table 4.3: Site-specific traffic generation rates

Land Use	Day	Peak Hour	Traffic Generation Rate / dwelling	In	Out
Senior Housing	Thursday	AM	0.20	60%	40%
		PM	0.16	40%	60%
	Saturday	Afternoon	0.19	46%	54%

Table 4.4 summarises the traffic generation of the existing and proposed development based on the site-specific traffic generation rates.

Table 4.4: Site-specific traffic generation estimates of existing and proposed land uses

Land Use	Dwelling Type	Dwelling Number / Area	Traffic Generation Rate	Traffic Generation	Total Peak Trip
Existing Senior Housing	ILUs	236	0.2 trips per dwelling	48	73
	RACF	123		25	
Proposed Senior Housing	ILUs	460	0.2 trips per dwelling	92	153
	RACF	153		31	
Proposed Neighbourhood shops/ Commercial	-	1,480	2 per 100 sqm of GFA ¹	30	
Net Additional Trip Generation in comparison to existing housing					

Based on the site-specific trip generation rate, the proposal could generate up to 81 net additional peak hour trips when compared with the existing development.

The above estimates do not include traffic generation for community facilities. The community facilities will be used by residents only, however staff members who will operate the community facilities will govern the traffic generation numbers for this land use. The staff numbers are not available at this stage, however for the purpose of this assessment, it is anticipated that these facilities could employ up to 10 staff. Based on

¹ Based on RMS guide to traffic generating developments

local journey to work data it is anticipated that 80% of these staff members are expected to arrive by personal vehicles and could generate up to 10 additional trips.

4.2 Traffic Impact

As discussed in section 3.2, the masterplan concept includes an adjustment to the road network where a second access to the site is proposed off the roundabout intersection of Kenyons Road and Arcadia Street. It is expected that with the proposed access to the site, combined with the division of the site in northern and southern precinct, the traffic to and from the site will be more staggered and would have less impact on any one site access or adjoining roads.

Such that, the proposed development could generate up to circa 40 additional vehicles on adjoining intersections to the Barcom Street and Kenyons Road accesses. Therefore, given the satisfactory traffic conditions of the local intersections (see Section 2.5.2 above), the additional peak hour trips would not generate significant impact and could be accommodated within the local road network.

Detailed intersection modelling would be required as part of any future development application for the site including provision of mitigation measures if required.

4.3 Public Transport Facilities

The bus route 802 approaches the site through Barcom Street access and turnaround from the same location. There is no change proposed to the bus route alignment, as with the proposed development the bus would still turnaround from the Barcom Street access.

Given the residents and staff on the site are anticipated to predominantly use private cars as primary mode of travel, the proposed development would not impact the public transport in the surrounding.

5 Parking Assessment

5.1 State Environmental Planning Policy (SEPP) Requirements

The site is located within the boundaries of former Holroyd City Council LGA, therefore currently subject to the provision of the Holroyd Development Control Plan (DCP) 2013. For the self-contained units and RACF developments the DCP recommends providing the parking facilities in accordance with the parking requirements as outlined in the SEPP (Housing for Senior or People with a Disability) 2004.

Table 5.1 shows the recommended parking controls used under this assessment and parking requirements.

Table 5.1: Recommended parking controls under SEPP

Land Use	Type	Proposed Yield	SEPP/ DCP Parking rates	Parking Requirements
Residential Flat Buildings (ILUs)	Studio / 1 Bedroom Apartment	93	1 car space for each 5 dwellings where the DA is made by, or is, made by a person jointly with, a social housing provider	92
	2 Bedroom Apartment	348		
	3 Bedroom Apartment	19		
	Total	460		
Neighbourhood Shop²	-	1,480 sqm	1 space / 30m ² of GLFA	50
Residential Care Facilities	Residents	153	1 space / 10 Beds	16
	Employees	70 ³	1 space / 2 person employed in connection with the development and on duty at any one time	35
	Ambulance	-	1 Ambulance bay for the development	1
Total				194

It is noted that the SEPP (Housing for Seniors or People with a Disability) requires that carparking spaces comply with the requirements for parking for persons with a disability set out in AS 2890 and that 5% of the total number of carparking spaces must be designed to enable the width of the spaces to be increase to 3.8 metres.

Based on the above the proposed development should provide minimum 194 parking spaces.

² Holroyd DCP 2013 parking requirement is applied for neighbourhood shop.

³ We have been advised by the SCC that approximately 70 RACF employees will be on the site during changeover of shifts.

5.2 Proposed Parking Provision

The proposed parking provision for ILUs in residential flat buildings is higher than the parking requirements outlined under SEPP parking controls. A detailed parking assessment for each building has been completed in the Master Plan Urban Design Report based on the parking controls outlined in Table 5.2. The parking assessment has been attached in Appendix C of this report

Table 5.2: Adopted parking controls for the proposal

Land Use	Type	Requirements
Residential Flat Buildings (ILUs)	Studio / 1 Bedroom Apartment	1 space / apartment
	2 Bedroom Apartment	1 space / apartment
	3 Bedroom Apartment	1.2 spaces / apartment
	Visitors	0.2 space / apartment
Neighbourhood Shop	-	1 space / 30m ² of GLFA
Residential Care Facilities	Residents	1 space / 10 Beds
	Employees	1 space / 2 person employed in connection with the development and on duty at any one time
	Ambulance	1 Ambulance bay for the development
Parking for person with disability	-	5% of car spaces

Based on the assessment, the overall developments would provide up to 658 parking spaces in total that include 92 visitor parking spaces and 50 parking spaces for neighbourhood shops.

For the RACF staff parking provision it is assumed that during changeover of shifts a maximum number of 70 staff members would be on the site. Given that the proposed RACF would provide 51 parking spaces and one ambulance parking.

The proposed development would provide the parking on the above lines in order to contain all the parking requirements of the development within the off-street carparks. The above parking provision is subject to minor changes as the design development progress to staged DA.

6 Conclusion

The Cardinal Gilroy Village Planning Proposal modifies the maximum height control, maximum floor space ratio control, and permissible non-residential uses.

