

**PROPOSED SENIORS LIVING
DEVELOPMENT
BAYVIEW GOLF CLUB SITE
CABBAGE TREE ROAD, BAYVIEW
*Assessment of Traffic and
Parking Implications***

April 2019
(Rev E)

Reference 17131

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1. INTRODUCTION

This report has been prepared for Waterbrook to accompany a Site Compatibility Certificate (SCC) Application to the Department of Planning and Environment for a proposed Seniors Living residential development on part of the Bayview Golf Course site at Bayview (Figure 1).

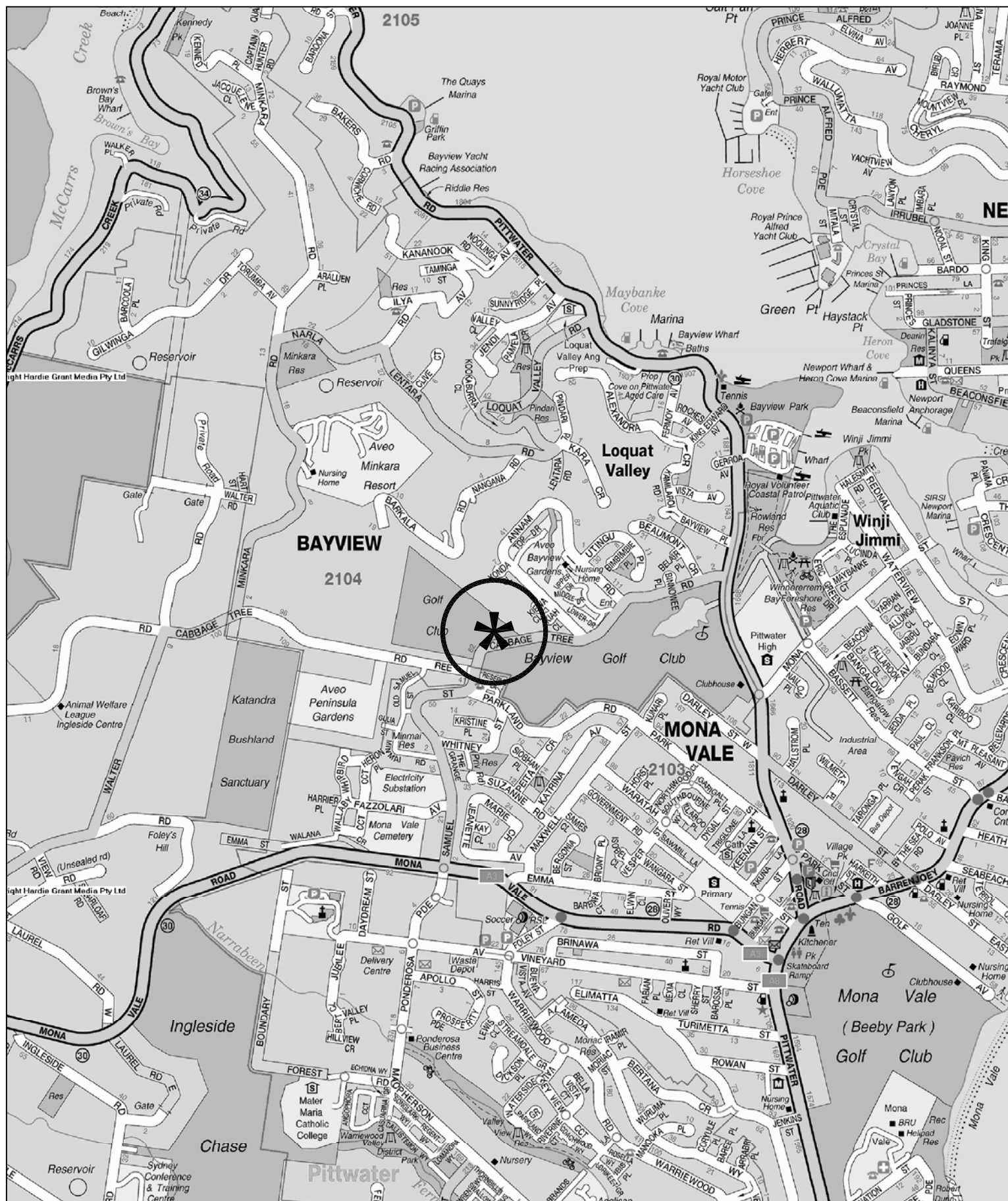
Bayview is a picturesque location with open outlooks and a surrounding 'bushland' environment. The Bayview Golf Club occupies a large site along the western side of Pittwater Road and earlier development processes involved the relocation of the club house to enable residential apartment development on a superfluous part of the site.

The development site is located in the western part of the Golf Course and the Department of Planning has previously approved a Site Compatibility Certificate to permit medium density residential development. The now proposed development scheme involves:

- 7 buildings
- 85 apartments
- Ancillary facilities

The purpose of this report is to:

- * describe the site, its context and the proposed development scheme
- * describe the road network and traffic circumstances
- * assess the potential traffic implications
- * assess the adequacy of the proposed parking provision
- * assess the proposed vehicle access, internal circulation and servicing arrangements



LEGEND



LOCATION

FIG 1

2. PROPOSED DEVELOPMENT SCHEME

2.1 SITE, CONTEXT AND EXISTING USE

The development site (Figure 2) is located on the northern side of Cabbage Tree Road just to the north of Parkland Road at Bayview. The site is on the eastern edge of the western part of the Bayview Golf Course and comprises an irregular shaped area of some 18,592m². The site, which is vacant apart from golf greens has a significant change in levels and perimeter trees.

The golf course extends away to the east and west and the surrounding development consists predominantly of single dwellings with some medium density townhouse and apartment style residences.

2.2 PROPOSED DEVELOPMENT

It is proposed to clear and excavate part of the site to construct 3-level building over basement car parking. The proposed residential buildings and a facilities building will comprise:

	Buildings/Apartments					
	A	B	C	D	E	F
Two-bed	-	-	-	-	-	12
Three-bed	12	12	13	15	15	6

Total: 85 apartments (73xThree Bed and 12xTwo Bed)

Ancillary facilities including reception, restaurant/bar, health and beauty services are to be provided in a separate building (G).

A total of 161 parking spaces will be provided in basement levels with vehicle access located on Cabbage Tree Road at the eastern site boundary in the form of a roundabout.



LEGEND



LOCATION

FIG 2

Architectural details of the proposed development scheme are provided on the plans prepared by Marchese and Partners Pty Ltd which accompany the Application and are reproduced in part in Appendix A.

3. ROAD NETWORK AND TRAFFIC CONDITIONS

3.1 ROAD NETWORK

The road network serving the site (Figure 3) comprises:

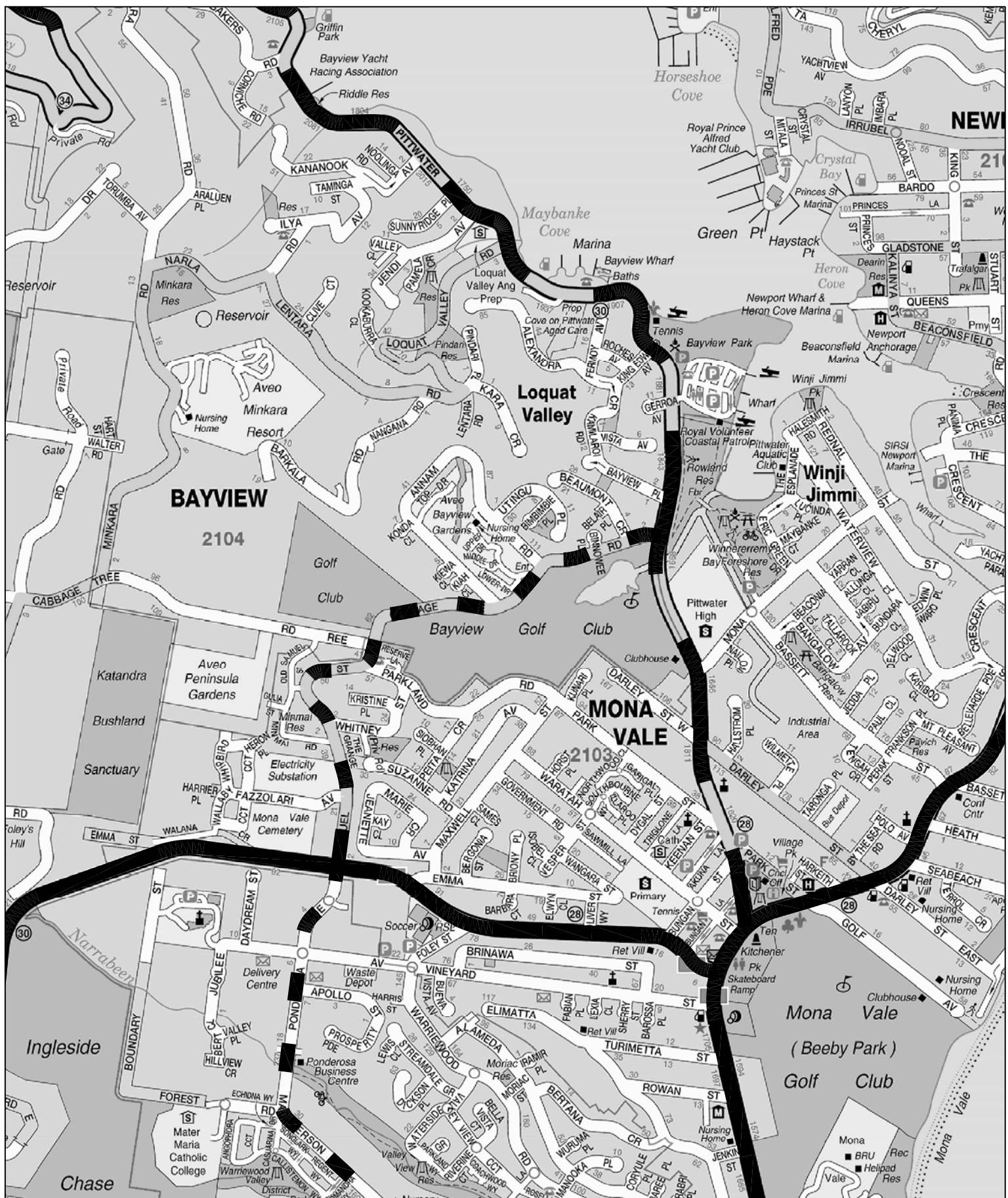
- * *Pittwater Road / Barrenjoey Road* – a classified State Road and Arterial Route providing a north / south link between the Pittwater Peninsula and southerly destinations including Central Sydney
- * *Pittwater Road north of Barrenjoey Road* – a sub-arterial route providing a link between Mona Vale and Church Point
- * *Mona Vale Road* – a State Road and arterial route which provides the main east/west connection between Mona Vale and the northern metropolitan areas of Pymble and Hornsby
- * *Cabbage Tree Road / Samuel Street* – a collector route linking between Pittwater Road and Mona Vale Road
- * *Parkland Road, Annam Road etc.* – local roads connecting to Cabbage Tree Road

Cabbage Tree Road in the vicinity of the site has 1 traffic lane in each direction and is relatively straight and level with a crest some distance to the west and a bend some distances to the west.

