

**RAMSAY HEALTH CARE
PLANNING PROPOSAL FOR
MENTAL HEALTH FACILITY
FREDERICK STREET, ARTARMON
*Assessment of Traffic and
Parking Implications***

December 2014
(Rev C)

Reference 14267

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1. INTRODUCTION

This report has been prepared to accompany a Planning Proposal to Willoughby Council for an envisaged multi function Mental Health Facility in Frederick Street at Artarmon. (Figure 1).

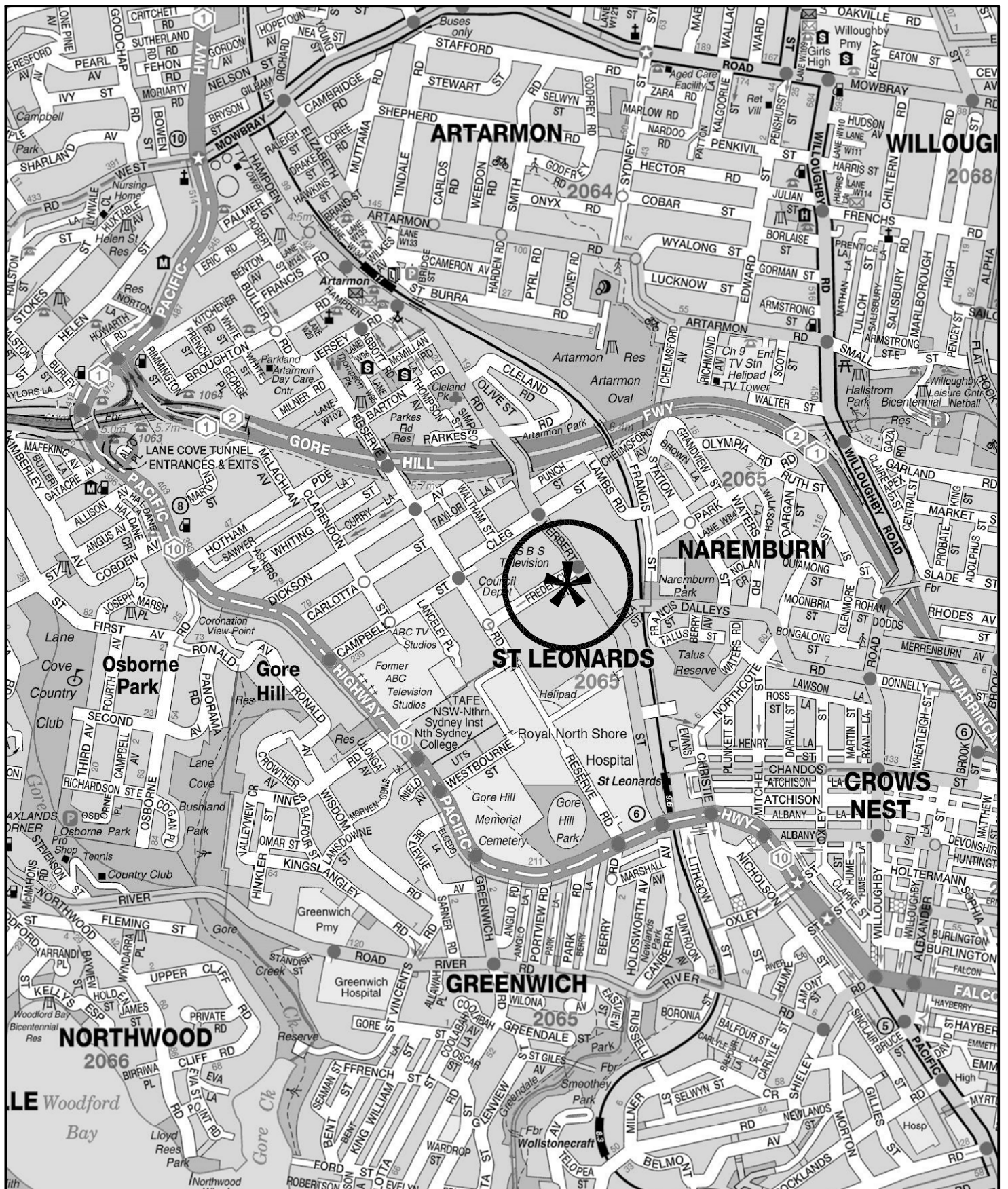
The provision of mental health services is an increasingly important sphere of medical care and a significant effort is being made by government and private providers to reduce the current shortage of available facilities. The St. Leonards/Artarmon area has developed as a significant hospital and medical precinct and this is advantaged by the available transport services and access to the arterial road system.

Ramsay Healthcare desire to develop a “mental health facility” on the Frederick Street site replacing the former car dealership use. The envisaged development comprises:

Hospital	Consultant Suites
170 Beds	30 Suites

The purpose of this report is to:

- * describe the site, its context and the envisaged development scheme
- * describe the road network serving the site, the prevailing traffic conditions and the public transport services available
- * assess the potential traffic implications
- * assess the envisaged parking provision
- * assess the suitability of the envisaged vehicle access, internal circulation and servicing arrangements



LEGEND



LOCATION

FIG 1

2. PLANNING PROPOSAL

2.1 SITE, CONTEXT AND EXISTING USE

The site (Figure 2) is Lot 2 in a proposed subdivision of Lot C in DP401303 being a rectangular shaped area of some 6,260m² which has a frontage of some 108m to the southern side of Frederick Street located just to the west of Herbert Street.

The site is located within the St Leonards/Artarmon Industrial Area and is adjoined by industrial buildings to the east, west and south. The SBS Television Studios are located on the northern side of Frederick Street (corner of Herbert Street) along with a large bulky goods complex (corner of Reserve Road).