The traffic generated from this modification has been assessed and based on those results it was found that:

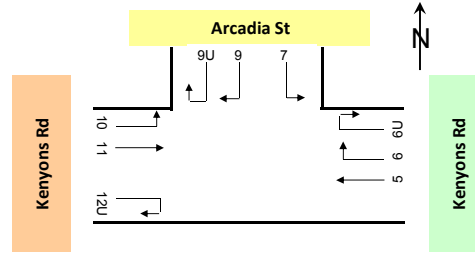
- The proposed masterplan could generate up to 81 net additional trips during any peak hour.
- Based on the future road network and proposed additional access to the site via the roundabout intersection of Kenyons Road and Arcadia Street, the net additional trips from the proposed development are more likely to be distributed among two access points to the development.
- Given the satisfactory traffic conditions of the local intersections, the additional peak hour trips are not expected to generate significant impact to intersection performance, delays, or queues. This would be confirmed in future development applications through detailed traffic modelling.
- The proposed development would provide parking provision to comply with parking controls outlined in SEPP (Housing for Seniors or People with a Disability) 2004.

Based on the assessment provided within this report, the intent of the Planning Proposal can be supported with regards to traffic and transport, with detailed traffic impacts subject to further assessment under future development applications.

Appendix A – Traffic Counts

Job No. : N4550
Client : TTW
Suburb : Merrylands West
Location : 1. Kenyons Road / Arcadia Street

Day/Date : Thu, 25th October 2018
Weather : Fine
Description : Classified Intersection Count
 : Peak Hour Summary

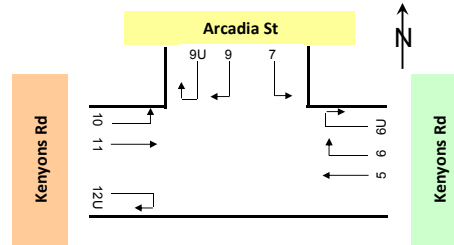


Approach	Kenyons Rd			Arcadia St			Kenyons Rd			Grand Total
	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	
AM 8:00 to 9:00	423	3	426	247	1	248	293	5	298	972
PM 16:45 to 17:45	621	3	624	175	0	175	127	2	129	928

Approach	Kenyons Rd			Arcadia St			Kenyons Rd			Grand Total
	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	
6:00 to 7:00	180	3	183	72	0	72	92	3	95	350
6:15 to 7:15	196	5	201	81	0	81	96	5	101	383
6:30 to 7:30	228	6	234	95	0	95	117	5	122	451
6:45 to 7:45	240	7	247	127	1	128	143	6	149	524
7:00 to 8:00	261	7	268	142	3	145	170	7	177	590
7:15 to 8:15	313	5	318	170	3	173	198	5	203	694
7:30 to 8:30	367	6	373	206	3	209	241	6	247	829
7:45 to 8:45	410	4	414	233	2	235	283	5	288	937
8:00 to 9:00	423	3	426	247	1	248	293	5	298	972
AM Totals	864	13	877	461	4	465	555	15	570	1,912
16:00 to 17:00	557	5	562	146	0	146	140	2	142	850
16:15 to 17:15	577	5	582	151	0	151	130	1	131	864
16:30 to 17:30	586	4	590	171	0	171	133	2	135	896
16:45 to 17:45	621	3	624	175	0	175	127	2	129	928
17:00 to 18:00	603	2	605	179	0	179	140	2	142	926
17:15 to 18:15	567	3	570	151	0	151	152	3	155	876
17:30 to 18:30	529	2	531	128	0	128	146	2	148	807
17:45 to 18:45	465	3	468	117	0	117	140	1	141	726
18:00 to 19:00	410	2	412	95	0	95	133	1	134	641
PM Totals	1,570	9	1,579	420	0	420	413	5	418	2,417

Job No. : N4550
 Client : TTW
 Suburb : Merrylands West
 Location : 1. Kenyons Rd / Arcadia St

Day/Date : Sat, 27th October 2018
 Weather : Fine
 Description : Classified Intersection Count
 : Peak Hour Summary

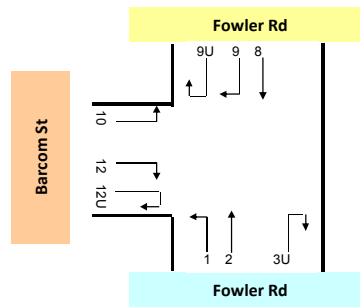


Approach	Kenyons Rd			Arcadia St			Kenyons Rd			Grand Total
	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	
Time Period										
13:15 to 14:15	296	0	296	104	1	105	120	2	122	523

Approach	Kenyons Rd			Arcadia St			Kenyons Rd			Grand Total
	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	
Time Period										
10:00 to 11:00	246	2	248	86	0	86	115	2	117	451
10:15 to 11:15	255	3	258	89	0	89	124	2	126	473
10:30 to 11:30	263	4	267	87	0	87	126	4	130	484
10:45 to 11:45	251	5	256	99	0	99	116	2	118	473
11:00 to 12:00	243	4	247	98	0	98	124	2	126	471
11:15 to 12:15	247	3	250	92	0	92	118	3	121	463
11:30 to 12:30	231	3	234	94	0	94	120	2	122	450
11:45 to 12:45	237	2	239	79	0	79	119	2	121	439
12:00 to 13:00	242	2	244	71	0	71	108	2	110	425
12:15 to 13:15	248	2	250	74	0	74	95	1	96	420
12:30 to 13:30	264	1	265	78	0	78	98	2	100	443
12:45 to 13:45	266	1	267	91	0	91	107	2	109	467
13:00 to 14:00	283	0	283	98	1	99	107	2	109	491
13:15 to 14:15	296	0	296	104	1	105	120	2	122	523
13:30 to 14:30	300	0	300	89	1	90	130	1	131	521
13:45 to 14:45	288	1	289	79	1	80	121	1	122	491
14:00 to 15:00	275	2	277	78	0	78	134	1	135	490
14:15 to 15:15	269	2	271	71	0	71	128	1	129	471
14:30 to 15:30	285	3	288	83	0	83	106	1	107	478
14:45 to 15:45	287	3	290	84	0	84	102	1	103	477
15:00 to 16:00	299	3	302	80	0	80	92	1	93	475
Totals	1,588	13	1,601	511	1	512	680	10	690	2,803

Job No. : N4550
 Client : TTW
 Suburb : Merrylands West
 Location : 2. Barcom St / Fowler Rd