3.2 TRAFFIC CONTROLS

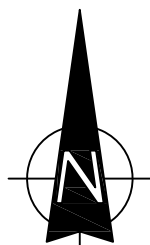
The existing traffic controls in the vicinity of the site (Figure 4) comprise:

- * the roundabout at the intersection of Cabbage Tree Road and Samuel Street
- * the roundabout at the intersection of Mona Vale Road, Samuel Street and Ponderosa Parade
- * the 3 tonne load limit and 50 kmph speed restriction on Cabbage Tree Road



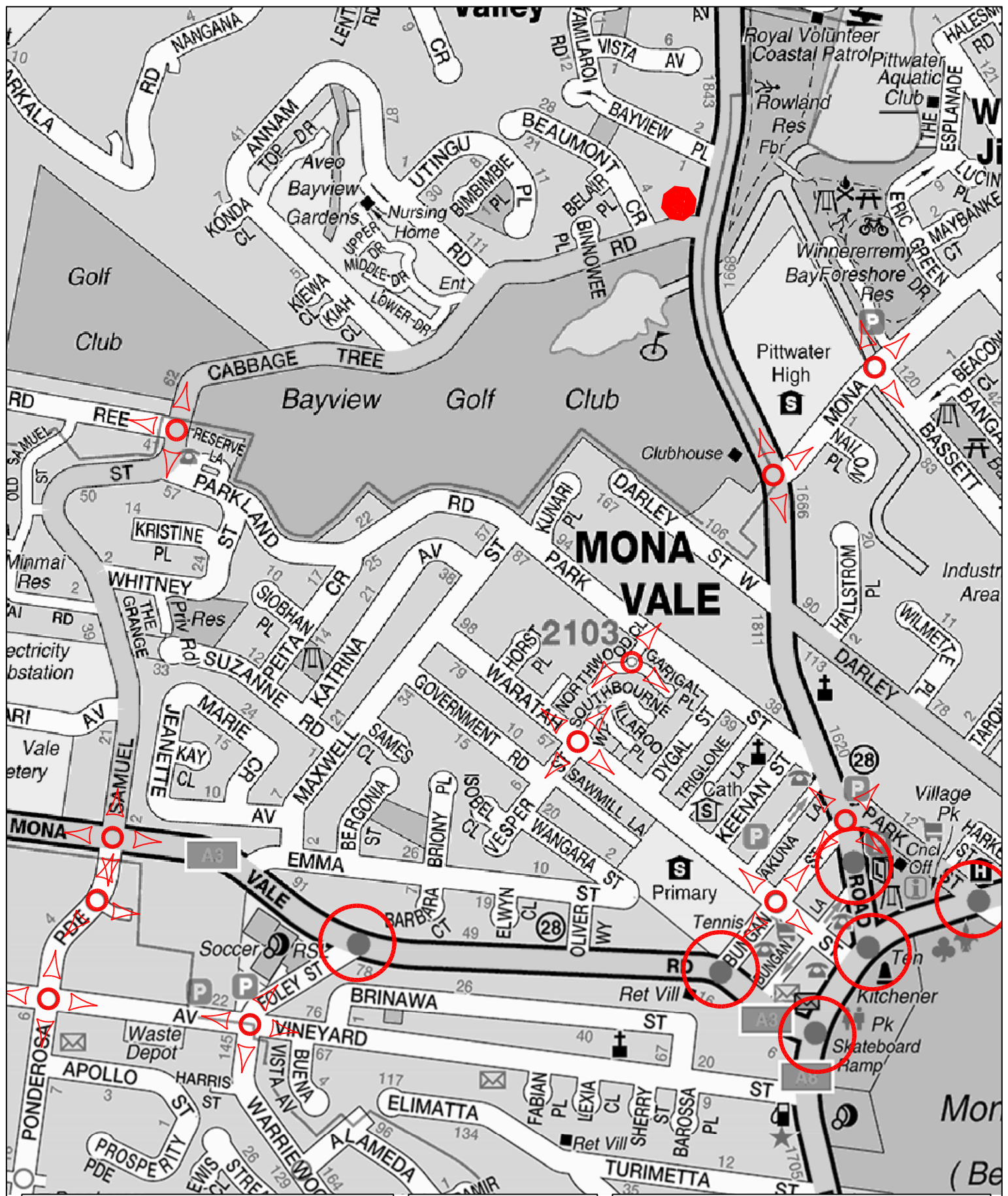
LEGEND

- ARTERIAL
- SUB-ARTERIAL
- COLLECTOR






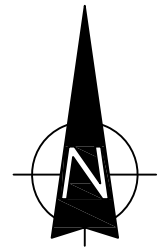
ROAD NETWORK

FIG 3



LEGEND

- 
TRAFFIC SIGNAL CONTROL
- 
ROUNDABOUT
- 
RESTRICTED TURNING MOVEMENT



TRAFFIC CONTROLS

FIG 4

- * the traffic control signals at the intersections of:
 - Pittwater Road and Barrenjoey Road
 - Mona Vale Road and Pittwater Road
- * the STOP control in Cabbage Tree Road at Pittwater Road
- * the 60 kmph speed restriction in both Pittwater Road and Darley Street East
- * the local area traffic management devices (raised thresholds) along Parkland Road
- * the Bus Zones along the Cabbage Tree Road route

3.3 TRAFFIC CONDITIONS

An indication of the prevailing traffic conditions in the vicinity of the site is provided by recent surveys carried out as part of this study. These comprised automatic “tube” surveys on Cabbage Tree Road near the site and the results are provided in Appendix B and summarised in the following:

	Vehicles Per Hour	
	AM Peak	PM Peak
Northbound	244	406
Southbound	383	319

Traffic conditions in the area are generally quite satisfactory and access movements in particular are assisted by the roundabout at the Mona Vale Road, Samuel Street and Ponderosa Parade intersection.

3.4 TRANSPORT SERVICES

State Transit bus services are subject to recent change with the introduction of the new “B Line” route between Newport and the City. Routes 155 operates to and from the Mona Vale Centre running along Cabbage Tree Road. This service connects to/from Narabeen and links with other bus services which provide connections to Manly, Chatswood, North Sydney, the City and the Metropolitan.

Transport Network Route 182 operates along Samuel Street, Parkland Road and Waratah Street to / from the Mona Vale Centre and Narabeen (see details overleaf).

3.5 FUTURE CIRCUMSTANCES

The Department of Planning has prepared a Draft Structure Plan for potential urban development in the Ingleside Precinct. The precinct occupies some 700 ha extending between Bayview and Elanora Heights to the east and Terry Hills and Duffys Forest to the west.

The envisaged urban development would provide for some 3,400 dwellings of various types, a neighbourhood centre and at least 1 school. The upgrading of Mona Vale Road, scheduled for completion in 2021 would be crucial to the road infrastructure needs of the Ingleside development.

Details of the Precinct Structure Plan and the access road network are shown on the diagrams reproduced overleaf. A Traffic and Transport Assessment¹ has been prepared to assess the infrastructure needs and implications of the envisaged development under the Structure Plan. The “Summary” to the AECOM Study is reproduced in Appendix D.

In relation to the potential impact on Cabbage Tree Road the Study assessment is that there will be some increased traffic movements on Cabbage Tree Road in the future, however this will not be significantly greater than the 2036 without Precinct development circumstance.

¹ *Ingleside Precinct
Traffic and Transport Assessment
AECOM October 2016*





New Northern Beaches bus network

Route line colour legend

- B-Line
- City all stops
- City limited stops/express
- Metrobus
- North Sydney all stops
- North Sydney limited stops/express
- Manly all stops
- Chatswood all stops
- Cross regional
- Local all stops
- Other routes

Map symbols legend

- B-Line stop
- Bus terminus
- Train station
- Ferry wharf
- Light rail stop
- Educational institution
- Shopping Centre
- Hospital
- Place of interest