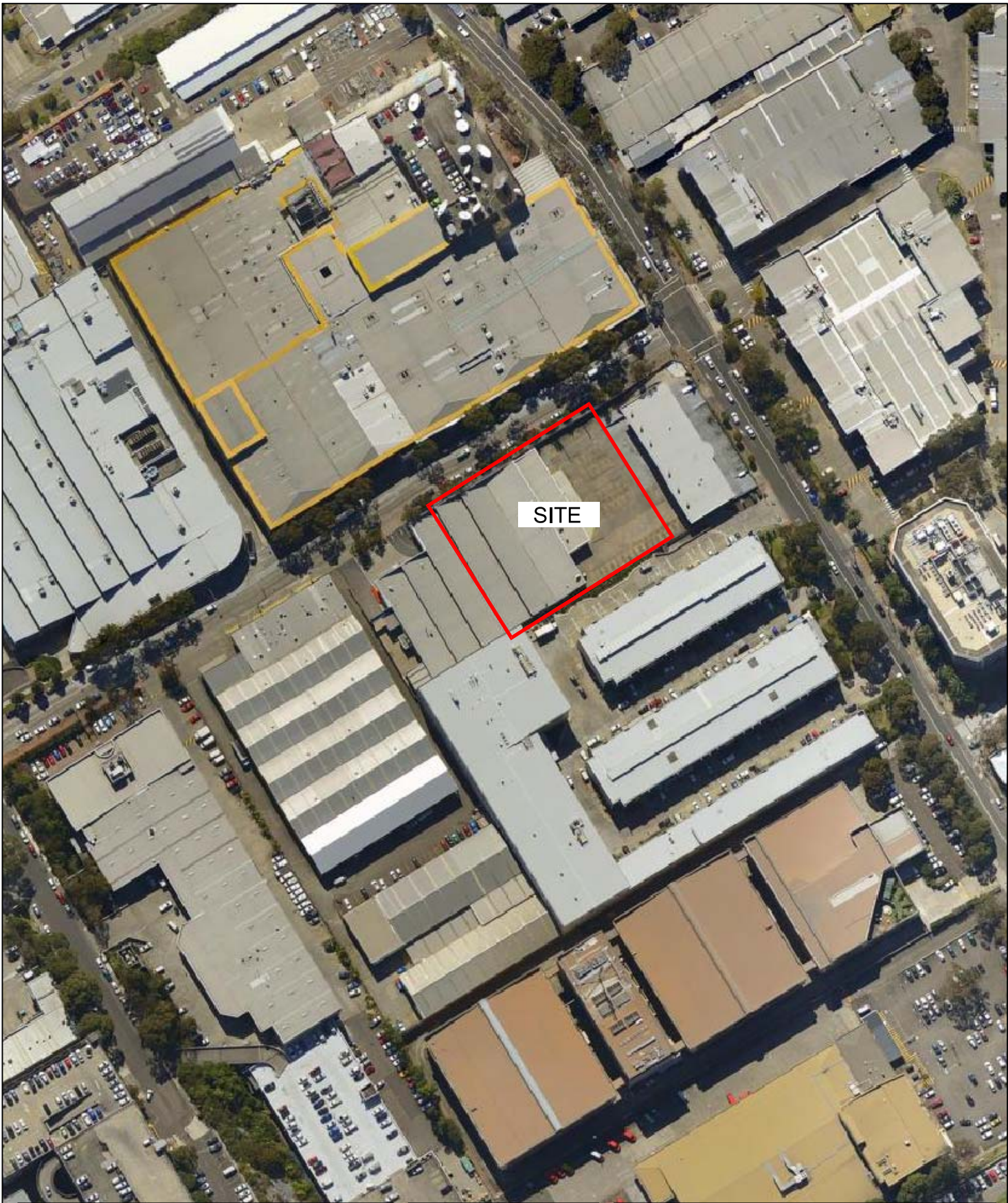
The North Shore Hospitals (Public and Private) are located just to the south along with other ancillary medical facilities. There is a mix of industrial, commercial and residential apartment buildings along Herbert Street and the large former ABC Television Studios site just to the west is being redeveloped for contemporary mixed commercial uses. St Leonards Railway Station is located some 650m to the south and there are high frequency bus services operating along the Pacific Highway.

The total Lot C site was formerly occupied by a car dealership and the subject part is occupied by a large brick/metal building of some 5,000m² with an open carpark on the eastern side.

2.2 ENVISAGED DEVELOPMENT

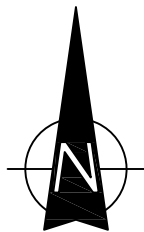
It would be proposed to demolish the existing building and excavate the site to provide a new 8 level building over basement carparking. The envisaged development comprises:

Hospital	Consultant Suites
170 Beds	30 Suites
111 Staff	30 Practitioners
	7 Staff



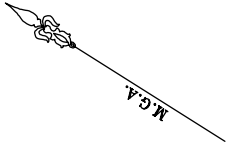
SITE

LEGEND



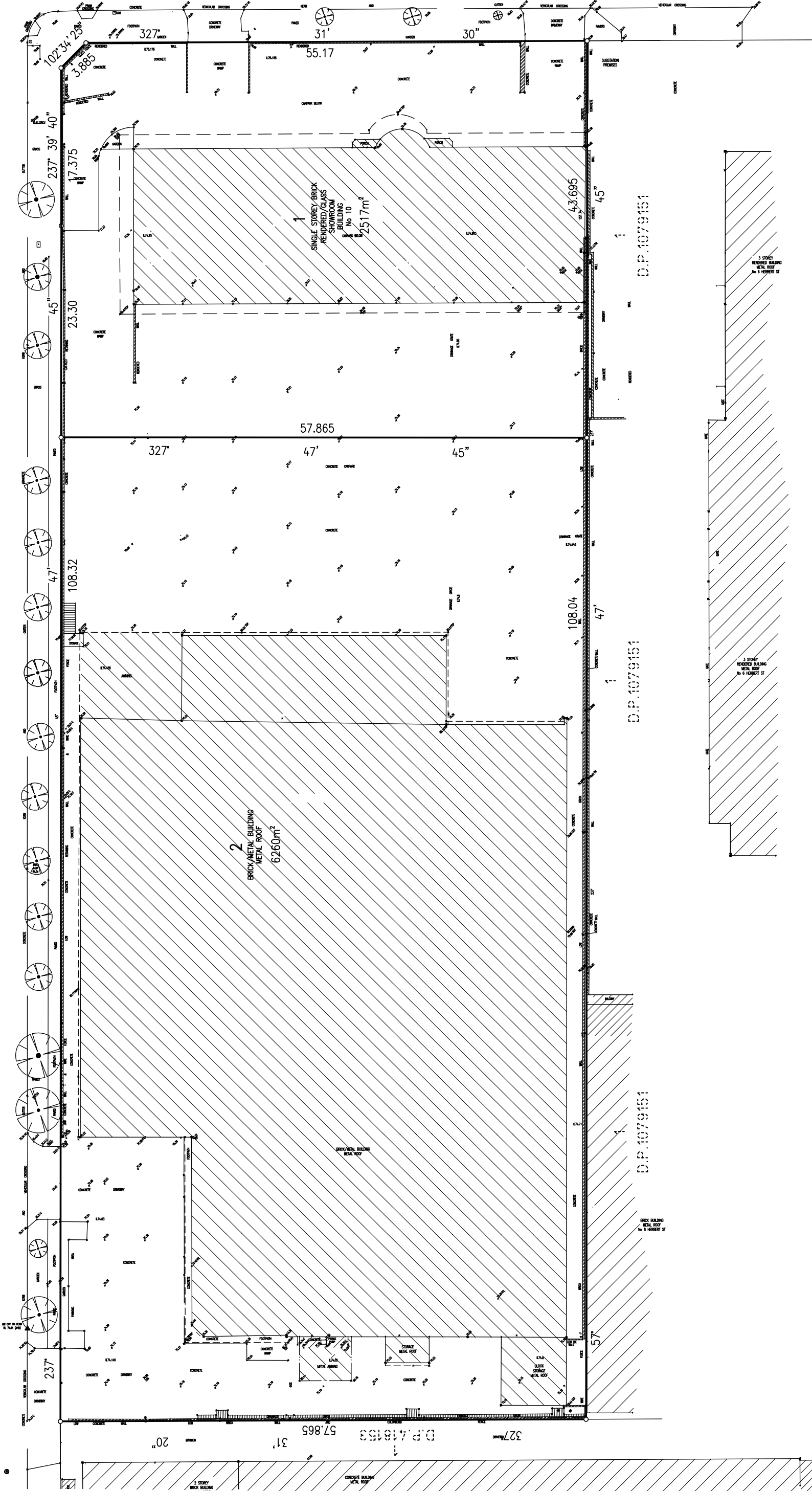
SITE

FIG 2



FREDERICK STREET

HERBERT STREET



Surveyor: TASY MORAITIS
Date of Survey:
Surveyor's Ref: 131113 DP

PLAN OF PROPOSED SUBDIVISION OF
LOT C IN D.P.401303 BEING
10 HERBERT STREET ST LEONARDS

LGA: WILLOUGHBY
Locality: ST LEONARDS
Subdivision No: 00000000
Lengths are in metres. Reduction Ratio 1: 300

REGISTERED

DRAFT PLAN
PRINTED 1 OCT 2014
(ISSUE 3)

A total of 150 parking spaces would be provided in the 2 level basement carpark with vehicle accesses on Frederick Street.