Day/Date : Thu, 25th October 2018
 Weather : Fine
 Description : Classified Intersection Count
 : Peak Hour Summary



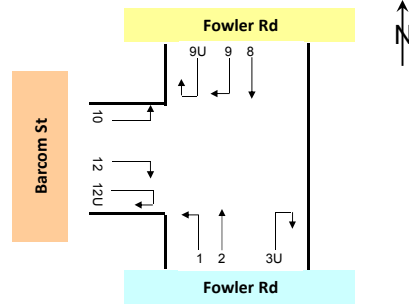
Approach	Fowler Rd			Fowler Rd			Barcom St			Grand Total
	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	
AM 8:00 to 9:00	799	17	816	562	16	578	32	3	35	1,429
PM 16:15 to 17:15	673	8	681	708	22	730	19	2	21	1,432

Approach	Fowler Rd			Fowler Rd			Barcom St			Grand Total
	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	
6:00 to 7:00	476	27	503	331	10	341	19	1	20	864
6:15 to 7:15	495	35	530	365	14	379	25	2	27	936
6:30 to 7:30	530	33	563	412	17	429	24	2	26	1,018
6:45 to 7:45	585	29	614	465	16	481	26	3	29	1,124
7:00 to 8:00	639	23	662	519	18	537	25	2	27	1,226
7:15 to 8:15	713	18	731	552	16	568	21	2	23	1,322
7:30 to 8:30	777	14	791	555	16	571	26	3	29	1,391
7:45 to 8:45	787	13	800	565	14	579	30	2	32	1,411
8:00 to 9:00	799	17	816	562	16	578	32	3	35	1,429
AM Totals	1,914	67	1,981	1,412	44	1,456	76	6	82	3,519
16:00 to 17:00	679	6	685	685	26	711	24	2	26	1,422
16:15 to 17:15	673	8	681	708	22	730	19	2	21	1,432
16:30 to 17:30	661	6	667	700	17	717	21	2	23	1,407
16:45 to 17:45	670	9	679	695	16	711	21	2	23	1,413
17:00 to 18:00	659	10	669	705	11	716	14	2	16	1,401
17:15 to 18:15	607	8	615	655	16	671	13	2	15	1,301
17:30 to 18:30	576	9	585	640	17	657	11	2	13	1,255
17:45 to 18:45	544	8	552	615	14	629	7	2	9	1,190
18:00 to 19:00	515	6	521	570	13	583	9	1	10	1,114
PM Totals	1,853	22	1,875	1,960	50	2,010	47	5	52	3,937

Job No. : N4550
Client : TTW
Suburb : Merrylands West
Location : 2. Barcom St / Fowler Rd

Day/Date : Sat, 27th October 2018
Weather : Fine
Description : Classified Intersection Count

Peak Hour Summary

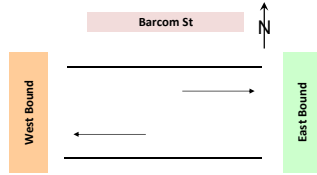


Approach	Fowler Rd			Fowler Rd			Barcom St			Grand Total
	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	
Time Period										
13:15 to 14:15	472	6	478	567	11	578	28	4	32	1,088

Approach	Fowler Rd			Fowler Rd			Barcom St			Grand Total
	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	
Time Period										
10:00 to 11:00	464	7	471	423	13	436	24	4	28	935
10:15 to 11:15	479	10	489	435	16	451	25	4	29	969
10:30 to 11:30	473	11	484	450	13	463	24	3	27	974
10:45 to 11:45	490	13	503	462	11	473	24	2	26	1,002
11:00 to 12:00	510	13	523	478	8	486	26	3	29	1,038
11:15 to 12:15	490	10	500	479	10	489	30	3	33	1,022
11:30 to 12:30	518	9	527	480	14	494	31	4	35	1,056
11:45 to 12:45	506	7	513	495	15	510	35	4	39	1,062
12:00 to 13:00	499	10	509	498	16	514	37	4	41	1,064
12:15 to 13:15	506	10	516	483	11	494	32	4	36	1,046
12:30 to 13:30	484	8	492	521	8	529	30	3	33	1,054
12:45 to 13:45	470	10	480	516	9	525	24	4	28	1,033
13:00 to 14:00	472	6	478	533	9	542	15	4	19	1,039
13:15 to 14:15	472	6	478	567	11	578	28	4	32	1,088
13:30 to 14:30	482	6	488	534	13	547	27	5	32	1,067
13:45 to 14:45	479	5	484	528	10	538	30	4	34	1,056
14:00 to 15:00	464	6	470	521	9	530	37	5	42	1,042
14:15 to 15:15	453	5	458	497	8	505	35	5	40	1,003
14:30 to 15:30	461	6	467	480	7	487	35	4	39	993
14:45 to 15:45	451	4	455	478	9	487	33	5	38	980
15:00 to 16:00	467	4	471	461	11	472	29	4	33	976
Totals	2,876	46	2,922	2,914	66	2,980	168	24	192	6,094

Job No. : N4550
Client : TTW
Suburb : Merrylands West
Location : Barcom St

Day/Date : Thu, 25th October 2018
Weather : Fine
Description : Mid-block Count
: 15 mins Data

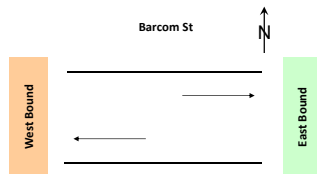


Classifications
Class 1 : Lights
Class 2 : Heavies

Approach	Barcom St					
	West Bound			East Bound		
Direction	Lights	Heavies	Total	Lights	Heavies	Total
6:00 to 6:15	2	0	2	1	0	1
6:15 to 6:30	8	0	8	4	0	4
6:30 to 6:45	6	2	8	2	1	3
6:45 to 7:00	10	1	11	5	1	6
7:00 to 7:15	7	1	8	9	1	10
7:15 to 7:30	9	0	9	2	0	2
7:30 to 7:45	14	1	15	2	1	3
7:45 to 8:00	6	0	6	3	0	3
8:00 to 8:15	9	1	10	3	1	4
8:15 to 8:30	8	0	8	8	0	8
8:30 to 8:45	9	1	10	10	1	11
8:45 to 9:00	14	0	14	8	0	8
AM Totals	102	7	109	57	6	63
16:00 to 16:15	4	1	5	10	0	10
16:15 to 16:30	4	0	4	6	1	7
16:30 to 16:45	7	0	7	8	0	8
16:45 to 17:00	5	1	6	9	1	10
17:00 to 17:15	5	0	5	8	0	8
17:15 to 17:30	3	1	4	5	1	6
17:30 to 17:45	5	0	5	3	0	3
17:45 to 18:00	3	1	4	6	1	7
18:00 to 18:15	4	0	4	6	0	6
18:15 to 18:30	3	0	3	2	1	3
18:30 to 18:45	5	0	5	6	0	6
18:45 to 19:00	0	0	0	4	0	4
PM Totals	48	4	52	73	5	78