Map last modified 9 May 2017

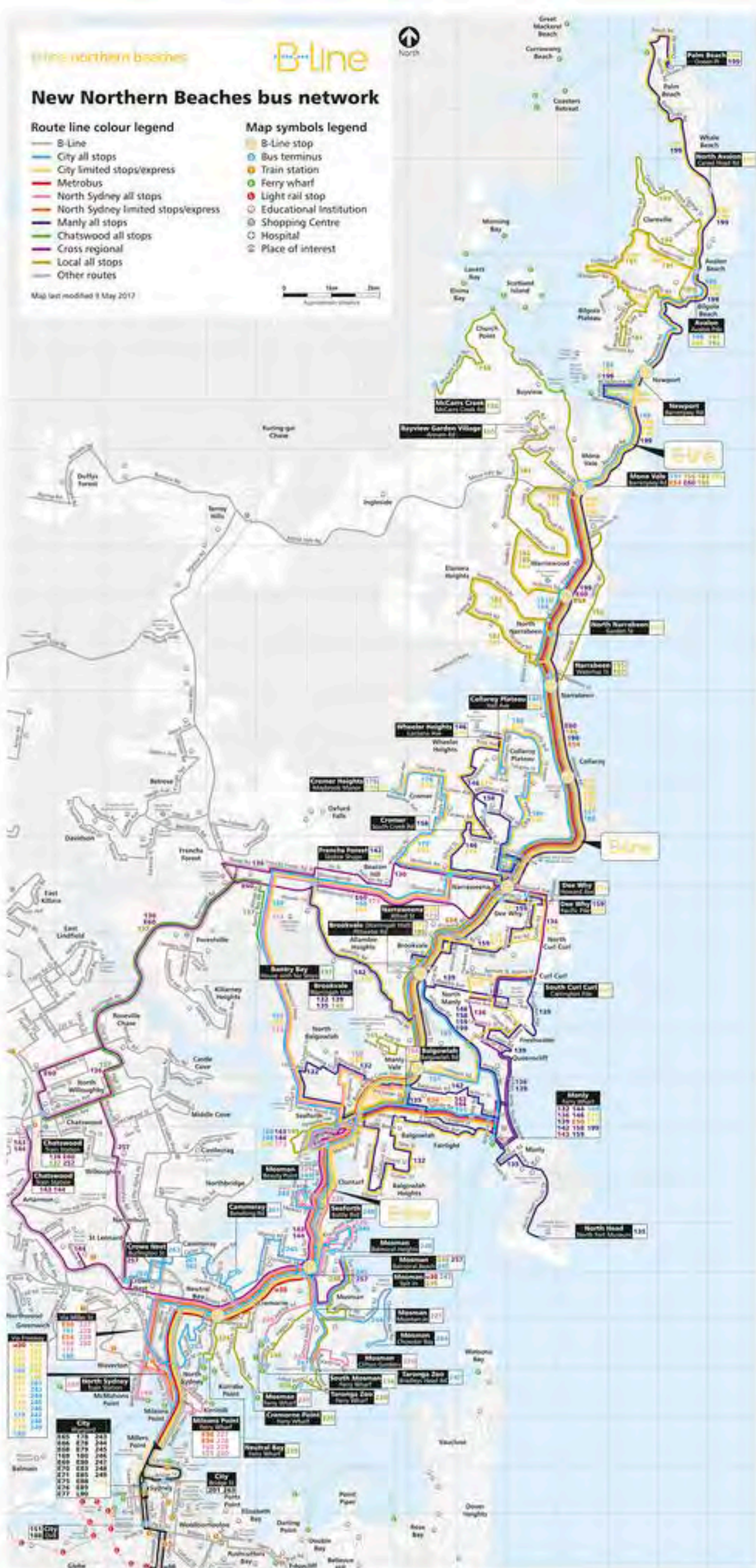


Figure 1 Structure Plan

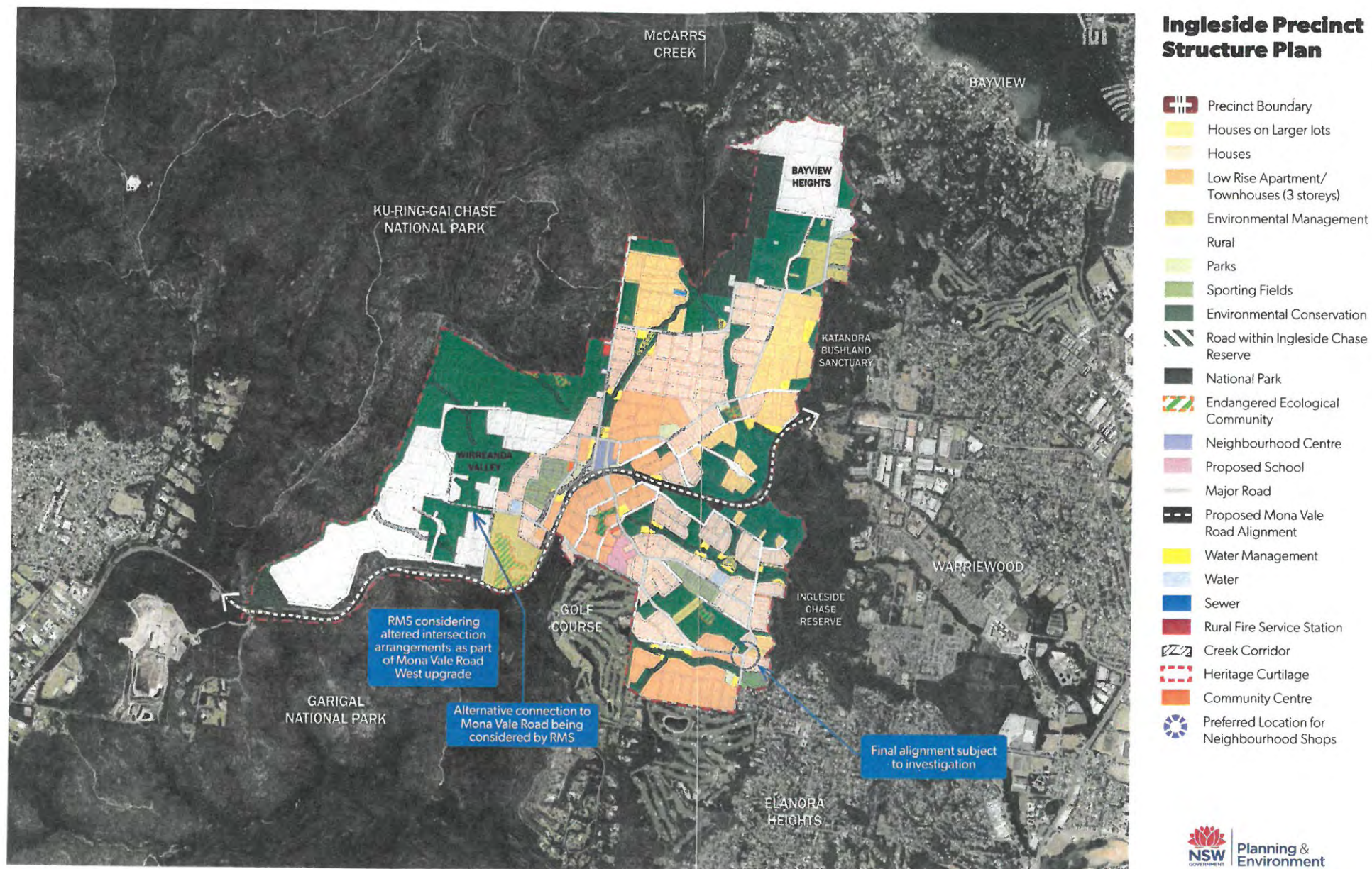
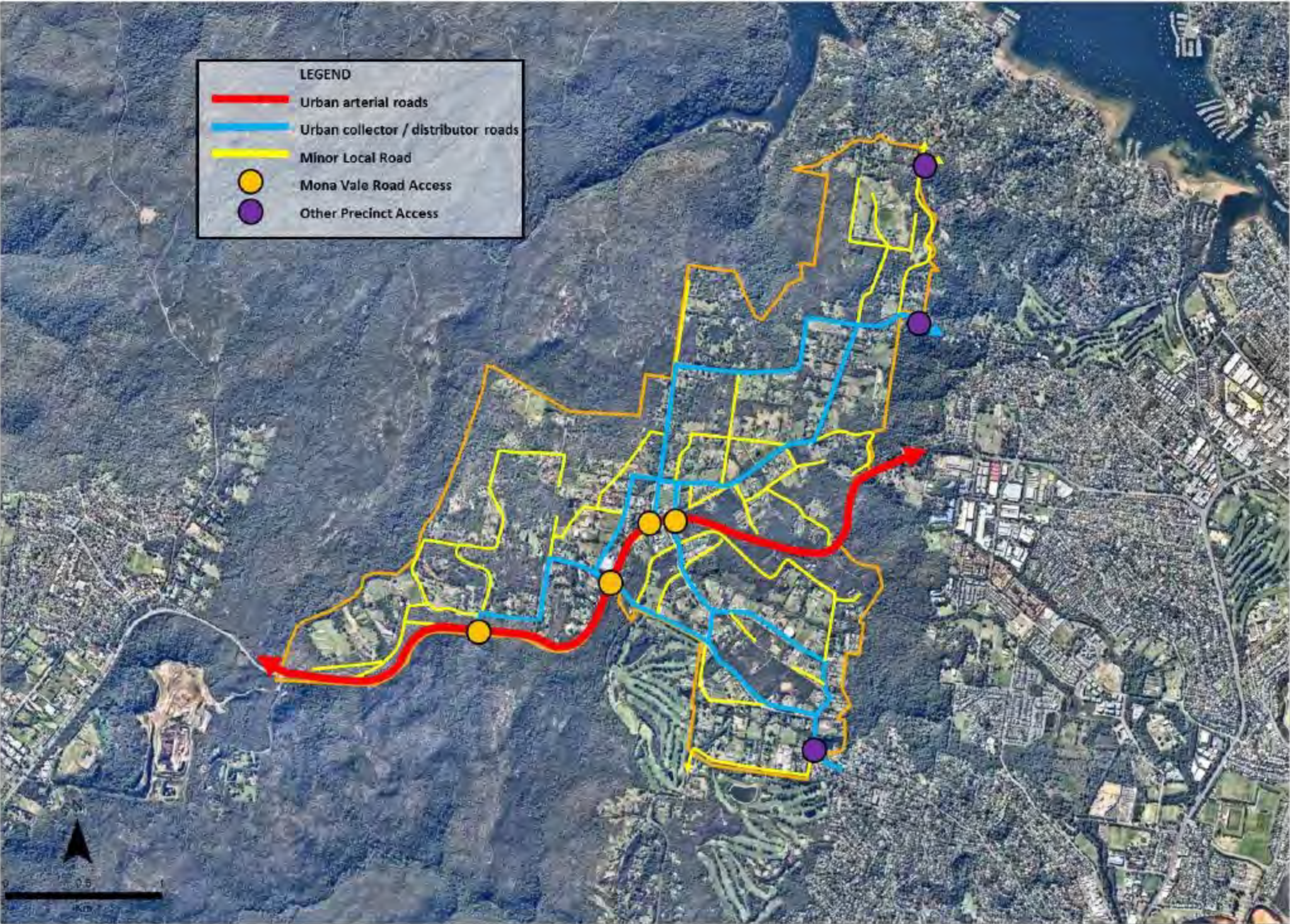


Figure 13: Proposed precinct access and outline road network



4. PARKING

The SEPP (Seniors Living) specifies a parking provision in respect to the proposed development as follows:

0.5 space per bedroom
(not social housing provider)

Application of this criteria to the proposed development indicates the following:

12 x two-bedroom (24 bedrooms)	-	12 spaces
73 x three-bedroom (219 bedrooms)	-	110 spaces
Visitors	-	39 spaces
Total:	-	161 spaces

It is proposed to provide a total of 161 spaces for residents and visitors in the basement carpark in full satisfaction of the SEPP requirements and there will also be parking provided for golf buggys. This generous provision will accommodate peak seasonal visitor parking demands (e.g. Christmas, Mothers/Fathers Days and special functions) in the circumstances where there is no alternative public parking available in the vicinity.

5. TRAFFIC

The RMS Guide to Traffic Generating Developments² does not provide criteria for SEPP developments but provides peak traffic generation criteria for Medium Density Residential (Apartments) development as follows:

2 bedrooms	0.4 – 0.5 vtpd per dwelling
3 or more bedrooms	0.5 – 0.65 vtpd per dwelling

However, the “experience” with another existing Waterbrook Seniors Living complexes (e.g. Greenwich, Yowie Bay etc) is that some 25-30% of residents do not own a motor vehicle (mini bus travel is provided). Because of the comprehensive on-site facilities and age/retirement status of residents the traffic movements are constrained particularly during the weekday AM and PM commuter peak periods.

The assessed traffic generation of the proposed apartments during the AM and PM peak periods would be 0.2 vtpd per apartment and added to this would be some minor staff, visitor and service vehicle movements. It is apparent therefore that the projected traffic generation will be some 20 – 30 vtpd during the peak periods as follows for a worst case outcome:

AM		PM	
IN	OUT	IN	OUT
20	10	10	20

The potential operational performance of the proposed access roundabout has been assessed using SIDRA with a 20% growth factor on the existing traffic volumes. The results, indicating a satisfactory operational performance are provided in Appendix C and summarised in the following while the criteria for interpreting SIDRA results is reproduced overleaf.

² *Guide to Traffic Generating Developments
Roads and Maritime Services*

AM		PM	
LOS	AVD	LOS	AVD
A	4.9	A	4.8

LOS – Level of Service

AVD – Average Vehicle Delay (secs)

6. ACCESS, INTERNAL CIRCULATION AND SERVICING

ACCESS

Vehicular access will comprise a 6.4 metre wide ingress / egress roadway connecting to Cabbage Tree Road at the eastern site boundary where excellent sight distance is available. This will form a 4-way intersection with the existing Club maintenance access and a roundabout control will be provided. The roundabout will incorporate the modified existing pedestrian refuge and will act to constraint vehicle speeds along Cabbage Tree Road.

INTERNAL CIRCULATION

The access road will 'split' to provide access to / from a porte cochere and to/from the basement carpark and loading dock areas. Generous provision for manoeuvring is made in the design which accords with the criteria of AS2890.1 and 6.