Details of the envisaged development scheme are provided on the plans prepared by Team 2 Architects which accompany the Planning Proposal and are reproduced in Appendix A.

3. ROAD NETWORK AND TRAFFIC CONDITIONS

3.1 ROAD NETWORK

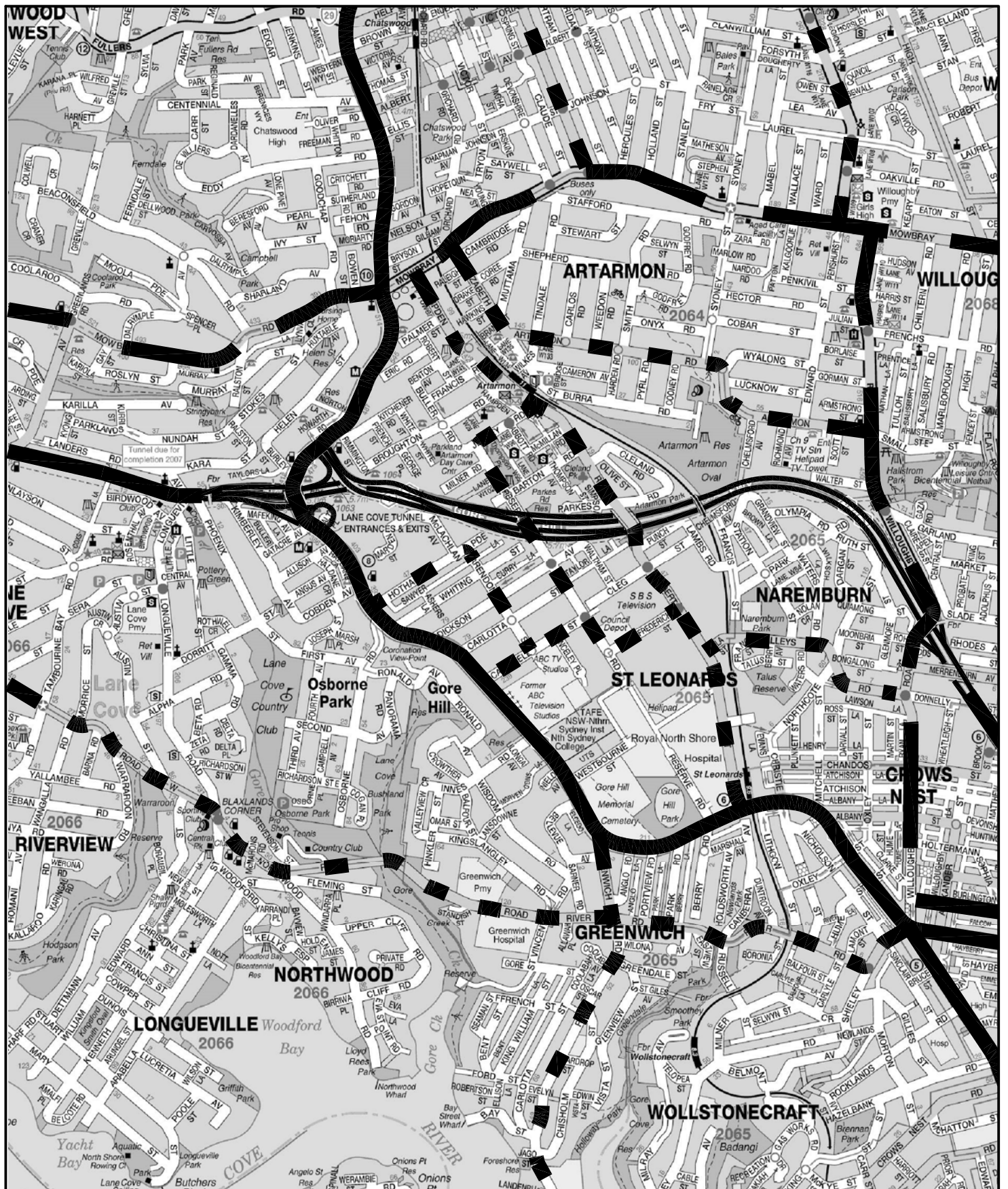
- * *Gore Hill Freeway* – a major arterial route connecting between the harbour crossing and the Pacific Highway, Lane Cove Tunnel and M2 Motorway routes
- * *Pacific Highway* – a State Road and arterial route providing the major north/south connection between Sydney and Hornsby
- * *Herbert Street /Hampden Road* – a major ‘collector’ road which provides connection between Pacific Highway at St Leonards and Mowbray Road at Chatswood
- * *Frederick Street, Reserve Road and Cambell Street* – collector road routes linking through St Leonards and Artarmon (Reserve Road is closed in the section through the hospital site)

Frederick Street is relatively straight and level with a 12.8 wide carriageway.

3.2 TRAFFIC CONTROLS

The traffic controls on the road system serving the area (Figure 4) comprise:

- * the traffic signals at the Herbert Street and Frederick Street intersection. Details of this intersection are provided in Appendix B
- * the roundabout at the Frederick Street and Reserve Road intersection. Details of this intersection are provided in Appendix B
- * the traffic signals along the Pacific Highway at the Herbert Street, Westbourne Street and Reserve Road intersection