Job No. : N4550
Client : TTW
Suburb : Merrylands West
Location : Barcom St

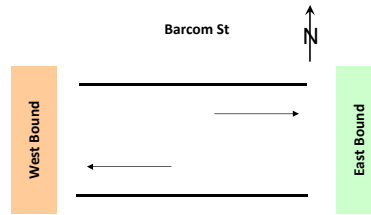
Day/Date : Thu, 25th October 2018
Weather : Fine
Description : Mid-block Count
: Hourly Summary



Approach	Barcom St					
	West Bound			East Bound		
Direction	Lights	Heavies	Total	Lights	Heavies	Total
6:00 to 7:00	26	3	29	12	2	14
6:15 to 7:15	31	4	35	20	3	23
6:30 to 7:30	32	4	36	18	3	21
6:45 to 7:45	40	3	43	18	3	21
7:00 to 8:00	36	2	38	16	2	18
7:15 to 8:15	38	2	40	10	2	12
7:30 to 8:30	37	2	39	16	2	18
7:45 to 8:45	32	2	34	24	2	26
8:00 to 9:00	40	2	42	29	2	31
AM Totals	102	7	109	57	6	63
16:00 to 17:00	20	2	22	33	2	35
16:15 to 17:15	21	1	22	31	2	33
16:30 to 17:30	20	2	22	30	2	32
16:45 to 17:45	18	2	20	25	2	27
17:00 to 18:00	16	2	18	22	2	24
17:15 to 18:15	15	2	17	20	2	22
17:30 to 18:30	15	1	16	17	2	19
17:45 to 18:45	15	1	16	20	2	22
18:00 to 19:00	12	0	12	18	1	19
PM Totals	48	4	52	73	5	78

Job No. : N4550
Client : TTW
Suburb : Merrylands West
Location : Barcom St

Day/Date : Sat, 27th October 2018
Weather : Fine
Description : Mid-block Count
 : Peak Hour Summary



Approach	West Bound			East Bound			Grand Total
	Lights	Heavies	Total	Lights	Heavies	Total	
14:30 to 15:30	27	4	31	33	4	37	68

Approach	West Bound			East Bound			Grand Total
	Lights	Heavies	Total	Lights	Heavies	Total	
10:00 to 11:00	20	3	23	24	3	27	50
10:15 to 11:15	22	4	26	25	4	29	55
10:30 to 11:30	23	4	27	27	3	30	57
10:45 to 11:45	20	4	24	24	4	28	52
11:00 to 12:00	20	3	23	18	3	21	44
11:15 to 12:15	20	3	23	20	2	22	45
11:30 to 12:30	21	3	24	20	4	24	48
11:45 to 12:45	26	3	29	21	2	23	52
12:00 to 13:00	24	4	28	23	4	27	55
12:15 to 13:15	23	4	27	19	5	24	51
12:30 to 13:30	20	4	24	18	4	22	46
12:45 to 13:45	19	3	22	19	4	23	45
13:00 to 14:00	20	4	24	21	4	25	49
13:15 to 14:15	28	3	31	31	3	34	65
13:30 to 14:30	27	4	31	31	4	35	66
13:45 to 14:45	26	4	30	32	4	36	66
14:00 to 15:00	26	4	30	33	4	37	67
14:15 to 15:15	23	4	27	31	4	35	62
14:30 to 15:30	27	4	31	33	4	37	68
14:45 to 15:45	22	5	27	30	5	35	62
15:00 to 16:00	23	4	27	27	4	31	58
Total	133	22	155	146	22	168	323

Appendix B – SIDRA Modelling Results

MOVEMENT SUMMARY

▽ Site: 2 [Barcom Fowler (AM) - EXISTING]

Priority-controlled intersection of Barcom Street with Fowler Road

Site Category: -

Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Fowler Road												
1	L2	16	13.3	0.411	5.3	LOS A	0.0	0.0	0.00	0.01	0.00	50.4
2	T1	843	1.9	0.411	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	59.5
Approach		859	2.1	0.411	0.1	NA	0.0	0.0	0.00	0.01	0.00	59.2
North: Fowler Road												
8	T1	586	2.9	0.317	0.7	LOS A	0.7	4.9	0.12	0.02	0.15	54.5
9	R2	22	0.0	0.317	13.1	LOS A	0.7	4.9	0.12	0.02	0.15	52.2
Approach		608	2.8	0.317	1.2	NA	0.7	4.9	0.12	0.02	0.15	54.3
West: Barcom Street												
10	L2	32	10.0	0.087	11.2	LOS A	0.3	2.1	0.72	0.88	0.72	32.7
12	R2	5	0.0	0.087	23.3	LOS B	0.3	2.1	0.72	0.88	0.72	32.4
Approach		37	8.6	0.087	12.9	LOS A	0.3	2.1	0.72	0.88	0.72	32.7
All Vehicles		1504	2.5	0.411	0.9	NA	0.7	4.9	0.06	0.04	0.08	55.5

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

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

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

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

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

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

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

MOVEMENT SUMMARY

▽ Site: 2 [Barcom Fowler (PM) - EXISTING]