SERVICING

Refuse will be removed from the loading bay by Contract garbage collection service and large delivery vehicles (e.g. furniture pantechicons and / or furniture / appliance delivery vehicles) will also use the loading bay Small service vehicles (couriers, service personnel etc.) will be able to use the visitor parking spaces in the basement.

Details of the turning path assessment for the various on-site areas and the proposed roundabout are provided in Appendix E.

7. INDICATIVE CONSTRUCTION TRAFFIC MANAGEMENT PLAN

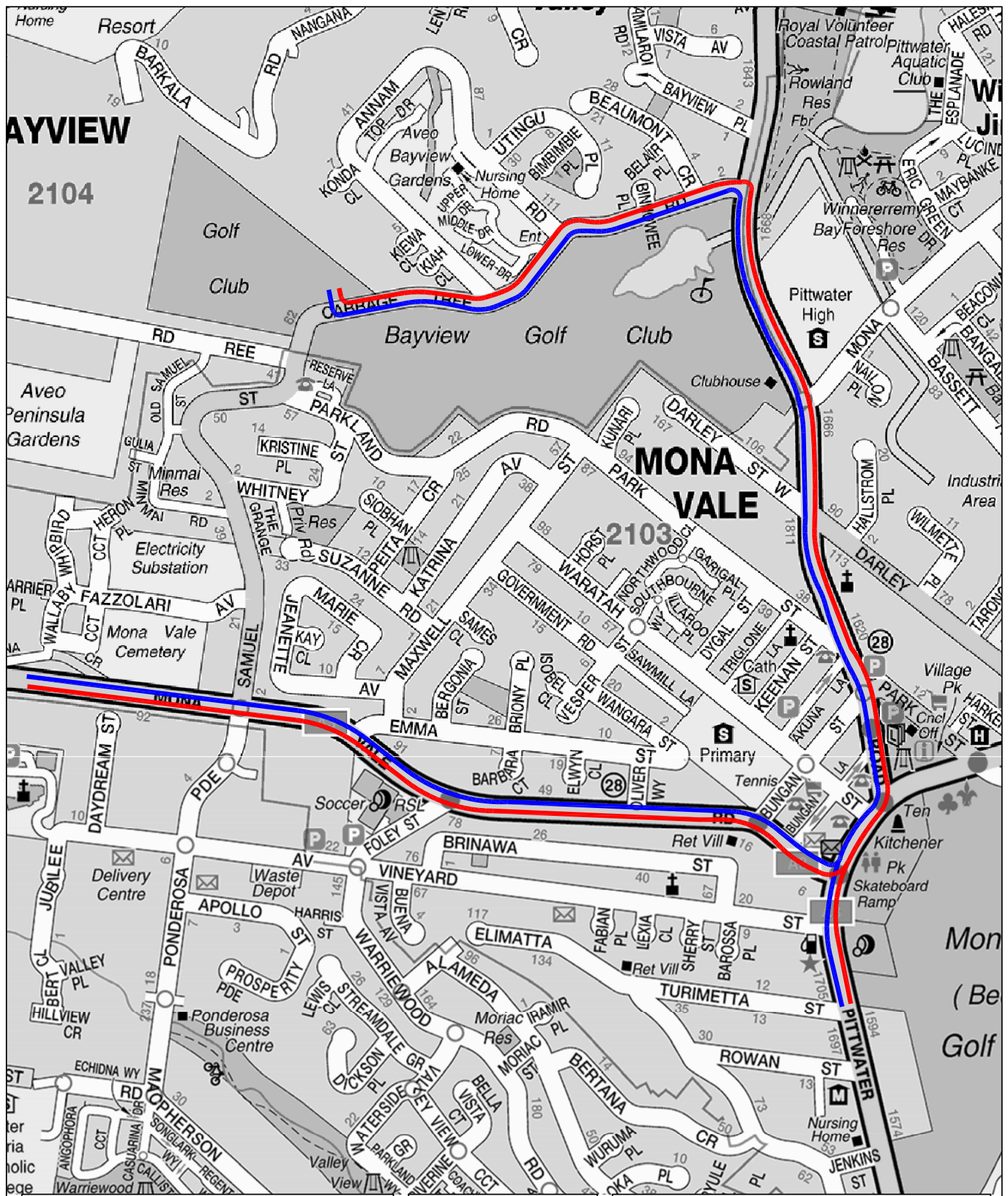
A detailed Traffic Management Plan will be prepared for the Construction Certificate process. However, the principals of this plan will be as follows:

- * vehicle access to be located on Cabbage Tree Road
- * no on-street WORKS ZONE
- * worker parking to be provided on-site with more in basement (when constructed)
- * all materials to be stored on-site
- * truck route to be from Mona Vale Road, Pittwater Road and then Cabbage Tree Road and vice versa on egress as shown in Figure 5
- * separate permit to be obtained for any temporary use of mobile crane
- * traffic controller/s to be engaged to assist truck access movements (as required)
- * Type A fencing to be installed along boundary
- * working hours as per Consent Condition
- * Program

Setup and Earthworks	- 3 weeks
Construction	- 50 weeks
Fitout	- 27 weeks

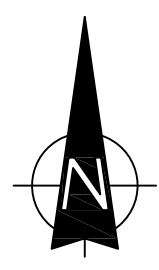
- * Truck Movements

Setup and Earthworks	- 10 to 20 truck&dog visitations per day
Construction	- 3 to 4 truck visitations per day (more during concrete pours)
Fitout	- 3 to 4 truck visitations per day



LEGEND

-  ARRIVAL
-  DEPARTURE



TRUCK ROUTES

FIG 5

8. CONCLUSION

Assessment of the proposed development scheme at Bayview indicates that:

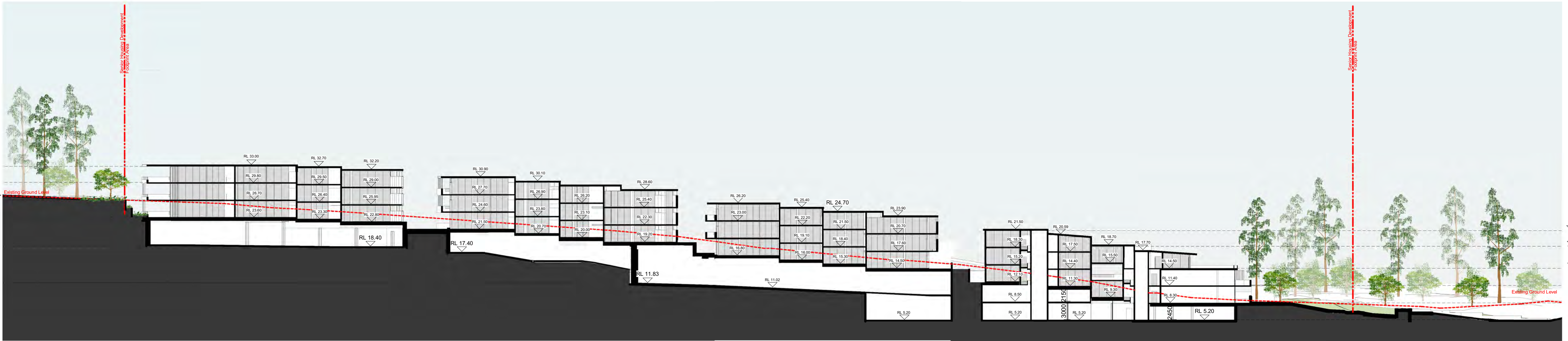
- * there will not be any unsatisfactory traffic capacity, safety or environmental related implications
- * there will be a suitable and appropriate parking provision for the nature of the development proposed
- * there will be suitable vehicle access internal circulation and servicing arrangements