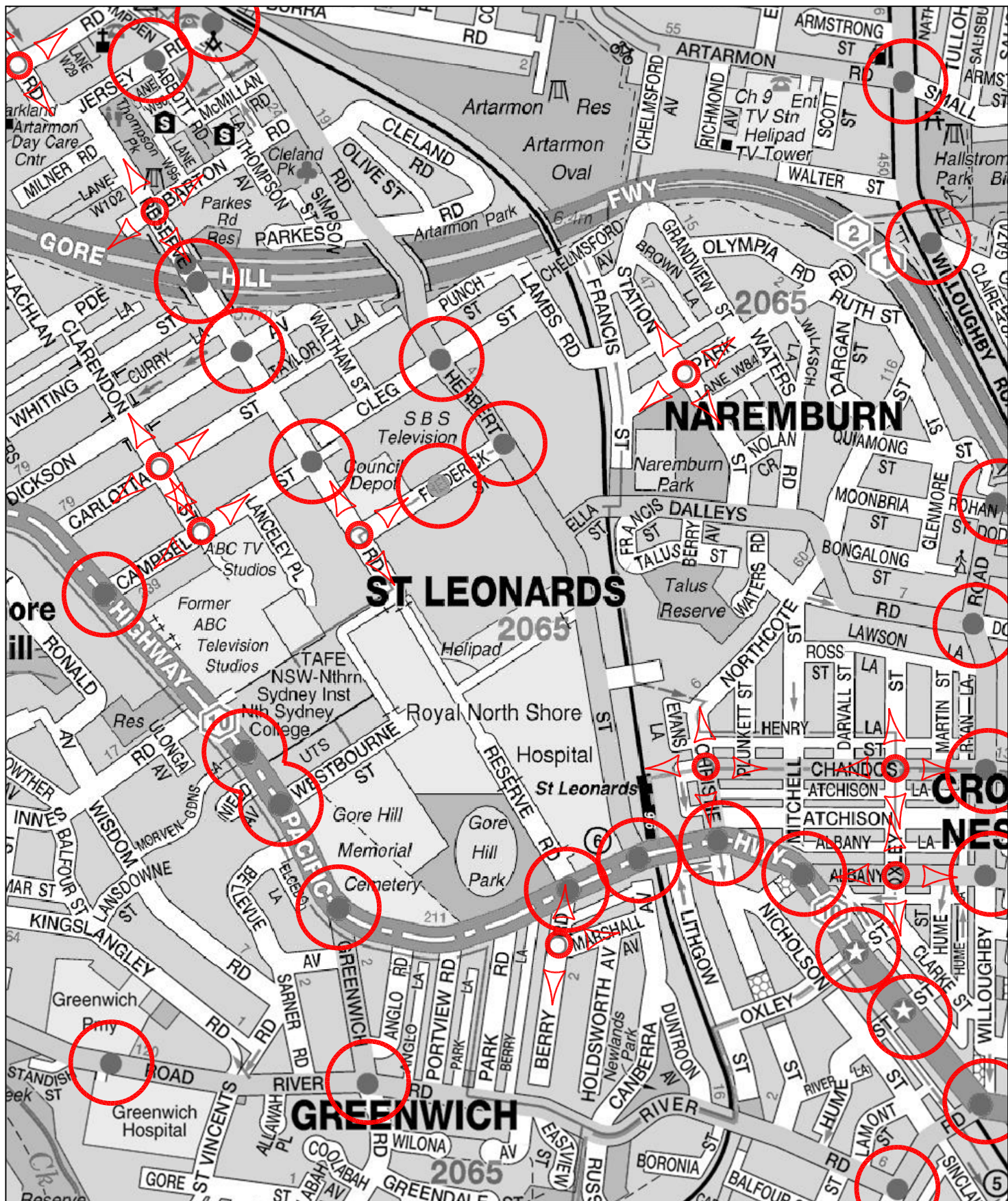
LEGEND

- ARTERIAL
- SUB-ARTERIAL
- COLLECTOR



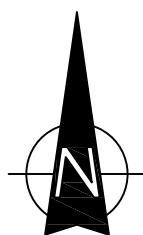
ROAD NETWORK

FIG 3



LEGEND

-  TRAFFIC SIGNAL CONTROL
-  ROUNDABOUT
-  RESTRICTED TURNING MOVEMENT



TRAFFIC CONTROLS

FIG 4

- * the 60 kmph speed restriction on the Highway and 50 kmph speed restriction on the local and collector roads
- * the CLEARWAY and the BUS ZONE restrictions along the Pacific Highway
- * the traffic signals on Frederick Street at the bulky goods site access and at other intersections along Reserve Road and Herbert Street/Hampden Road

3.3 TRAFFIC CONDITIONS

An indication of the prevailing traffic conditions in the area is provided by data published by RMS and surveys undertaken as part of this study. This RMS data is expressed in terms of Annual Average Daily Traffic (AADT) and the latest recorded volumes are as follows:

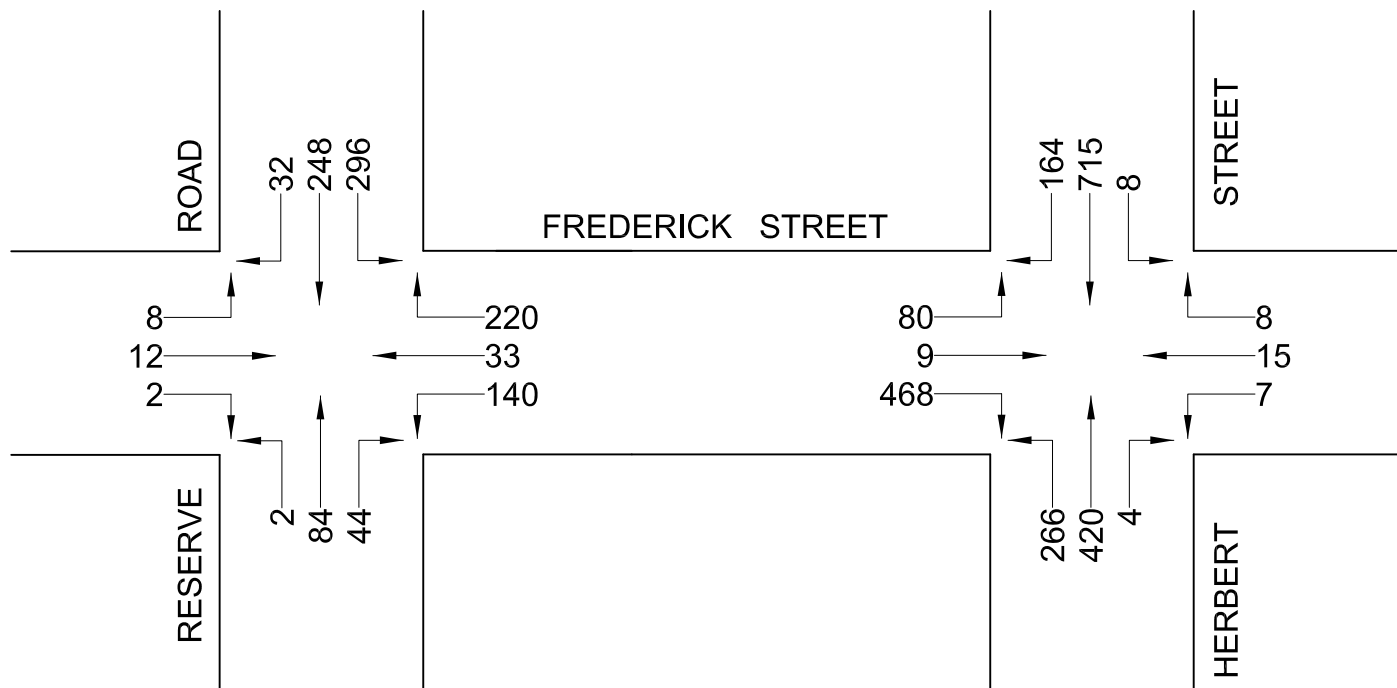
	AADT
Pacific Highway	41,885
Herbert Street	18,494

Traffic surveys have been undertaken at the Herbert Street/Frederick Street and Frederick Street/Reserve Road intersections during the morning and afternoon peak periods. The results of those surveys are provided in Appendix C and summarised on Figure 5.

The operational performance of these intersections has been assessed using SIDRA and the results indicating satisfactory performances are provided in Appendix D and summarised in the following while the criteria for interpreting the results are reproduced overleaf:

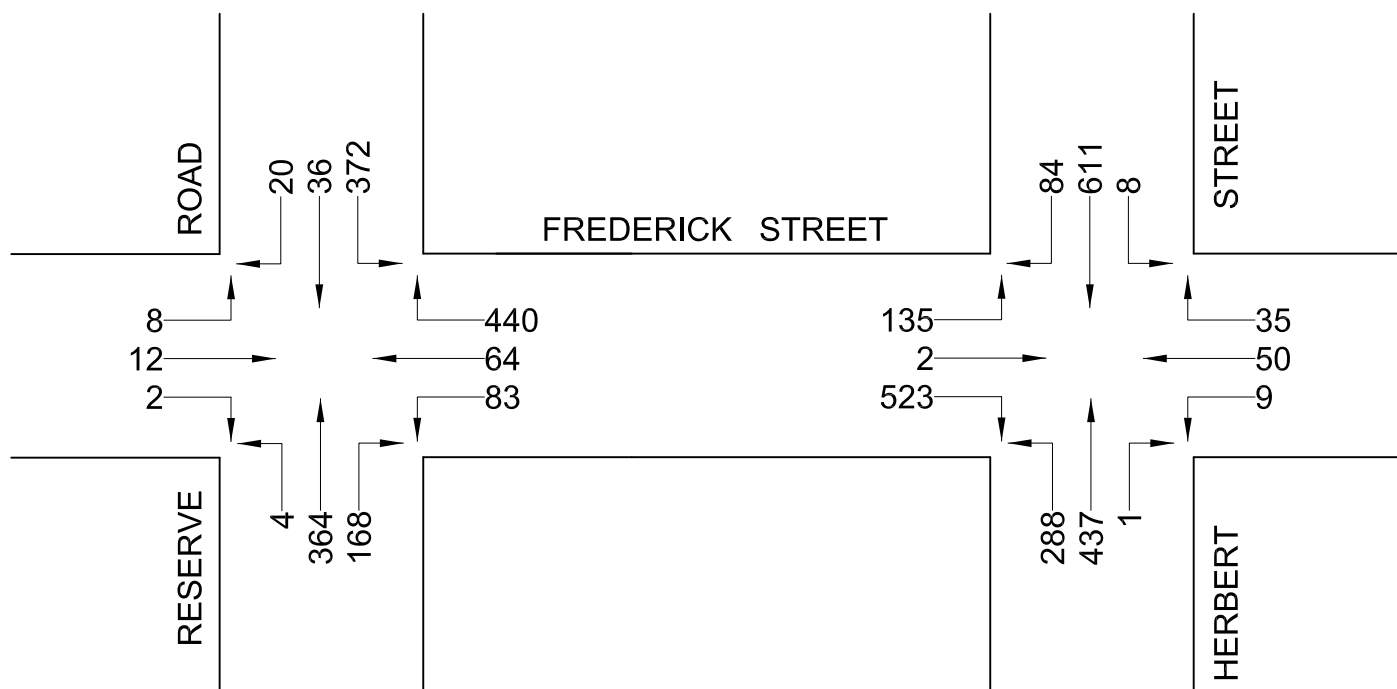
EXISTING	AM		PM	
	LOS	AVD	LOS	AVD
Herbert and Frederick	B	25.0	B	28.0
Frederick and Reserve	A	9.4	A	12.1

ACCESS



AM PEAK

ACCESS



PM PEAK

LEGEND



PEAK
TRAFFIC MOVEMENTS

FIG 5

The results of the SIDRA assessments indicate that these intersections operate satisfactorily and traffic conditions in the area are also generally quite satisfactory with vehicle and pedestrian movements facilitated by the numerous traffic signal and roundabout controls.

3.4 TRANSPORT SERVICES

The site is ideally located in relation to public transport services which include the St Leonards Railway Station and the numerous high frequency bus services operated along the Pacific Highway including services which provide access to retail/commercial centres of Lane Cove, Chatswood, Macquarie Centre, North Sydney and Sydney CBD.

Criteria for Interpreting Results of SIDRA Analysis

1. Level of Service (LOS)

LOS	Traffic Signals and Roundabouts	Give Way and Stop Signs
'A'	Good	Good
'B'	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
'C'	Satisfactory	Satisfactory but accident study required
'D'	Operating near capacity	Near capacity and accident study required
'E'	At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode	At capacity and requires other control mode
'F'	Unsatisfactory and requires additional capacity	Unsatisfactory and requires other control mode

2. Average Vehicle Delay (AVD)

The AVD provides a measure of the operational performance of an intersection as indicated on the table below which relates AVD to LOS. The AVD's listed in the table should be taken as a guide only as longer delays could be tolerated in some locations (ie inner city conditions) and on some roads (ie minor side street intersecting with a major arterial route).

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 and accident study required
E	57 to 70	At capacity; at signals incidents will cause excessive delays Roundabouts require other control mode	At capacity and requires other control mode

3. Degree of Saturation (DS)

The DS is another measure of the operational performance of individual intersections.

For intersections controlled by **traffic signals**¹ both queue length and delay increase rapidly as DS approaches 1, and it is usual to attempt to keep DS to less than 0.9. Values of DS in the order of 0.7 generally represent satisfactory intersection operation. When DS exceeds 0.9 queues can be anticipated.

For intersections controlled by a **roundabout or GIVE WAY or STOP signs**, satisfactory intersection operation is indicated by a DS of 0.8 or less.

¹ the values of DS for intersections under traffic signal control are only valid for cycle length of 120 secs

4. TRAFFIC

The traffic generation of the former car dealership on the site can be assessed by application of the RMS Development Guideline traffic generation criteria of 0.7 vtpH per 100m² site area. Application of this to the proposed site area of 6,260m² would indicate a peak period traffic generation of 44 vtpH.

Mental health facilities exhibit a lower traffic generation characteristic than normal medical/surgical hospital facilities because there is a significantly lower 'visitor' factor. The RMS Development Guidelines in relation to a "private hospital" use provide the following equations for traffic generation:

$$\text{AM Peak} \quad -10.21 + 0.47 \text{ Beds} + 0.6 \text{ Day staff}$$

$$\text{PM Peak} \quad -2.84 + 0.25 \text{ Beds} + 0.40 \text{ Day Staff}$$

Application of this criteria to the bed/staff numbers proposed would indicate the following generation for a normal private hospital.

$$\text{AM } 79 \text{ vtpH} \quad \text{PM } 99 \text{ vtpH}$$

However the low level of visitor activity and will be a significant factor while other factors are:

- Length of stay in a Mental Health facility is 21 days as compared to 3 days in a medical/surgery facility
- Practitioners tend to see 1 patient per hour in a Mental Health Consultancy Suites compared to 2/3 in a medical/surgery facility
- It is Ramsay's policy that Inpatients at Metal Health Facilities are not allowed to drive and park their vehicles at the hospital during their stay

Ramsay Health Care experience is that this factor reduces car activity by some 30% however if a modest 20% reduction is applied the projected traffic movements are 64 vtpm in the AM and 80 vtpm in the PM as follows:

AM		PM	
IN	OUT	IN	OUT
48	16	20	60

The projected distribution of these movements is 60% to Reserve Road (and its connection to Gore Hill Freeway) and 40% to Herbert Street. The resultant distribution of the generated traffic is shown on Figure 6 and the effects on the access intersections have been modelled with SIDRA. The results which indicate a satisfactory outcome are provided in Appendix D and summarised in the following:

	AM		PM	
	LOS	AVD	LOS	AVD
Herbert and Frederick	B	25.9	C	29.1
Frederick and Reserve	A	9.4	A	12.4

ACCESS

ROAD

8
12
2
2
32
248
296
2
84
44

RESERVE

FREDERICK STREET

220
33
140
29
10
6
19
2
2

80
9
468
164
715
8
8
15
7
266
420
4
11

STREET

HERBERT

AM PEAK

ACCESS

ROAD

8
12
2
20
36
372
4
364
168

RESERVE

FREDERICK STREET

440
64
83
36
24
12
8
14
10
2

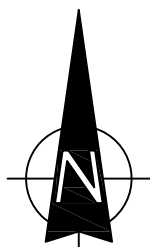
135
2
523
84
611
8
35
50
9
288
437
1
6

STREET

HERBERT

PM PEAK

LEGEND



PEAK
TRAFFIC MOVEMENTS
POST DEVELOPMENT

FIG 6

5. PARKING

The RMS Development Guidelines specify a peak parking demand for a private hospital as follows:

$$- 19.56 + 0.85 \text{ Beds} + 0.27 \text{ day staff}$$

This equates to 165 parking spaces however again the Ramsay Health Care experience is that parking demand for their mental health facilities is at least 30% lower than that at a normal hospital and Ramsay prohibits patients from “self-driving” to visit its mental health facilities. However, a modest reduction of 20% would indicate a provision of 132 spaces while the most comparable Ramsay Mental Health facility is at New Farm in Brisbane which has 95 parking spaces for 128 beds and application of that factor to the envisaged development would indicate 126 spaces.