Priority-controlled intersection of Barcom Street with Fowler Road

Site Category: -

Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Fowler Road												
1	L2	12	0.0	0.341	5.4	LOS A	0.0	0.0	0.00	0.01	0.00	54.5
2	T1	705	1.2	0.341	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	59.5
Approach		717	1.2	0.341	0.1	NA	0.0	0.0	0.00	0.01	0.00	59.4
North: Fowler Road												
8	T1	744	2.8	0.391	0.5	LOS A	0.7	5.2	0.09	0.02	0.13	55.8
9	R2	24	8.7	0.391	12.2	LOS A	0.7	5.2	0.09	0.02	0.13	50.5
Approach		768	3.0	0.391	0.9	NA	0.7	5.2	0.09	0.02	0.13	55.5
West: Barcom Street												
10	L2	14	0.0	0.083	8.8	LOS A	0.2	1.8	0.77	0.87	0.77	29.3
12	R2	8	25.0	0.083	31.1	LOS C	0.2	1.8	0.77	0.87	0.77	28.1
Approach		22	9.5	0.083	17.3	LOS B	0.2	1.8	0.77	0.87	0.77	28.8
All Vehicles		1507	2.2	0.391	0.8	NA	0.7	5.2	0.06	0.03	0.08	56.0

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

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

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

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

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

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

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

MOVEMENT SUMMARY

▽ Site: 2 [Barcom Fowler (WEEKEND) - EXISTING]

Priority-controlled intersection of Barcom Street with Fowler Road

Site Category: -

Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Fowler Road												
1	L2	16	13.3	0.239	5.3	LOS A	0.0	0.0	0.00	0.02	0.00	50.3
2	T1	487	0.9	0.239	0.0	LOS A	0.0	0.0	0.00	0.02	0.00	59.2
Approach		503	1.3	0.239	0.2	NA	0.0	0.0	0.00	0.02	0.00	58.7
North: Fowler Road												
8	T1	585	1.8	0.302	0.2	LOS A	0.4	2.5	0.07	0.02	0.07	57.4
9	R2	23	4.5	0.302	8.6	LOS A	0.4	2.5	0.07	0.02	0.07	52.5
Approach		608	1.9	0.302	0.5	NA	0.4	2.5	0.07	0.02	0.07	57.1
West: Barcom Street												
10	L2	21	10.0	0.065	7.7	LOS A	0.2	1.6	0.57	0.74	0.57	34.9
12	R2	13	16.7	0.065	15.9	LOS B	0.2	1.6	0.57	0.74	0.57	34.1
Approach		34	12.5	0.065	10.8	LOS A	0.2	1.6	0.57	0.74	0.57	34.6
All Vehicles		1145	1.9	0.302	0.7	NA	0.4	2.5	0.05	0.04	0.06	56.1

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

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

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

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

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

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

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

MOVEMENT SUMMARY

Site: 1 [Kenyons Road w/ Arcadia Street (AM) - EXISTING]

Roundabout intersection of Kenyons Road with Arcadia Street
 Site Category: -
 Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Kenyons Road												
5	T1	368	0.9	0.347	5.1	LOS A	2.4	17.2	0.30	0.53	0.30	49.9
6	R2	76	0.0	0.347	8.1	LOS A	2.4	17.2	0.30	0.53	0.30	32.4
6u	U	4	0.0	0.347	9.6	LOS A	2.4	17.2	0.30	0.53	0.30	49.8
Approach		448	0.7	0.347	5.6	LOS A	2.4	17.2	0.30	0.53	0.30	47.0
North: Arcadia Street												
7	L2	188	0.6	0.266	6.3	LOS A	1.5	10.9	0.50	0.66	0.50	43.0
9	R2	71	0.0	0.266	8.9	LOS A	1.5	10.9	0.50	0.66	0.50	43.8
9u	U	2	0.0	0.266	10.3	LOS A	1.5	10.9	0.50	0.66	0.50	29.0
Approach		261	0.4	0.266	7.0	LOS A	1.5	10.9	0.50	0.66	0.50	43.2
West: Kenyons Road												
10	L2	59	0.0	0.252	5.7	LOS A	1.5	10.7	0.27	0.52	0.27	42.7
11	T1	252	2.1	0.252	5.3	LOS A	1.5	10.7	0.27	0.52	0.27	49.9
12u	U	3	0.0	0.252	9.6	LOS A	1.5	10.7	0.27	0.52	0.27	50.1
Approach		314	1.7	0.252	5.4	LOS A	1.5	10.7	0.27	0.52	0.27	48.8
All Vehicles		1023	0.9	0.347	5.9	LOS A	2.4	17.2	0.34	0.56	0.34	46.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Vehicle movement LOS values are based on average delay per movement.

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.

MOVEMENT SUMMARY

Site: 1 [Kenyons Road w/ Arcadia Street (PM) - EXISTING]

Roundabout intersection of Kenyons Road with Arcadia Street
 Site Category: -
 Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Kenyons Road												
5	T1	564	0.6	0.479	5.1	LOS A	3.9	27.1	0.30	0.51	0.30	50.0
6	R2	91	0.0	0.479	8.1	LOS A	3.9	27.1	0.30	0.51	0.30	32.5
6u	U	2	0.0	0.479	9.5	LOS A	3.9	27.1	0.30	0.51	0.30	50.0
Approach		657	0.5	0.479	5.5	LOS A	3.9	27.1	0.30	0.51	0.30	47.7
North: Arcadia Street												
7	L2	132	0.0	0.163	5.2	LOS A	0.9	6.2	0.32	0.58	0.32	44.1
9	R2	52	0.0	0.163	7.8	LOS A	0.9	6.2	0.32	0.58	0.32	44.8
9u	U	1	0.0	0.163	9.3	LOS A	0.9	6.2	0.32	0.58	0.32	18.9
Approach		184	0.0	0.163	6.0	LOS A	0.9	6.2	0.32	0.58	0.32	44.1
West: Kenyons Road												
10	L2	15	0.0	0.118	5.7	LOS A	0.6	4.4	0.27	0.52	0.27	42.6
11	T1	113	1.9	0.118	5.4	LOS A	0.6	4.4	0.27	0.52	0.27	49.8
12u	U	8	0.0	0.118	9.6	LOS A	0.6	4.4	0.27	0.52	0.27	50.0
Approach		136	1.6	0.118	5.7	LOS A	0.6	4.4	0.27	0.52	0.27	49.2
All Vehicles		977	0.5	0.479	5.6	LOS A	3.9	27.1	0.30	0.53	0.30	47.4

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

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

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.