APPENDIX A

DEVELOPMENT PLANS

BLOCK D

ROOF D
RL 32.70
LEVEL 2D
RL 29.80
LEVEL 1D
RL 26.70
GROUND LEVEL D
RL 23.80
BASEMENT 1D
RL 18.40
BASEMENT 2C
RL 11.90



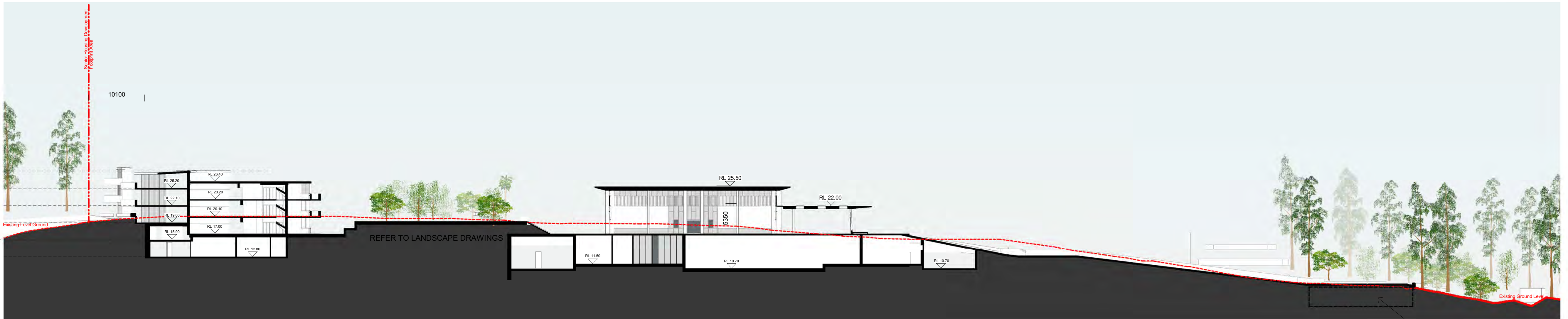
BLOCK A

ROOF A
RL 21.20
PENTHOUSE A
RL 18.40
LEVEL 2A
RL 14.50
LEVEL 1A
RL 11.40
GROUND LEVEL A
RL 8.30
BASEMENT 3A
RL 5.20

SECTION BLOCKS D-C-B-A
1 : 400

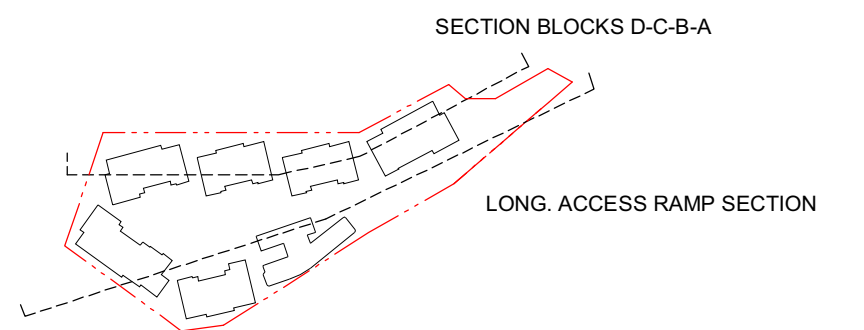
BLOCK E

ROOF E
RL 28.30
LEVEL 2E
RL 25.20
LEVEL 1E
RL 22.10
GROUND LEVEL E
RL 19.00
BASEMENT 1E
RL 15.90
BASEMENT 2E
RL 12.80

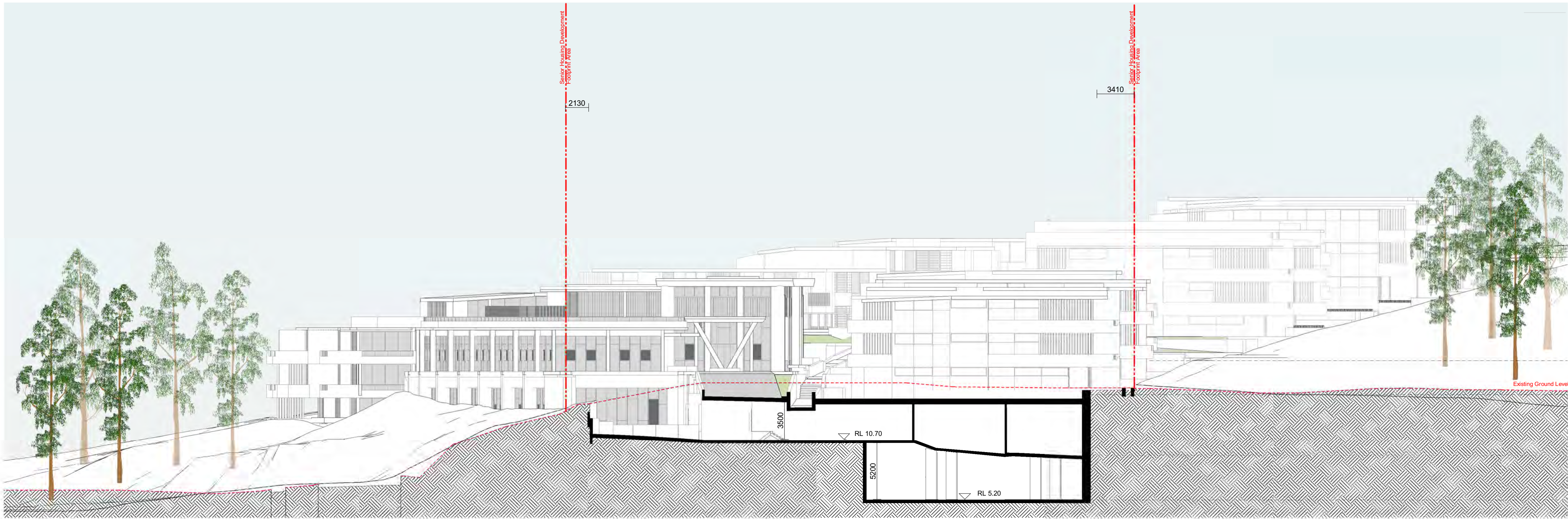


STORMWATER DETENTION TANK
FOR DETAILS REFER
STORMWATER DRAWINGS

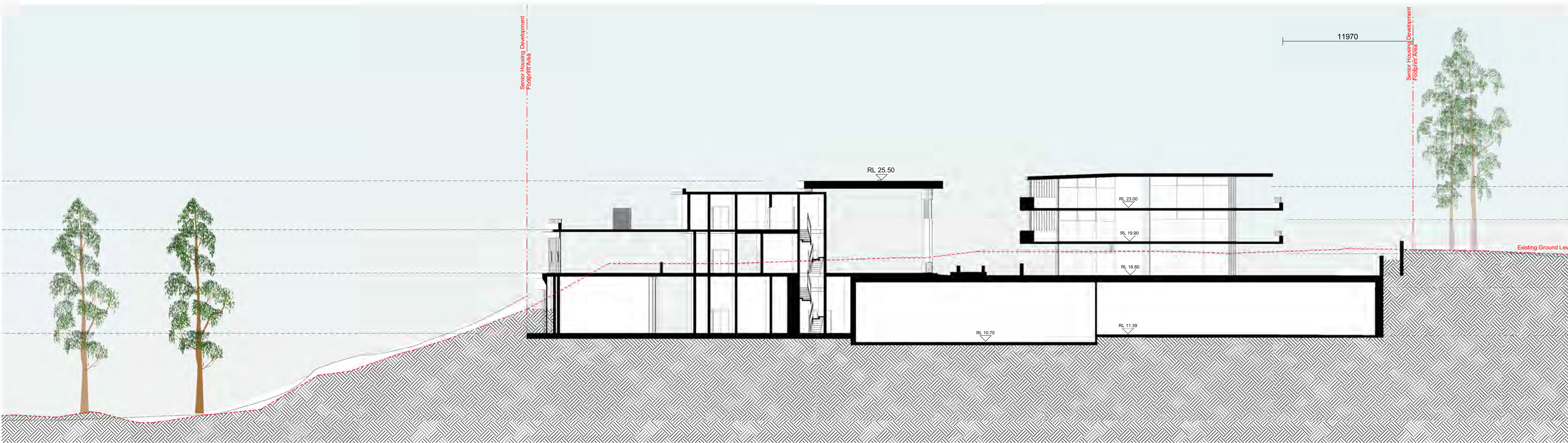
LONGITUDINAL ACCESS RAMP SECTION 1
1 : 400



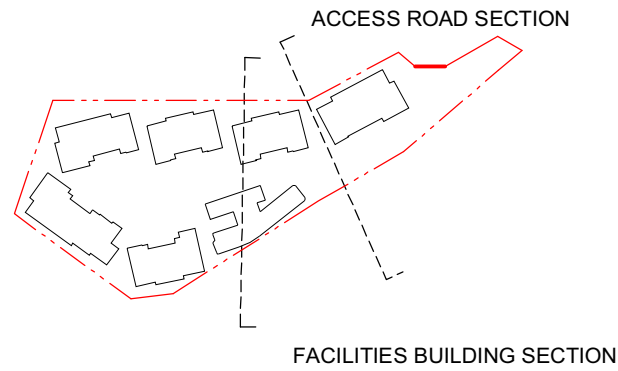
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	<div>PROJECT</div> <div>WATERBROOK BAYVIEW CABBAGE TREE ROAD, BAYVIEW</div>	<div>SCALE</div> <div>As indicated @A1 1 : 400 @A1</div>	<div>DATE</div> <div>27/03/2019</div>	<div>DRAWN</div> <div>JF</div>	<div>CHECKED</div> <div>EBdC</div>				
	<div>JOB</div> <div>14023</div>	<div>DRAWING</div> <div>DA4.02</div>		<div>REVISION</div> <div>A</div>					



ACCESS ROAD SECTION
1 : 250



FACILITIES BUILDING SECTION
1 : 250



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DEVELOPMENT APPLICATION

REVISION	DATE	DESCRIPTION	BY
A	27/03/2019	DA submission	DG

- NOTES:
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 - For Tree and vegetation management plan please refer Arborist and Ecologist report.
 - For all external works, stormwater and services refer Civil and Stormwater drawings.
 - Coordinate system: Mapping Grid of Australia (MGA)
 - Datum & map projection: GDA84 in map projection zone 56
 - Source and date of cadastral data: Six maps report dated 14 August 2017
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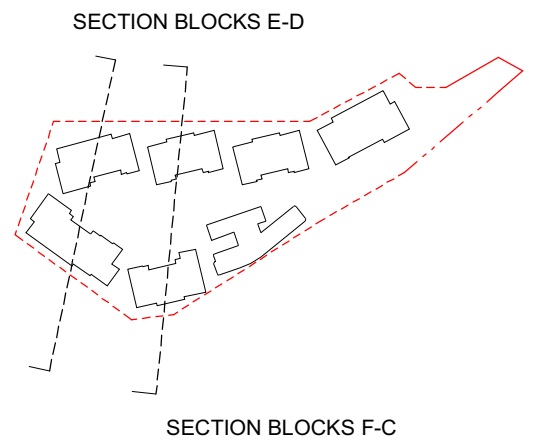
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CLIENT
WATERBROOK

PROJECT
WATERBROOK BAYVIEW
CABBAGE TREE ROAD, BAYVIEW

DRAWING TITLE
SITE SECTION - SECTION 1-1

SCALE	DATE	DRAWN	CHECKED
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JOB	DRAWING	REVISION	
14023	DA4.01	A	



SCALE 1:250 @A1	DATE 27/03/2019	DRAWN JF	CHECKED EBdC
JOB 14023	DRAWING DA4.03		REVISION A



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DEVELOPMENT APPLICATION

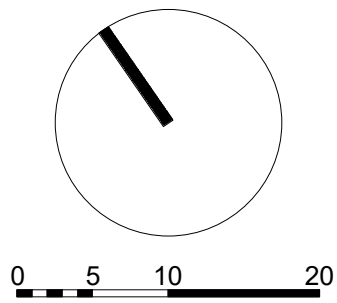
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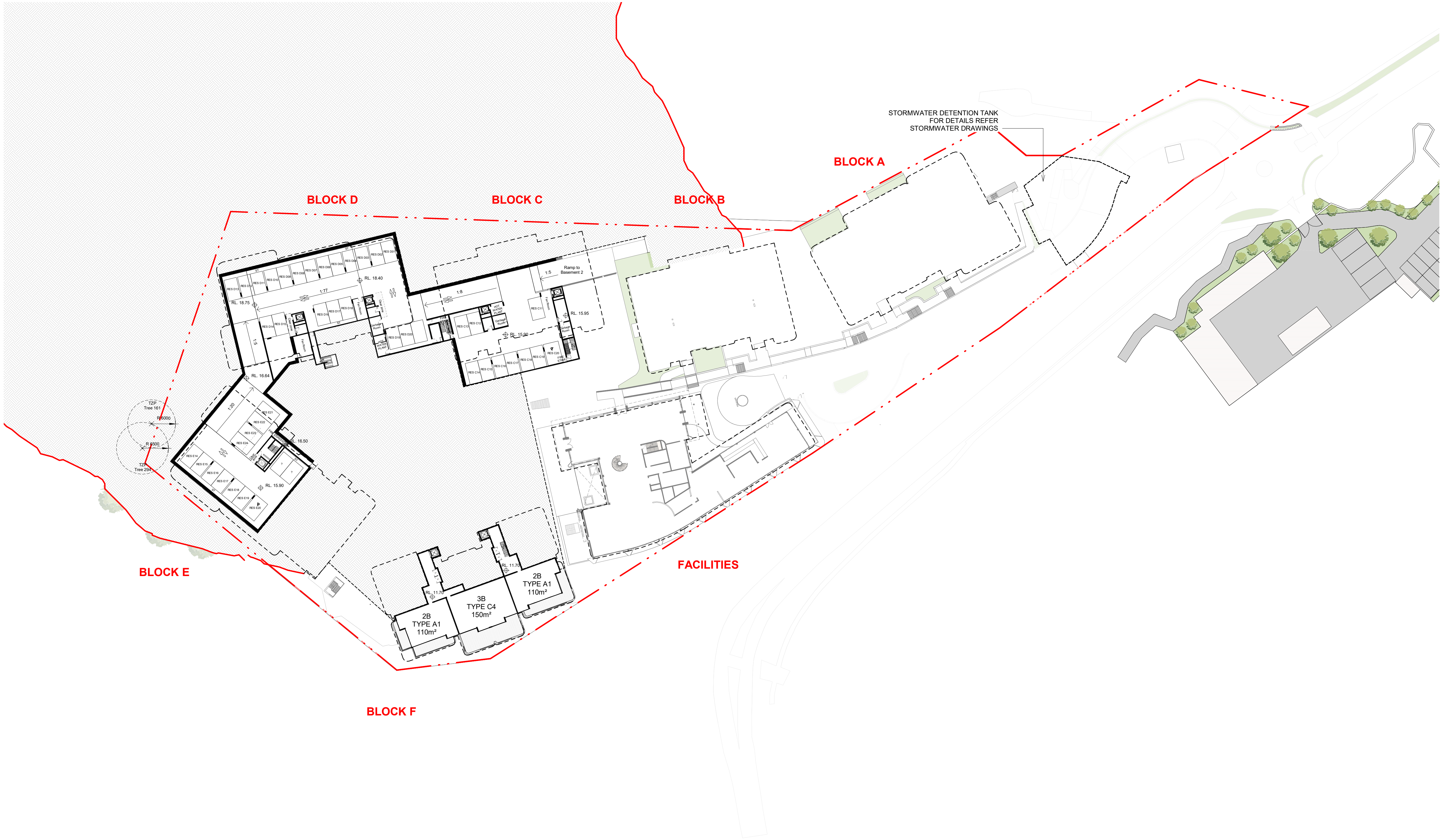