Willoughby Council’s DCP in relation to a “hospital” use specifies the following:

Practitioners	-	1 space each
Staff	-	1 space per 2
Beds	-	1 space per 3
Patients	-	1 per suite

Application of this to be envisaged development would indicate the following:

Practitioners	30	30 spaces
Staff	118	59 spaces
Beds	170	57 spaces
Patients	30	30 spaces
	Total	176 spaces

As indicated in the preceding, it is apparent that patients staying in a mental health facility will receive significantly less visitors than patients in a normal hospital. It is also apparent that practitioners in the consulting suites will only be on site for proportion of the time and will attend to significantly fewer patients per day than in normal medical consultant suites.

Having regard for the RMS Private Hospital parking criteria and lower visitor circumstance, it is envisaged to provide 150 parking spaces in the basement carpark and this will provide a “buffer” of some 20-30 spaces to the projected peak demand of 126 to 128 spaces. This envisaged provision would include an appropriate quantum of accessible spaces while at the same time there would be an appropriate provision for motor cycle and bicycle spaces.

6. ACCESS, INTERNAL CIRCULATION AND SERVICING

ACCESS

It is envisaged that vehicle access for the development would comprise:

- * a combined ingress/egress driveway near the eastern boundary for visitor parking and set down/pick up movements
- * a combined ingress/egress driveway near the western boundary for staff parking and service vehicles

These accesses will be located where there are good sight distances available and will comply with the requirements of AS2890.1 & 2.

INTERNAL CIRCULATION

The layout of the carpark areas will comply with the design criteria of AS 2890.1 & 6 including bays, aisles and manoeuvring areas.

SERVICING

The loading dock area on western side of the building will provide for LRV (12.5m) long trucks.

7. CONCLUSION

The envisaged Ramsay Healthcare Mental Health Facility at Artarmon would provide a much need augmentation to the mental health services on the lower North Shore area.

Assessment of the envisaged development has concluded that:

- * there will not be any adverse traffic implications
- * the envisaged parking provision will be adequate and appraisals
- * the envisaged access, internal circulation and servicing arrangements will suitable and the design will comply with Australian Standards

APPENDIX A

DEVELOPMENT PLANS

TO BE READ IN CONJUNCTION WITH THE FOLLOWING DRAWINGS:

Count
00 - Ground Floor
81
01 - Upper Ground
72
Grand total: 153

Includes drop-off spaces

KEY TO ARCHITECTURAL DRAWINGS.

Department Legend

Area	Count
Administration	1
Admissions	1
Cafe	1
Circulation	1
Day services	1
Executive Office	1
External Space	1
Main Entry/Reception	1
Medical Suites	1
Parking	1
Patient Area	1
Services	1
Staff Area	1
Support	1

DRAWING STATUS:

Sketch

Rev	Revision Description	Date
1	For prelim review and costing	16/09/2014
2	Building Relocated	03/10/2014
3	Client review	30/10/2014
4	Services review	06/11/2014
5	For information	21/11/2014

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Client

Ramsay Healthcare

Frederick Street, Artarmon

Project

Ramsay Healthcare - Proposed Mental Health Facility

Title

Proposed First Floor Plan

Project No	590	
Drawing No	PA-102	Rev 5
Scale	1 : 200	@ A2



TO BE READ IN CONJUNCTION WITH THE FOLLOWING DRAWINGS:

Count
00 - Ground Floor
81
01 - Upper Ground
72
Grand total: 153

Includes drop-off spaces

KEY TO ARCHITECTURAL DRAWINGS.

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Medical Suites	1
Parking	1
Patient Area	1
Services	1
Staff Area	1
Support	1

DRAWING STATUS:

Sketch

Rev	Revision Description	Date
0	For Information	03/09/2014
2	For Information	08/09/2014
3	For Information	08/09/2014
4	For Prelim review and costing	16/09/2014
5	Building Relocated	03/10/2014
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TEAMS

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Client

Ramsay Healthcare

Frederick Street, Artarmon

Project

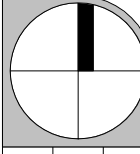
Ramsay Healthcare - Proposed

Mental Health Facility

Title

Proposed Ground Floor Plan

Project No	590	
Drawing No	PA-101	Rev 8
Scale	1 : 200	@ A2



APPENDIX B

INTERSECTION PLANS



APPENDIX C

TRAFFIC SURVEY RESULTS

APPENDIX D

SIDRA RESULTS

MOVEMENT SUMMARY

Site: FREDERICK HERBERT AM

Signals - Fixed Time Cycle Time = 110 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow 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
South: HERBERT ST											
1	L	266	2.0	0.437	22.8	LOS B	6.3	44.6	0.47	0.75	36.9
2	T	420	2.0	0.482	16.3	LOS B	11.7	83.2	0.56	0.49	39.9
3	R	4	2.0	0.482	24.5	LOS B	11.7	83.2	0.56	0.97	37.3
Approach		690	2.0	0.482	18.9	LOS B	11.7	83.2	0.52	0.59	38.7
East: SHOP ACCESS											
4	L	7	2.0	0.167	64.1	LOS E	0.4	2.7	0.97	0.65	21.7
5	T	15	2.0	0.223	57.0	LOS E	1.3	8.9	0.99	0.70	22.2
6	R	8	2.0	0.223	65.2	LOS E	1.3	8.9	0.99	0.71	22.0
Approach		30	2.0	0.223	60.8	LOS E	1.3	8.9	0.98	0.69	22.0
North: HERBERT ST											
7	L	8	2.0	0.620	14.3	LOS A	3.7	26.4	0.36	1.02	44.5
8	T	715	2.0	0.875	8.4	LOS A	13.1	93.1	0.44	0.40	46.7
9	R	164	2.0	0.875	25.6	LOS B	13.1	93.1	0.74	0.92	36.1
Approach		887	2.0	0.875	11.6	LOS A	13.1	93.1	0.50	0.51	44.3
West: FREDERICK ST											
10	L	80	2.0	0.412	38.6	LOS C	3.5	24.9	0.77	0.76	29.2
11	T	9	2.0	0.412	30.4	LOS C	3.5	24.9	0.77	0.60	30.1
12	R	468	2.0	0.852	54.8	LOS D	26.5	188.8	1.00	0.94	23.9
Approach		557	2.0	0.852	52.1	LOS D	26.5	188.8	0.96	0.91	24.6
All Vehicles		2164	2.0	0.875	25.0	LOS B	26.5	188.8	0.63	0.64	35.0

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.