MOVEMENT SUMMARY

Site: 1 [Kenyons Road w/ Arcadia Street (WEEKEND) - EXISTING]

Roundabout intersection of Kenyons Road with Arcadia Street
 Site Category: -
 Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Kenyons Road												
5	T1	273	0.0	0.212	4.7	LOS A	1.2	8.7	0.11	0.51	0.11	51.0
6	R2	39	0.0	0.212	7.7	LOS A	1.2	8.7	0.11	0.51	0.11	33.1
6u	U	1	0.0	0.212	9.2	LOS A	1.2	8.7	0.11	0.51	0.11	50.9
Approach		313	0.0	0.212	5.1	LOS A	1.2	8.7	0.11	0.51	0.11	48.8
North: Arcadia Street												
7	L2	94	0.0	0.099	5.1	LOS A	0.5	3.5	0.29	0.56	0.29	44.7
9	R2	16	6.7	0.099	7.8	LOS A	0.5	3.5	0.29	0.56	0.29	43.6
9u	U	1	0.0	0.099	9.2	LOS A	0.5	3.5	0.29	0.56	0.29	19.0
Approach		111	1.0	0.099	5.5	LOS A	0.5	3.5	0.29	0.56	0.29	44.3
West: Kenyons Road												
10	L2	13	0.0	0.100	5.4	LOS A	0.5	3.5	0.15	0.50	0.15	43.4
11	T1	115	1.8	0.100	5.0	LOS A	0.5	3.5	0.15	0.50	0.15	50.5
12u	U	1	0.0	0.100	9.3	LOS A	0.5	3.5	0.15	0.50	0.15	50.8
Approach		128	1.6	0.100	5.1	LOS A	0.5	3.5	0.15	0.50	0.15	50.0
All Vehicles		552	0.6	0.212	5.2	LOS A	1.2	8.7	0.16	0.51	0.16	48.4

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

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

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.

Appendix C – Detailed Parking Assessment

8.0 Appendix A - Yield

YIELD

8.1 Yield - Masterplan

8.1.1 Total Yield

SITE AREA	74886
TOTAL GFA	61,797 m ²
TOTAL NSA	51,919 m ²
FSR	0.83 :1
<i>Independent Living Units GFA</i>	51,565 m ²
<i>Residential Aged Care Facility GFA</i>	7,442 m ²
<i>Neighbourhood Shops GFA</i>	1,480 m ²
<i>Community Facilities GFA</i>	1,311 m ² (not including proposed community centre)

ILUs	Number
TOTAL 1 Bed	93
TOTAL 2 Bed	348
TOTAL 3 Bed	19
Total ILUs	460

Total RACF Bedrooms	153
----------------------------	------------

8.1.2 Assumptions

Apartment Size and Mix

Apartment Type	Apartment Size (NSA)	Apartment Mix
1 Bedroom Apartment	70sqm	15%
2 Bedroom Apartment	100sqm	80%
3 Bedroom Apartment	130sqm	5%

Efficiency

Level	GBA Efficiency	NSA Efficiency
Ground Floor	65%	75%
Level 1 +	75%	85%

Car Parking

- All ILUs, RACF, Neighbourhood Shops and visitor spaces are located on basements.
- 2 x car park spaces at grade per building for drop-off only.
- The car park spaces have been calculated based on the controls below:

Legislation	Number of Spaces	Per
Residential Flat Buildings (ILUs)	1	Studio / 1 Bedroom Apartment
	1	2 Bedroom Apartment
	1.2	3 Bedroom Apartment
	0.2 (Visitor)	Every Apartment
Neighbourhood Shop	1	Every 30sqm of leasable GFA
Residential Care Facilities	1	10 Beds
	1	2 persons employed in connection with the development and on duty at any one time
	1	for an Ambulance
Persons with a Disability (SEPP Housing for Seniors or People with a Disability 2004)	5% of car spaces	To be an accessible care space (at least one if fewer than 20 spaces)

BUILDING YIELDS
NORTHERN PRECINCT
BUILDING A - ILU

	LEVELS	GBA	USE	Efficiency Rate	GFA	Efficiency Rate	NSA	Unit Size and Type	Mix	# Units	Car Spaces Rates	# Spaces
Total	4	5,164 sqm			3,744 sqm		3,098 sqm			26		59
	Ground	1,291 sqm	Retail	65%	839 sqm	75%	629 sqm	1Bed 70 sqm	15%	5	1Bed 1	5
	1	1,291 sqm	Residential	75%	968 sqm	85%	823 sqm	2Bed 100 sqm	80%	20	2Bed 1	20
	2	1,291 sqm	Residential	75%	968 sqm	85%	823 sqm	3Bed 130 sqm	5%	1	3Bed 1.2	1
	3	1,291 sqm	Residential	75%	968 sqm	85%	823 sqm				Visitor 0.2	5.2
											Retail 1 space / 30sqm	28

BUILDING B - RACF

	LEVELS	GBA	USE	Efficiency Rate	GFA	Efficiency Rate	NSA	Unit Size and Type	Mix	# Units	Car Spaces Rates	# Spaces	
Total	4	10,908 sqm			8,082 sqm		6,838 sqm			153		73	
	Lower Ground	496 sqm	Retail	65%	322 sqm	75%	242 sqm	Bedroom 65 sqm	100%	153	Residents 1 space / 10 beds	15	
	Ground	490 sqm	Retail	65%	319 sqm	85%	271 sqm	<i>RACF yield has been calculated using 65m2 per a room - divided into the GBA</i>				Staff 1 space / 2 workers	35
	Ground	2,335 sqm	Residential	75%	1,751 sqm	85%	1,489 sqm				Ambulance 1	1	
	1	2,826 sqm	Residential	75%	2,120 sqm	85%	1,802 sqm				Retail 1 space / 30sqm	21	
	2	2,826 sqm	Residential	75%	2,120 sqm	85%	1,802 sqm						
	3	1,935 sqm	Residential	75%	1,451 sqm	85%	1,234 sqm						

BUILDING C - ILU

	LEVELS	GBA	USE	Efficiency Rate	GFA	Efficiency Rate	NSA	Unit Size and Type	Mix	# Units	Car Spaces Rates	# Spaces
Total	4	5,221 sqm			3,806 sqm		3,164 sqm			33		40
	Ground	1,093 sqm	Residential	65%	710 sqm	75%	533 sqm	1Bed 70 sqm	15%	7	1Bed 1	7
	1	1,376 sqm	Residential	75%	1,032 sqm	85%	877 sqm	2Bed 100 sqm	80%	25	2Bed 1	25
	2	1,376 sqm	Residential	75%	1,032 sqm	85%	877 sqm	3Bed 130 sqm	5%	1	3Bed 1.2	1
	3	1,376 sqm	Residential	75%	1,032 sqm	85%	877 sqm				Visitor 0.2	6.7