CLIENT
WATERBROOK

PROJECT
**WATERBROOK BAYVIEW
CABBAGE TREE ROAD, BAYVIEW**

DRAWING TITLE
KEY PLAN - LEVEL GROUND

SCALE 1:500 @A1	DATE 27/03/2019	DRAWN DG	CHECKED EBdC
JOB 14023	DRAWING DA2.04	REVISION A	



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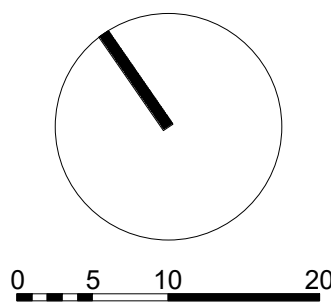
REVISION	DATE	DESCRIPTION	BY
A	27/03/2019	DA submission	DG

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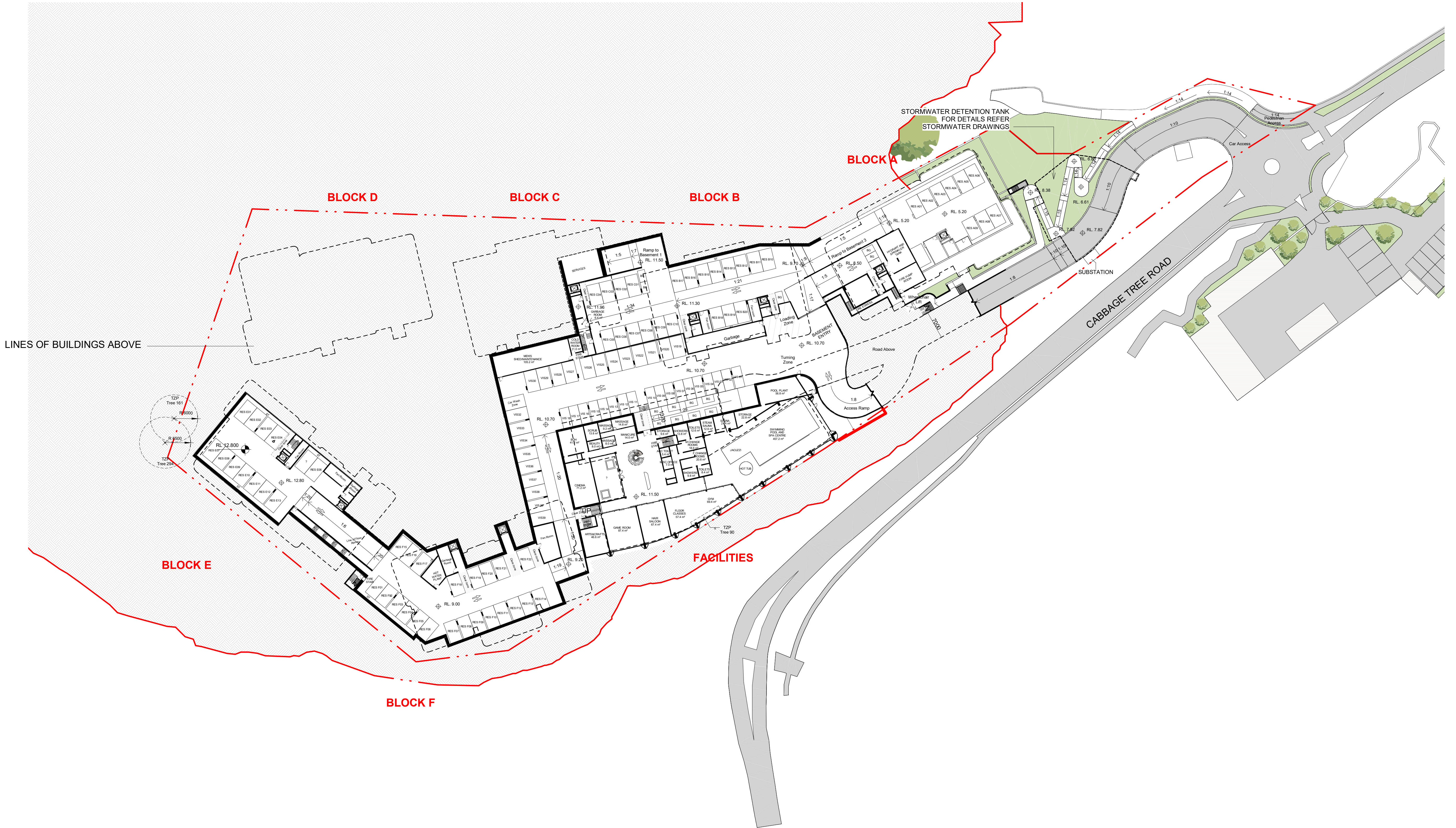


CLIENT
WATERBROOK

PROJECT
**WATERBROOK BAYVIEW
CABBAGE TREE ROAD, BAYVIEW**

DRAWING TITLE
KEY PLAN - BASEMENT 1 AND LOWER GROUND

SCALE 1 : 500 @A1	DATE 27/03/2019	DRAWN DG	CHECKED EBdC
JOB 14023	DRAWING DA2.03	REVISION A	



<div>IMPORTANT NOTES:</div> <div>Do not scale from drawings. All dimensions to be checked on site before commencement of work. All discrepancies to be brought to the attention of the Architect. Larger scale drawings and written dimensions take preference. This drawing is copyright and the property of the author, and must not be retained, copied or used without the express authority of MARCHESE + PARTNERS INTERNATIONAL PTY. LTD.</div> <div>DEVELOPMENT APPLICATION</div>	<div>REVISION</div> <div>A</div>		<div>DATE</div> <div>27/03/2019</div>	<div>DESCRIPTION</div> <div>DA submission</div>	<div>BY</div> <div>DG</div>	<div>NOTES:</div> <div><div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></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APPENDIX B

TRAFFIC SURVEY RESULTS

Count Number 4313 Ref : TTPA Lat/Long : S33 40.109 / E151 17.635 UBD 118 D-16
 Street CABBAGE TREE ROAD, BAYVIEW : From CICADA GLEN ROAD to PITTWATER ROAD : NORTH EAST
 Location At pedestrian refuge, near House No. 50a ELP MV3452 Carriageway

Start Date 25-SEP-17
 Start Time 1500
 Duration 7 DAYS
 Interval 1 HOUR

Weekly 50th Percentile Speed 54
 Weekly 85th Percentile Speed 60
 Five Day AADT 1456
 Seven Day AADT 1040

TOTAL COUNT MATRIX

	MON 25TH	TUE 26TH	WED 27TH	5 Day		7 Day	
				Total	Average	Total	Average
Midnight - 1am		6	11	17	3	17	9
1am - 2am		3	4	7	1	7	4
2am - 3am		0	1	1	0	1	1
3am - 4am		3	3	6	1	6	3
4am - 5am		6	7	13	3	13	7
5am - 6am		36	35	71	14	71	36
6am - 7am		161	136	297	59	297	149
7am - 8am		192	192	384	77	384	192
8am - 9am		244	231	475	95	475	238
9am - 10am		244	206	450	90	450	225
10am - 11am		228	240	468	94	468	234
11am - Midday		237	215	452	90	452	226
Midday - 1pm		256	228	484	97	484	242
1pm - 2pm		255	240	495	99	495	248
2pm - 3pm	259	310		569	114	569	285
3pm - 4pm	317	316		633	127	633	317
4pm - 5pm	349	406		755	151	755	378
5pm - 6pm	380	385		765	153	765	383
6pm - 7pm	249	214		463	93	463	232
7pm - 8pm	99	101		200	40	200	100
8pm - 9pm	53	63		116	23	116	58
9pm - 10pm	36	46		82	16	82	41
10pm - 11pm	27	32		59	12	59	30
11pm - Midnight	10	10		20	4	20	10
Total	1779	3754	1749	7282	1456	7282	1040

Count Number 4313 Ref : TTPA Lat/Long : S33 40.109 / E151 17.635 UBD 118 D-16
 Street CABBAGE TREE ROAD, BAYVIEW : From PITTWATER ROAD to CICADA GLEN ROAD : SOUTH WEST
 Location At pedestrian refuge, near House No. 50a ELP MV3452 Carriageway

Start Date 25-SEP-17
 Start Time 1500
 Duration 7 DAYS
 Interval 1 HOUR

Weekly 50th Percentile Speed 51
 Weekly 85th Percentile Speed 58
 Five Day AADT 1607
 Seven Day AADT 1148

TOTAL COUNT MATRIX

	MON 25TH	TUE 26TH	WED 27TH	5 Day		7 Day	
				Total	Average	Total	Average
Midnight - 1am		3	3	6	1	6	3
1am - 2am		3	7	10	2	10	5
2am - 3am		5	5	10	2	10	5
3am - 4am		2	2	4	1	4	2
4am - 5am		4	6	10	2	10	5
5am - 6am		84	87	171	34	171	86
6am - 7am		255	266	521	104	521	261
7am - 8am		366	383	749	150	749	375
8am - 9am		358	359	717	143	717	359
9am - 10am		350	314	664	133	664	332
10am - 11am		293	274	567	113	567	284
11am - Midday		282	315	597	119	597	299
Midday - 1pm		271	280	551	110	551	276
1pm - 2pm		273	238	511	102	511	256
2pm - 3pm	315	309		624	125	624	312
3pm - 4pm	319	317		636	127	636	318
4pm - 5pm	266	298		564	113	564	282
5pm - 6pm	228	269		497	99	497	249
6pm - 7pm	144	150		294	59	294	147
7pm - 8pm	59	76		135	27	135	68
8pm - 9pm	56	20		76	15	76	38
9pm - 10pm	33	40		73	15	73	37
10pm - 11pm	17	19		36	7	36	18
11pm - Midnight	5	7		12	2	12	6
Total	1442	4054	2539	8035	1607	8035	1147