SIDRA Standard Delay Model used.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	34.4	LOS D	0.1	0.1	0.79	0.79
P3	Across E approach	53	20.4	LOS C	0.1	0.1	0.61	0.61
P5	Across N approach	53	34.4	LOS D	0.1	0.1	0.79	0.79
P7	Across W approach	53	20.4	LOS C	0.1	0.1	0.61	0.61
All Pedestrians		212	27.4	LOS C			0.70	0.70

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: FREDERICK HERBERT PM

Signals - Fixed Time Cycle Time = 80 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow 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
South: HERBERT ST											
1	L	288	2.0	0.487	26.8	LOS B	7.2	51.1	0.67	0.79	34.6
2	T	437	2.0	0.612	20.3	LOS B	12.4	88.5	0.77	0.67	36.8
3	R	1	2.0	0.612	28.5	LOS B	12.4	88.5	0.77	0.92	35.5
Approach		726	2.0	0.612	22.9	LOS B	12.4	88.5	0.73	0.72	35.8
East: SHOP ACCESS											
4	L	9	2.0	0.154	47.3	LOS D	0.3	2.5	0.95	0.66	26.1
5	T	50	2.0	0.601	42.1	LOS C	3.5	25.0	1.00	0.80	26.0
6	R	35	2.0	0.601	50.4	LOS D	3.5	25.0	1.00	0.80	25.9
Approach		94	2.0	0.601	45.7	LOS D	3.5	25.0	1.00	0.78	25.9
North: HERBERT ST											
7	L	8	2.0	0.621	18.6	LOS B	5.5	39.3	0.53	0.96	41.4
8	T	611	2.0	0.877	15.1	LOS B	12.9	91.9	0.69	0.62	40.1
9	R	84	2.0	0.877	29.6	LOS C	12.9	91.9	0.91	0.93	34.6
Approach		703	2.0	0.877	16.9	LOS B	12.9	91.9	0.72	0.67	39.3
West: FREDERICK ST											
10	L	135	2.0	0.472	29.6	LOS C	3.9	28.0	0.77	0.77	33.1
11	T	2	2.0	0.472	21.4	LOS B	3.9	28.0	0.77	0.61	34.2
12	R	523	2.0	0.879	46.6	LOS D	23.6	168.3	1.00	0.99	26.3
Approach		660	2.0	0.879	43.1	LOS D	23.6	168.3	0.95	0.94	27.4
All Vehicles		2183	2.0	0.879	28.0	LOS B	23.6	168.3	0.81	0.77	33.2

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.

SIDRA Standard Delay Model used.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	25.6	LOS C	0.1	0.1	0.80	0.80
P3	Across E approach	53	22.5	LOS C	0.1	0.1	0.75	0.75
P5	Across N approach	53	25.6	LOS C	0.1	0.1	0.80	0.80
P7	Across W approach	53	22.5	LOS C	0.1	0.1	0.75	0.75
All Pedestrians		212	24.1	LOS C			0.78	0.78

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: FREDERICK RESERVE AM

Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: RESERVE RD											
1	L	2	2.0	0.134	9.3	LOS A	0.7	5.2	0.48	0.67	47.5
2	T	84	2.0	0.134	8.5	LOS A	0.7	5.2	0.48	0.62	47.7
3	R	44	2.0	0.134	12.5	LOS A	0.7	5.2	0.48	0.77	45.3
Approach		130	2.0	0.134	9.8	LOS A	0.7	5.2	0.48	0.67	46.8
East: FREDERICK ST											
4	L	140	2.0	0.393	9.8	LOS A	2.5	18.1	0.56	0.70	46.9
5	T	33	2.0	0.393	8.9	LOS A	2.5	18.1	0.56	0.66	46.9
6	R	220	2.0	0.393	13.0	LOS A	2.5	18.1	0.56	0.77	44.7
Approach		393	2.0	0.393	11.5	LOS A	2.5	18.1	0.56	0.73	45.6
North: RESERVE RD											
7	L	296	2.0	0.415	8.1	LOS A	3.1	22.0	0.27	0.60	48.4
8	T	248	2.0	0.415	7.2	LOS A	3.1	22.0	0.27	0.52	48.9
9	R	32	2.0	0.415	11.2	LOS A	3.1	22.0	0.27	0.73	46.0
Approach		576	2.0	0.415	7.9	LOS A	3.1	22.0	0.27	0.57	48.5
West: ACCESS											
10	L	8	2.0	0.024	9.5	LOS A	0.1	0.8	0.48	0.64	47.5
11	T	12	2.0	0.024	8.6	LOS A	0.1	0.8	0.48	0.58	47.7
12	R	2	2.0	0.024	12.6	LOS A	0.1	0.8	0.48	0.74	45.2
Approach		22	2.0	0.024	9.3	LOS A	0.1	0.8	0.48	0.62	47.4
All Vehicles		1121	2.0	0.415	9.4	LOS A	3.1	22.0	0.40	0.64	47.2

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 used.

MOVEMENT SUMMARY

Site: FREDERICK RESERVE PM

Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: RESERVE RD											
1	L	4	2.0	0.663	15.8	LOS B	7.0	49.6	0.86	1.02	42.0
2	T	364	2.0	0.663	15.0	LOS B	7.0	49.6	0.86	1.01	42.2
3	R	168	2.0	0.663	19.0	LOS B	7.0	49.6	0.86	1.05	40.3
Approach		536	2.0	0.663	16.2	LOS B	7.0	49.6	0.86	1.02	41.6
East: FREDERICK ST											
4	L	83	2.0	0.423	8.1	LOS A	3.3	23.4	0.28	0.57	48.1
5	T	64	2.0	0.423	7.2	LOS A	3.3	23.4	0.28	0.50	48.6
6	R	440	2.0	0.423	11.2	LOS A	3.3	23.4	0.28	0.68	45.6
Approach		587	2.0	0.423	10.4	LOS A	3.3	23.4	0.28	0.64	46.3
North: RESERVE RD											
7	L	372	2.0	0.388	9.0	LOS A	2.8	20.1	0.51	0.65	47.3
8	T	36	2.0	0.388	8.1	LOS A	2.8	20.1	0.51	0.60	47.4
9	R	20	2.0	0.388	12.1	LOS A	2.8	20.1	0.51	0.73	45.3
Approach		428	2.0	0.388	9.1	LOS A	2.8	20.1	0.51	0.65	47.2
West: ACCESS											
10	L	8	2.0	0.046	15.4	LOS B	0.3	2.0	0.83	0.79	42.4
11	T	12	2.0	0.046	14.5	LOS B	0.3	2.0	0.83	0.77	42.6
12	R	2	2.0	0.046	18.4	LOS B	0.3	2.0	0.83	0.82	40.6
Approach		22	2.0	0.046	15.2	LOS B	0.3	2.0	0.83	0.78	42.3
All Vehicles		1573	2.0	0.663	12.1	LOS A	7.0	49.6	0.55	0.77	44.7

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 used.

MOVEMENT SUMMARY

Site: FREDERICK HERBERT AM -
POST DEV

Signals - Fixed Time Cycle Time = 120 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: HERBERT ST											
1	L	277	2.0	0.460	22.6	LOS B	6.7	47.5	0.45	0.75	37.0
2	T	420	2.0	0.466	15.9	LOS B	11.9	84.4	0.52	0.46	40.3
3	R	4	2.0	0.466	24.1	LOS B	11.9	84.4	0.52	0.98	37.4
Approach		701	2.0	0.466	18.6	LOS B	11.9	84.4	0.49	0.58	38.9
East: SHOP ACCESS											
4	L	7	2.0	0.182	69.7	LOS E	0.4	2.9	0.98	0.65	20.5
5	T	15	2.0	0.243	62.8	LOS E	1.4	9.8	0.99	0.70	20.9
6	R	8	2.0	0.243	71.0	LOS F	1.4	9.8	0.99	0.71	20.8
Approach		30	2.0	0.243	66.6	LOS E	1.4	9.8	0.99	0.69	20.8
North: HERBERT ST											
7	L	8	2.0	0.615	15.4	LOS B	4.1	29.3	0.40	1.01	43.6
8	T	715	2.0	0.869	8.7	LOS A	12.1	86.5	0.45	0.41	46.5
9	R	172	2.0	0.869	23.4	LOS B	12.1	86.5	0.65	0.90	37.2
Approach		895	2.0	0.869	11.6	LOS A	12.1	86.5	0.49	0.51	44.3
West: FREDERICK ST											
10	L	82	2.0	0.454	41.3	LOS C	3.9	27.7	0.77	0.76	28.2
11	T	9	2.0	0.454	33.1	LOS C	3.9	27.7	0.77	0.60	29.0
12	R	470	2.0	0.856	58.6	LOS E	28.9	205.5	1.00	0.94	23.0
Approach		561	2.0	0.856	55.6	LOS D	28.9	205.5	0.96	0.91	23.7
All Vehicles		2187	2.0	0.869	25.9	LOS B	28.9	205.5	0.62	0.64	34.5

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.