BUILDING D - ILU

	LEVELS	GBA	USE	Efficiency Rate	GFA	Efficiency Rate	NSA	Unit Size and Type	Mix	# Units	Car Spaces Rates	# Spaces
Total	6	5,136 sqm			3,766 sqm		3,146 sqm			29		35
	Ground	856 sqm	Community Facilities	65%	556 sqm	75%	417 sqm	1Bed 70 sqm	15%	6	1Bed 1	6
	1	856 sqm	Residential	75%	642 sqm	85%	546 sqm	2Bed 100 sqm	80%	22	2Bed 1	22
	2	856 sqm	Residential	75%	642 sqm	85%	546 sqm	3Bed 130 sqm	5%	1	3Bed 1.2	1
	3	856 sqm	Residential	75%	642 sqm	85%	546 sqm				Visitor 0.2	5.7
	4	856 sqm	Residential	75%	642 sqm	85%	546 sqm					
	5	856 sqm	Residential	75%	642 sqm	85%	546 sqm					

BUILDING E - ILU

	LEVELS	GBA	USE	Efficiency Rate	GFA	Efficiency Rate	NSA	Unit Size and Type			Mix	# Units	Car Spaces Rates		# Spaces	
Total	5	7,250			5,257		4,352					46			56	
	Lower Ground	1,802	sqm	Residential	65% 1,171	sqm	75% 878	sqm	1Bed	70	sqm	15%	9	1Bed	1	9
	Ground	2,325	sqm	Residential	75% 1,744	sqm	85% 1,482	sqm	2Bed	100	sqm	80%	35	2Bed	1	35
	1	1,041	sqm	Residential	75% 781	sqm	85% 664	sqm	3Bed	130	sqm	5%	2	3Bed	1.2	2
	2	1,041	sqm	Residential	75% 781	sqm	85% 664	sqm						Visitor	0.2	9.2
	3	1,041	sqm	Residential	75% 781	sqm	85% 664	sqm								

BUILDING F - ILU

	LEVELS	GBA	USE	Efficiency Rate	GFA	Efficiency Rate	NSA	Unit Size and Type			Mix	# Units	Car Spaces Rates		# Spaces	
Total	4	3,664			2,061		2,198					23			28	
	Ground	916	sqm	Residential	65% 595	sqm	75% 447	sqm	1Bed	70	sqm	15%	5	1Bed	1	5
	1	916	sqm	Residential	75% 687	sqm	85% 584	sqm	2Bed	100	sqm	80%	18	2Bed	1	18
	2	916	sqm	Residential	75% 687	sqm	85% 584	sqm	3Bed	130	sqm	5%	1	3Bed	1.2	1
	3	916	sqm	Residential	75% 687	sqm	85% 584	sqm						Visitor	0.2	4.6

BUILDING G - ILU

	LEVELS	GBA	USE	Efficiency Rate	GFA	Efficiency Rate	NSA	Unit Size and Type			Mix	# Units	Car Spaces Rates		# Spaces	
Total	5	4,200			3,066		2,552					27			32	
	Ground	840	sqm	Residential	65% 546	sqm	75% 410	sqm	1Bed	70	sqm	15%	5	1Bed	1	5
	1	840	sqm	Residential	75% 630	sqm	85% 536	sqm	2Bed	100	sqm	80%	20	2Bed	1	20
	2	840	sqm	Residential	75% 630	sqm	85% 536	sqm	3Bed	130	sqm	5%	1	3Bed	1.2	1
	3	840	sqm	Residential	75% 630	sqm	85% 536	sqm						Visitor	0.2	5.4
	4	840	sqm	Residential	75% 630	sqm	85% 536	sqm								

BUILDING H - ILU

	LEVELS	GBA	USE	Efficiency Rate	GFA	Efficiency Rate	NSA	Unit Size and Type			Mix	# Units	Car Spaces Rates		# Spaces	
Total	4	4,644			3,335		2,738					29			35	
	Ground	1,482	sqm	Residential	65% 963	sqm	75% 722	sqm	1Bed	70	sqm	15%	6	1Bed	1	6
	1	1,482	sqm	Residential	75% 1,112	sqm	85% 945	sqm	2Bed	100	sqm	80%	22	2Bed	1	22
	2	840	sqm	Residential	75% 630	sqm	85% 536	sqm	3Bed	130	sqm	5%	1	3Bed	1.2	1
	3	840	sqm	Residential	75% 630	sqm	85% 536	sqm						Visitor	0.2	5.8

SOUTHERN PRECINCT

BUILDING I - ILU

	LEVELS	GBA	USE	Efficiency Rate	GFA	Efficiency Rate	NSA	Unit Size and Type			Mix	# Units	Car Spaces Rates		# Spaces	
Total	6	6,638			4,933		4,163					44			53	
	Lower Ground	456	sqm	Residential	65% 296	sqm	75% 222	sqm	1Bed	70	sqm	15%	9	1Bed	1	9
	Ground	1,054	sqm	Residential / Thoroughfare	75% 791	sqm	85% 672	sqm	2Bed	100	sqm	80%	33	2Bed	1	33
	1	1,282	sqm	Residential	75% 962	sqm	85% 817	sqm	3Bed	130	sqm	5%	2	3Bed	1.2	2
	2	1,282	sqm	Residential	75% 962	sqm	85% 817	sqm						Visitor	0.2	8.8
	3	1,282	sqm	Residential	75% 962	sqm	85% 817	sqm								
	4	1,282	sqm	Residential	75% 962	sqm	85% 817	sqm								