Count Number

4313

Ref : TTPA

Lat/Long : S33 40.109 / E151 17.635

UBD 118 D-16

Street

CABBAGE TREE ROAD, BAYVIEW : From CICADA GLEN ROAD to PITTWATER ROAD : NORTH EAST

Location

At pedestrian refuge, near House No. 50a ELP MV3452

Carriageway

Start Date

25-SEP-17

Start Time

1500

Duration

7 DAYS

Interval

1 HOUR

Weekly Mean Speed

54

Weekly 85th Percentile Speed

60

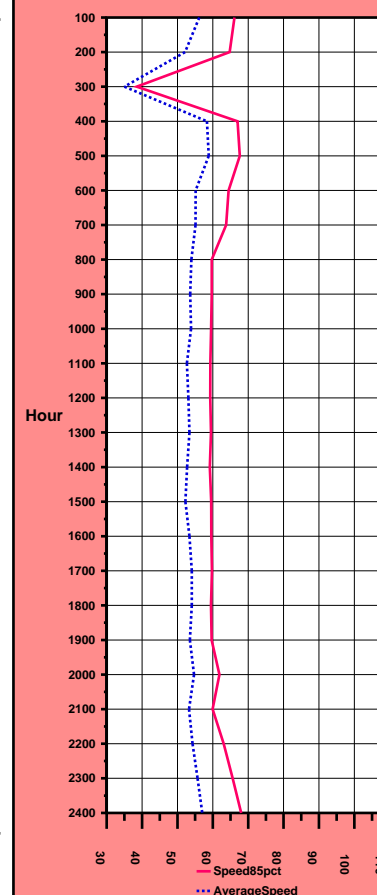
Five Day AADT

1456

Seven Day AADT

1040

Time	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	100-110	110-120	Total	Mean	85pct
Midnight - 1am	0	1	0	0	2	9	4	0	0	1	0	0	17	56.2	66.1
1am - 2am	0	0	0	1	2	2	2	0	0	0	0	0	7	52.1	64.8
2am - 3am	0	0	0	1	0	0	0	0	0	0	0	0	1	35.0	38.5
3am - 4am	0	0	0	0	1	2	3	0	0	0	0	0	6	58.3	67.0
4am - 5am	0	0	0	0	1	7	4	1	0	0	0	0	13	58.8	67.6
5am - 6am	2	0	0	0	9	44	12	4	0	0	0	0	71	55.1	64.5
6am - 7am	1	0	1	6	51	170	60	7	0	0	0	0	296	55.1	63.8
7am - 8am	1	0	0	4	83	246	46	3	1	0	0	0	384	53.9	59.7
8am - 9am	0	1	2	4	115	291	58	4	0	0	0	0	475	53.6	59.7
9am - 10am	0	0	1	7	93	296	48	5	0	0	0	0	450	53.8	59.5
10am - 11am	0	0	4	6	136	271	51	0	0	0	0	0	468	52.7	59.3
11am - Midday	0	0	2	4	123	275	46	2	0	0	0	0	452	53.1	59.3
Midday - 1pm	0	0	0	11	118	298	53	3	1	0	0	0	484	53.4	59.5
1pm - 2pm	0	1	1	8	139	297	48	1	0	0	0	0	495	52.7	59.2
2pm - 3pm	0	4	19	12	139	324	63	7	1	0	0	0	569	52.3	59.6
3pm - 4pm	0	0	2	2	175	375	75	4	0	0	0	0	633	53.4	59.6
4pm - 5pm	0	0	0	11	157	485	98	3	1	0	0	0	755	54.0	59.8
5pm - 6pm	0	0	1	4	154	518	83	5	0	0	0	0	765	54.1	59.5
6pm - 7pm	0	0	0	6	122	275	56	3	1	0	0	0	463	53.5	59.7
7pm - 8pm	0	0	0	1	45	118	32	3	1	0	0	0	200	54.7	61.9
8pm - 9pm	0	0	0	4	32	63	14	3	0	0	0	0	116	53.3	59.9
9pm - 10pm	0	0	1	0	23	42	12	4	0	0	0	0	82	54.3	63.1
10pm - 11pm	0	0	0	2	13	29	11	2	2	0	0	0	59	55.7	65.6
11pm - Midnight	0	0	0	0	6	7	5	1	1	0	0	0	20	57.0	68.0
Total	4	7	34	94	1739	4444	884	65	9	1	0	0	7281		
% of Total				1	24	61	12	1							



Count Number

4313

Ref : TTPA

Lat/Long : S33 40.109 / E151 17.635

UBD 118 D-16

Street

CABBAGE TREE ROAD, BAYVIEW : From PITTWATER ROAD to CICADA GLEN ROAD : SOUTH WEST

Location

At pedestrian refuge, near House No. 50a ELP MV3452

Carriageway

Start Date

25-SEP-17

Start Time

1500

Duration

7 DAYS

Interval

1 HOUR

Weekly Mean Speed

50

Weekly 85th Percentile Speed

58

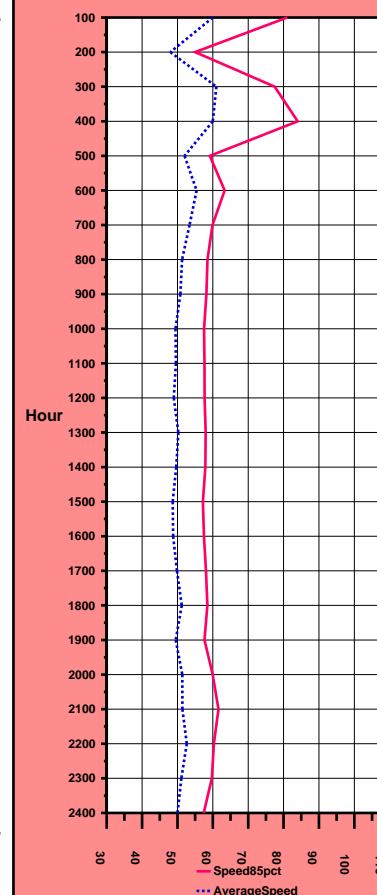
Five Day AADT

1607

Seven Day AADT

1148

Time	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	100-110	110-120	Total	Mean	85pct
Midnight - 1am	0	0	0	0	1	3	1	0	1	0	0	0	6	60.0	81.0
1am - 2am	0	0	0	0	7	3	0	0	0	0	0	0	10	48.0	55.0
2am - 3am	0	0	0	0	3	3	1	2	0	1	0	0	10	61.0	77.5
3am - 4am	0	0	0	1	0	1	1	0	1	0	0	0	4	60.0	84.0
4am - 5am	0	0	0	1	2	6	1	0	0	0	0	0	10	52.0	59.2
5am - 6am	0	0	1	1	29	103	34	2	1	0	0	0	171	55.4	63.3
6am - 7am	0	1	1	10	139	295	71	3	0	0	0	1	521	53.4	59.9
7am - 8am	0	0	4	25	269	399	50	2	0	0	0	0	749	51.3	58.5
8am - 9am	1	2	1	23	291	356	40	0	0	1	1	1	717	50.8	58.2
9am - 10am	0	0	2	41	316	272	29	3	0	0	0	0	663	49.4	57.5
10am - 11am	0	0	1	52	236	252	21	4	0	0	0	1	567	49.6	57.7
11am - Midday	0	4	5	43	289	217	34	4	1	0	0	0	597	49.0	57.7
Midday - 1pm	0	0	2	32	224	264	25	4	0	0	0	0	551	50.3	58.0
1pm - 2pm	1	2	3	32	219	225	26	3	0	0	0	0	511	49.7	57.9
2pm - 3pm	1	1	2	64	291	237	23	1	0	1	2	0	623	48.7	57.2
3pm - 4pm	0	2	5	57	299	237	32	3	1	0	0	0	636	48.8	57.5
4pm - 5pm	1	0	6	37	247	234	32	3	1	2	1	0	564	49.9	58.1
5pm - 6pm	0	0	1	21	191	248	28	4	3	1	0	0	497	51.2	58.4
6pm - 7pm	1	0	1	25	132	119	12	1	1	0	1	1	294	49.5	57.6
7pm - 8pm	1	0	1	6	50	57	19	1	0	0	0	0	135	51.4	60.0
8pm - 9pm	0	0	1	8	28	25	11	0	0	1	1	0	75	51.4	61.6
9pm - 10pm	1	0	0	4	22	34	7	3	0	0	1	0	72	52.6	60.3
10pm - 11pm	0	0	0	2	15	14	5	0	0	0	0	0	36	51.1	59.7
11pm - Midnigh	0	0	0	1	4	7	0	0	0	0	0	0	12	50.0	57.4
Total	7	12	37	486	3304	3611	503	43	10	7	7	4	8031		
% of Total				6	41	45	6	1							



APPENDIX C

SIDRA RESULTS

MOVEMENT SUMMARY

 Site: [CABBAGE TREE DR / WATERBROOK ACCESS AM]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	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 per veh	Average Speed km/h
South: MAINTENANCE ACCESS											
1	L2	5	2.0	0.196	4.7	LOS A	1.1	7.9	0.06	0.47	53.9
2	T1	300	2.0	0.196	4.7	LOS A	1.1	7.9	0.06	0.47	54.8
3	R2	2	2.0	0.196	8.0	LOS A	1.1	7.9	0.06	0.47	54.4
Approach		307	2.0	0.196	4.7	LOS A	1.1	7.9	0.06	0.47	54.8
East: CABBAGE TREE DR											
4	L2	2	2.0	0.006	7.1	LOS A	0.0	0.2	0.53	0.59	51.2
5	T1	1	2.0	0.006	7.2	LOS A	0.0	0.2	0.53	0.59	52.1
6	R2	2	2.0	0.006	10.5	LOS B	0.0	0.2	0.53	0.59	51.7
Approach		5	2.0	0.006	8.5	LOS A	0.0	0.2	0.53	0.59	51.6
North: WATERBROOK ACCESS											
7	L2	2	2.0	0.307	4.7	LOS A	2.1	14.9	0.12	0.46	53.6
8	T1	460	2.0	0.307	4.8	LOS A	2.1	14.9	0.12	0.46	54.6
9	R2	5	2.0	0.307	8.0	LOS A	2.1	14.9	0.12	0.46	54.2
Approach		467	2.0	0.307	4.8	LOS A	2.1	14.9	0.12	0.46	54.6
West: CABBAGE TREE DR											
10	L2	5	2.0	0.021	6.2	LOS A	0.1	0.7	0.43	0.62	51.2
11	T1	1	2.0	0.021	6.2	LOS A	0.1	0.7	0.43	0.62	52.1
12	R2	15	2.0	0.021	9.5	LOS A	0.1	0.7	0.43	0.62	51.7
Approach		21	2.0	0.021	8.6	LOS A	0.1	0.7	0.43	0.62	51.6
All Vehicles		800	2.0	0.307	4.9	LOS A	2.1	14.9	0.11	0.47	54.5

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

Roundabout LOS Method: SIDRA Roundabout LOS.