SIDRA Standard Delay Model used.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	36.8	LOS D	0.1	0.1	0.78	0.78
P3	Across E approach	53	20.4	LOS C	0.1	0.1	0.58	0.58
P5	Across N approach	53	36.8	LOS D	0.1	0.1	0.78	0.78
P7	Across W approach	53	20.4	LOS C	0.1	0.1	0.58	0.58
All Pedestrians		212	28.6	LOS C			0.68	0.68

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: FREDERICK HERBERT PM -
POST DEV

Signals - Fixed Time Cycle Time = 80 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow 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
South: HERBERT ST											
1	L	294	2.0	0.498	26.8	LOS B	7.4	52.4	0.68	0.79	34.5
2	T	437	2.0	0.612	20.3	LOS B	12.4	88.5	0.77	0.67	36.8
3	R	1	2.0	0.612	28.5	LOS B	12.4	88.5	0.77	0.92	35.5
Approach		732	2.0	0.612	22.9	LOS B	12.4	88.5	0.73	0.72	35.8
East: SHOP ACCESS											
4	L	9	2.0	0.154	47.3	LOS D	0.3	2.5	0.95	0.66	26.1
5	T	50	2.0	0.601	42.1	LOS C	3.5	25.0	1.00	0.80	26.0
6	R	35	2.0	0.601	50.4	LOS D	3.5	25.0	1.00	0.80	25.9
Approach		94	2.0	0.601	45.7	LOS D	3.5	25.0	1.00	0.78	25.9
North: HERBERT ST											
7	L	8	2.0	0.623	18.7	LOS B	5.5	39.5	0.53	0.96	41.4
8	T	613	2.0	0.880	15.2	LOS B	13.0	92.7	0.70	0.63	40.0
9	R	84	2.0	0.880	29.8	LOS C	13.0	92.7	0.92	0.94	34.5
Approach		705	2.0	0.880	17.0	LOS B	13.0	92.7	0.72	0.67	39.3
West: FREDERICK ST											
10	L	145	2.0	0.506	29.8	LOS C	4.2	30.2	0.77	0.77	33.0
11	T	2	2.0	0.506	21.5	LOS B	4.2	30.2	0.77	0.62	34.1
12	R	537	2.0	0.902	50.5	LOS D	25.6	182.6	1.00	1.02	25.1
Approach		684	2.0	0.902	46.0	LOS D	25.6	182.6	0.95	0.97	26.5
All Vehicles		2215	2.0	0.902	29.1	LOS C	25.6	182.6	0.81	0.78	32.7

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.

SIDRA Standard Delay Model used.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	25.6	LOS C	0.1	0.1	0.80	0.80
P3	Across E approach	53	22.5	LOS C	0.1	0.1	0.75	0.75
P5	Across N approach	53	25.6	LOS C	0.1	0.1	0.80	0.80
P7	Across W approach	53	22.5	LOS C	0.1	0.1	0.75	0.75
All Pedestrians		212	24.1	LOS C			0.78	0.78

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: FREDERICK RESERVE AM -
POST DEV

Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: RESERVE RD											
1	L	2	2.0	0.135	9.3	LOS A	0.7	5.3	0.49	0.68	47.5
2	T	84	2.0	0.135	8.5	LOS A	0.7	5.3	0.49	0.62	47.6
3	R	44	2.0	0.135	12.5	LOS A	0.7	5.3	0.49	0.77	45.3
Approach		130	2.0	0.135	9.9	LOS A	0.7	5.3	0.49	0.67	46.8
East: FREDERICK ST											
4	L	140	2.0	0.402	9.8	LOS A	2.6	18.7	0.57	0.70	46.8
5	T	33	2.0	0.402	9.0	LOS A	2.6	18.7	0.57	0.66	46.8
6	R	230	2.0	0.402	13.0	LOS A	2.6	18.7	0.57	0.77	44.6
Approach		403	2.0	0.402	11.5	LOS A	2.6	18.7	0.57	0.74	45.5
North: RESERVE RD											
7	L	325	2.0	0.434	8.1	LOS A	3.3	23.7	0.27	0.60	48.3
8	T	248	2.0	0.434	7.2	LOS A	3.3	23.7	0.27	0.52	48.9
9	R	32	2.0	0.434	11.3	LOS A	3.3	23.7	0.27	0.73	45.9
Approach		605	2.0	0.434	7.9	LOS A	3.3	23.7	0.27	0.57	48.4
West: ACCESS											
10	L	8	2.0	0.024	9.5	LOS A	0.1	0.8	0.49	0.64	47.5
11	T	12	2.0	0.024	8.7	LOS A	0.1	0.8	0.49	0.59	47.7
12	R	2	2.0	0.024	12.6	LOS A	0.1	0.8	0.49	0.74	45.2
Approach		22	2.0	0.024	9.3	LOS A	0.1	0.8	0.49	0.62	47.4
All Vehicles		1160	2.0	0.434	9.4	LOS A	3.3	23.7	0.40	0.64	47.2

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 used.

MOVEMENT SUMMARY

Site: FREDERICK RESERVE PM -
POST DEV

Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: RESERVE RD											
1	L	4	2.0	0.685	16.9	LOS B	7.6	53.8	0.89	1.07	41.1
2	T	364	2.0	0.685	16.2	LOS B	7.6	53.8	0.89	1.06	41.2
3	R	168	2.0	0.685	20.2	LOS B	7.6	53.8	0.89	1.09	39.4
Approach		536	2.0	0.685	17.4	LOS B	7.6	53.8	0.89	1.07	40.7
East: FREDERICK ST											
4	L	83	2.0	0.447	8.1	LOS A	3.6	25.6	0.29	0.57	48.1
5	T	64	2.0	0.447	7.3	LOS A	3.6	25.6	0.29	0.50	48.6
6	R	476	2.0	0.447	11.3	LOS A	3.6	25.6	0.29	0.67	45.6
Approach		623	2.0	0.447	10.4	LOS A	3.6	25.6	0.29	0.64	46.2
North: RESERVE RD											
7	L	384	2.0	0.398	9.0	LOS A	2.9	21.0	0.51	0.65	47.2
8	T	36	2.0	0.398	8.1	LOS A	2.9	21.0	0.51	0.60	47.3
9	R	20	2.0	0.398	12.2	LOS A	2.9	21.0	0.51	0.73	45.3
Approach		440	2.0	0.398	9.1	LOS A	2.9	21.0	0.51	0.65	47.1
West: ACCESS											
10	L	8	2.0	0.048	16.0	LOS B	0.3	2.1	0.85	0.80	41.9
11	T	12	2.0	0.048	15.1	LOS B	0.3	2.1	0.85	0.78	42.1
12	R	2	2.0	0.048	19.1	LOS B	0.3	2.1	0.85	0.83	40.1
Approach		22	2.0	0.048	15.8	LOS B	0.3	2.1	0.85	0.79	41.8
All Vehicles		1621	2.0	0.685	12.4	LOS A	7.6	53.8	0.56	0.79	44.4

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 used.