BUILDING J - ILU

	LEVELS	GBA	USE	Efficiency Rate	GFA	Efficiency Rate	NSA	Unit Size and Type			Mix	# Units	Car Spaces Rates		# Spaces	
Total	4	2,672			1,937		1,603					17			21	
	Ground	668	sqm	Residential	65% 434	sqm	75% 326	sqm	1Bed	70	sqm	15%	3	1Bed	1	3
	1	668	sqm	Residential	75% 501	sqm	85% 426	sqm	2Bed	100	sqm	80%	13	2Bed	1	13
	2	668	sqm	Residential	75% 501	sqm	85% 426	sqm	3Bed	130	sqm	5%	1	3Bed	1.2	1
	3	668	sqm	Residential	75% 501	sqm	85% 426	sqm						Visitor	0.2	3.5

BUILDING K - ILU

	LEVELS	GBA	USE	Efficiency Rate	GFA	Efficiency Rate	NSA	Unit Size and Type			Mix	# Units	Car Spaces Rates		# Spaces	
Total	5	3,552			2,638		2,225					24			28	
	Lower Ground	260	sqm	Residential	65% 169	sqm	75% 127	sqm	1Bed	70	sqm	15%	5	1Bed	1	5
	Ground	823	sqm	Residential	75% 617	sqm	85% 525	sqm	2Bed	100	sqm	80%	18	2Bed	1	18
	1	823	sqm	Residential	75% 617	sqm	85% 525	sqm	3Bed	130	sqm	5%	1	3Bed	1.2	1
	2	823	sqm	Residential	75% 617	sqm	85% 525	sqm						Visitor	0.2	4.7
	3	823	sqm	Residential	75% 617	sqm	85% 525	sqm								

BUILDING L - ILU

	LEVELS	GBA	USE	Efficiency Rate	GFA	Efficiency Rate	NSA	Unit Size and Type			Mix	# Units	Car Spaces Rates		# Spaces	
Total	4	4,644			3,367		2,786					24			28	
	Ground	1,161	sqm	Community Facilities	65% 755	sqm	75% 566	sqm	1Bed	70	sqm	15%	5	1Bed	1	5
	1	1,161	sqm	Residential	75% 871	sqm	85% 740	sqm	2Bed	100	sqm	80%	18	2Bed	1	18
	2	1,161	sqm	Residential	75% 871	sqm	85% 740	sqm	3Bed	130	sqm	5%	1	3Bed	1.2	1
	3	1,161	sqm	Residential	75% 871	sqm	85% 740	sqm						Visitor	0.2	4.7

BUILDING M - ILU

	LEVELS	GBA	USE	Efficiency Rate	GFA	Efficiency Rate	NSA	Unit Size and Type			Mix	# Units	Car Spaces Rates		# Spaces	
Total	4	2,884			2,059		1,682					18			22	
	Ground	1,041	sqm	Residential	65% 677	sqm	75% 507	sqm	1Bed	70	sqm	15%	4	1Bed	1	4
	1	1,041	sqm	Residential	75% 781	sqm	85% 664	sqm	2Bed	100	sqm	80%	13	2Bed	1	13
	2	401	sqm	Residential	75% 301	sqm	85% 256	sqm	3Bed	130	sqm	5%	1	3Bed	1.2	1
	3	401	sqm	Residential	75% 301	sqm	85% 256	sqm						Visitor	0.2	3.6

BUILDING N - ILU

	LEVELS	GBA	USE	Efficiency Rate	GFA	Efficiency Rate	NSA	Unit Size and Type			Mix	# Units	Car Spaces Rates		# Spaces	
Total	5	7,247			5,255		4,350					46			55	
	Lower Ground	1,801	sqm	Residential	65% 1,171	sqm	75% 878	sqm	1Bed	70	sqm	15%	9	1Bed	1	9
	Ground	2,323	sqm	Residential	75% 1,742	sqm	85% 1,481	sqm	2Bed	100	sqm	80%	35	2Bed	1	35
	1	1,041	sqm	Residential	75% 781	sqm	85% 664	sqm	3Bed	130	sqm	5%	2	3Bed	1.2	2
	2	1,041	sqm	Residential	75% 781	sqm	85% 664	sqm						Visitor	0.2	9.2
	3	1,041	sqm	Residential	75% 781	sqm	85% 664	sqm								

BUILDING O - ILU

	LEVELS	GBA	USE	Efficiency Rate	GFA	Efficiency Rate	NSA	Unit Size and Type			Mix	# Units	Car Spaces Rates		# Spaces
Total	4	3,680	sqm		2,668	sqm	2,208	sqm				23			28
	Ground	920	sqm	Residential	65%	598	sqm	75%	449	sqm	15%	5	1Bed	1	5
	1	920	sqm	Residential	75%	690	sqm	85%	587	sqm	80%	18	2Bed	1	18
	2	920	sqm	Residential	75%	690	sqm	85%	587	sqm	5%	1	3Bed	1.2	1
	3	920	sqm	Residential	75%	690	sqm	85%	587	sqm			Visitor	0.2	4.6

BUILDING P - ILU

	LEVELS	GBA	USE	Efficiency Rate	GFA	Efficiency Rate	NSA	Unit Size and Type			Mix	# Units	Car Spaces Rates		# Spaces
Total	4	5,155	sqm		3,763	sqm	3,132	sqm				33			39
	Ground	1,031	sqm	Residential	65%	670	sqm	75%	503	sqm	15%	6	1Bed	1	6
	1	1,031	sqm	Residential	75%	773	sqm	85%	657	sqm	80%	25	2Bed	1	25
	2	1,031	sqm	Residential	75%	773	sqm	85%	657	sqm	5%	1	3Bed	1.2	1
	3	1,031	sqm	Residential	75%	773	sqm	85%	657	sqm			Visitor	0.2	6.5
	4	1,031	sqm	Residential	75%	773	sqm	85%	657	sqm					

BUILDING Q - ILU

	LEVELS	GBA	USE	Efficiency Rate	GFA	Efficiency Rate	NSA	Unit Size and Type			Mix	# Units	Car Spaces Rates		# Spaces
Total	4	2,884	sqm		2,059	sqm	1,682	sqm				18			22
	Ground	1,041	sqm	Residential	65%	677	sqm	75%	507	sqm	15%	4	1Bed	1	4
	1	1,041	sqm	Residential	75%	781	sqm	85%	664	sqm	80%	13	2Bed	1	13
	2	401	sqm	Residential	75%	301	sqm	85%	256	sqm	5%	1	3Bed	1.2	1
	3	401	sqm	Residential	75%	301	sqm	85%	256	sqm			Visitor	0.2	3.6