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

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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Project: T:\WORK17\17131 - WATERBROOK, CABBAGE TREE ROAD, BAYVIEW - see 14084\MODELLING\PROJECT MODEL.sip7

MOVEMENT SUMMARY

 Site: [CABBAGE TREE DR / WATERBROOK ACCESS PM]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	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 per veh	Average Speed km/h
South: MAINTENANCE ACCESS											
1	L2	15	2.0	0.316	4.7	LOS A	2.0	14.6	0.07	0.47	53.8
2	T1	490	2.0	0.316	4.7	LOS A	2.0	14.6	0.07	0.47	54.8
3	R2	2	2.0	0.316	8.0	LOS A	2.0	14.6	0.07	0.47	54.4
Approach		507	2.0	0.316	4.7	LOS A	2.0	14.6	0.07	0.47	54.8
East: CABBAGE TREE DR											
4	L2	2	2.0	0.006	6.7	LOS A	0.0	0.2	0.48	0.58	51.6
5	T1	1	2.0	0.006	6.7	LOS A	0.0	0.2	0.48	0.58	52.4
6	R2	2	2.0	0.006	10.0	LOS A	0.0	0.2	0.48	0.58	52.1
Approach		5	2.0	0.006	8.0	LOS A	0.0	0.2	0.48	0.58	51.9
North: WATERBROOK ACCESS											
7	L2	2	2.0	0.250	4.7	LOS A	1.6	11.6	0.07	0.47	53.8
8	T1	390	2.0	0.250	4.7	LOS A	1.6	11.6	0.07	0.47	54.8
9	R2	5	2.0	0.250	8.0	LOS A	1.6	11.6	0.07	0.47	54.4
Approach		397	2.0	0.250	4.8	LOS A	1.6	11.6	0.07	0.47	54.8
West: CABBAGE TREE DR											
10	L2	5	2.0	0.013	7.3	LOS A	0.1	0.4	0.54	0.62	51.0
11	T1	1	2.0	0.013	7.3	LOS A	0.1	0.4	0.54	0.62	51.9
12	R2	5	2.0	0.013	10.6	LOS B	0.1	0.4	0.54	0.62	51.5
Approach		11	2.0	0.013	8.8	LOS A	0.1	0.4	0.54	0.62	51.3
All Vehicles		920	2.0	0.316	4.8	LOS A	2.0	14.6	0.08	0.47	54.7

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

Roundabout LOS Method: SIDRA Roundabout LOS.

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

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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APPENDIX D

AECOM SUMMARY

7.0 Summary

Over the next 20 years, Sydney's population is forecast to grow by 1.6 million people, requiring an additional 664,000 homes. The Northern Beaches is also expected to change dramatically during this time. In recent years, a number of locations have been identified by the NSW Government and local Councils across Sydney as potential sites for new precincts/communities to be developed in response to these demands.

The study aims to ensure that the Ingleside Precinct provides suitable facilities for people to walk, cycle, access public transport or use private cars, thus enabling people to make the most appropriate choice of transport mode for their journey and ensuring that the built environment supports travel choice; including walking for short trips to local shops, cycling to community centres or catching a bus to work. Ultimately this precinct will be designed to increase travel choice, accessibility and reduce dependency on private cars and hence reduce the associated emissions generated by high levels of private car use, as well as ensure that transport infrastructure provides an appropriate level of service that mitigates the impacts of future development, addresses the requirements of traffic growth on the strategic road network and meets the needs of relevant stakeholders.

This traffic and transport assessment has been informed by the recent Mona Vale Road Corridor Studies undertaken by the Roads and Maritime (*Mona Vale to Macquarie Park Corridor Strategy*, *Mona Vale Road McCarrs Creek Road to Powderworks Road Upgrade Preferred Options Report*) and has considered other strategic publications such as *The Northern Beaches BRT Pre-Feasibility Study* as well as a number of local studies undertaken for Pittwater Council and regional developments such as the Northern Beaches Hospital and Wakehurst Parkway Upgrades. The outcomes of the Ingleside transport study will then be used to inform any ongoing upgrades of the strategic road network and the development capacity of the precinct.

A summary of the transport infrastructure provision associated with the proposed development is summarised in **Table 23**.

Table 23: Summary of infrastructure provision

Mode	Infrastructure / Service improvements	Responsibility
Active Travel	Utility path alongside Mona Vale Road	Roads and Maritime
Active Travel	Off-road shared paths (collector roads)	Developer / Council
Active Travel	Off-road shared paths (green corridors)	Developer / Council
Public Transport	Bus priority treatment at Mona Vale Road intersections	Roads and Maritime
Public Transport	Enhanced bus services along Mona Vale Road	TfNSW
Public Transport	Enhance local services through Ingleside	TfNSW
Public Transport	Improved stopping facilities along Mona Vale Road	Roads and Maritime
Public Transport	New / upgraded bus stops on other local roads	Developer / Council
Private Car	Mona Vale Road Upgrade	Roads and Maritime
Private Car	Intersection improvements at Powderworks Road / Garden Street	Developer / Council / RMS
Private Car	Intersection improvements at Mona Vale Road / Pittwater Road	Roads and Maritime
Private Car	Provision of roundabouts within the Ingleside Precinct	Developer / Council

Source: AECOM , 2015

Intersections upgrades attributable to the Ingleside development predominantly occur as a result of enhanced access requirements, however the intersections of Mona Vale Road / Pittwater Road and Powderworks Road / Garden Street are necessitated as a result of additional traffic generated by the proposed Ingleside development

between 2021 and 2036. A summary of the intersection upgrades associated with the proposed development is summarised in **Table 24**.

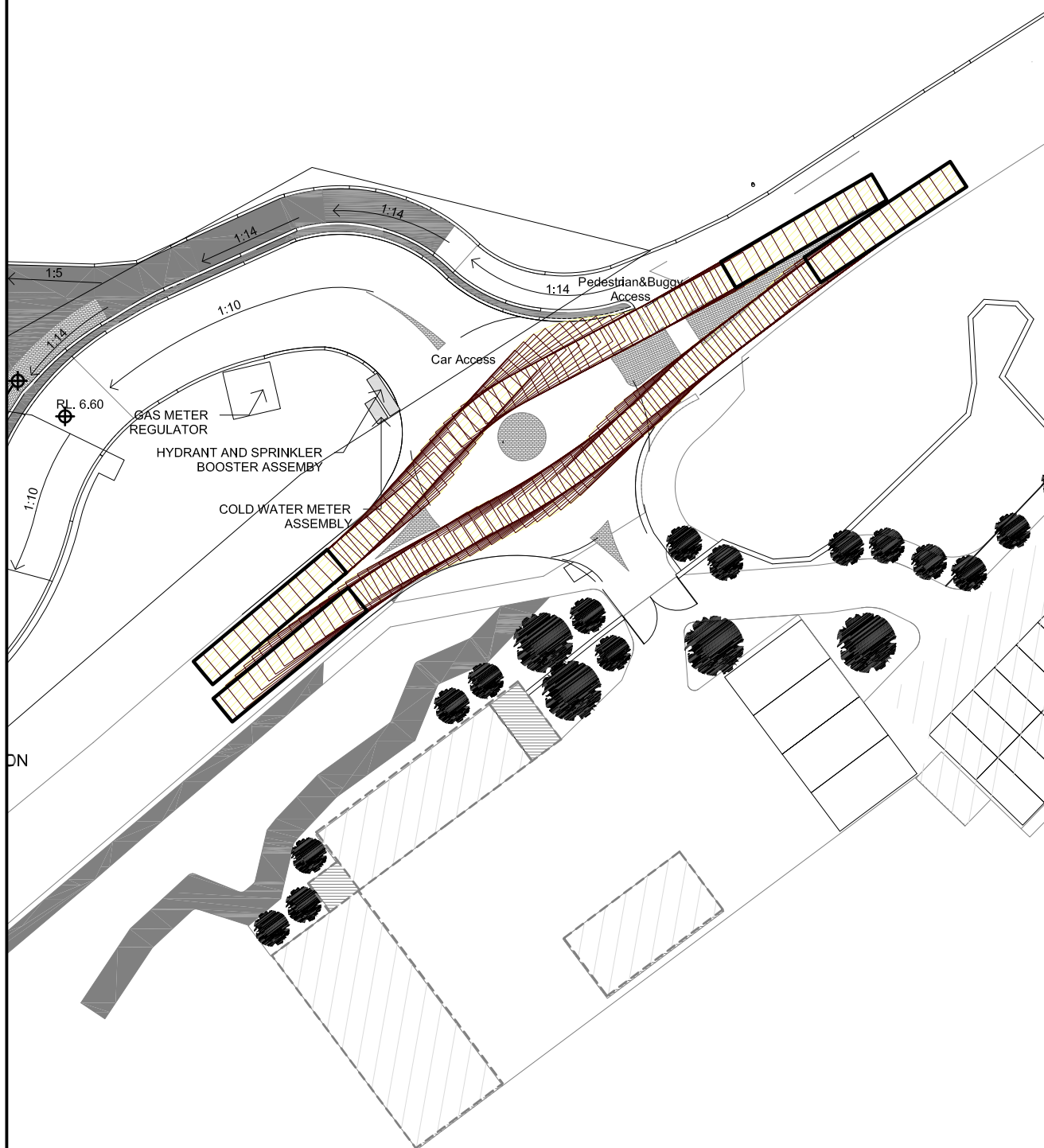
Table 24: Summary of intersection upgrades

Location	Existing Layout	Changes Likely to be required	Possible Future Layout
Mona Vale Road / Powderworks Road / Baha'i Temple Way intersection	4-arm signalised intersection	Realignment of Baha'i Temple Way	4-arm signalised intersection
Mona Vale Road / Chiltern Road intersection	3-arm seagull priority intersection	Right turn movements closed	3-arm left in / left out intersection
Mona Vale Road / Lane Cove Road / Manor Road intersection	4-arm signalised intersection	Deviation of Lane Cove Road	4-arm signalised intersection
Mona Vale Road / Pittwater Road	3-arm signalised intersection	Extension of right turn bays on Pittwater Road (150m) and Mona Vale Road (110m)	3-arm signalised intersection (subject to re-assessment at a later date)
Powderworks Road / Wattle Road	4-arm priority intersection	Roundabout provided to facilitate access across Powderworks Road	Roundabout
Powderworks Road / Wilson Avenue	3-arm priority intersection	Roundabout provided to facilitate safer access to Wilga-Wilson	Roundabout
Powderworks Road / Ingleside Road	3-arm priority intersection	Roundabout provided to facilitate safer access to Ingleside Road	Roundabout
Powderworks Road / Wilga Street	3-arm priority intersection	Roundabout provided to facilitate access to Wilga-Wilson	Sub-arterial Road / roundabout
Powderworks Road / Garden Street	3-arm signalised intersection	Extension / formalisation of left turn bays on Garden Street and Powderworks Road	3-arm signalised intersection
Chiltern Road / Neighbourhood centre access Road	N/A	Roundabout provided to facilitate access to the proposed neighbourhood centre	Roundabout
Lane Cove Road / Ingleside Road	3-arm priority intersection	Roundabout provided to facilitate access across Lane Cove Road	Roundabout
Lane Cove Road / View Road	3-arm priority intersection	Roundabout provided to facilitate access across Lane Cove Road	Roundabout
Cabbage Tree Road / Walter Road	4-arm priority intersection	Roundabout provided to facilitate safer access in all directions	Roundabout
Lane Cove Road / Neighbourhood centre access Road	4-arm priority intersection	New intersection created as a result of deviation of Lane Cove Road	Priority Give-way

Source: AECOM, 2015

APPENDIX E

TURNING PATH ASSESSMENT



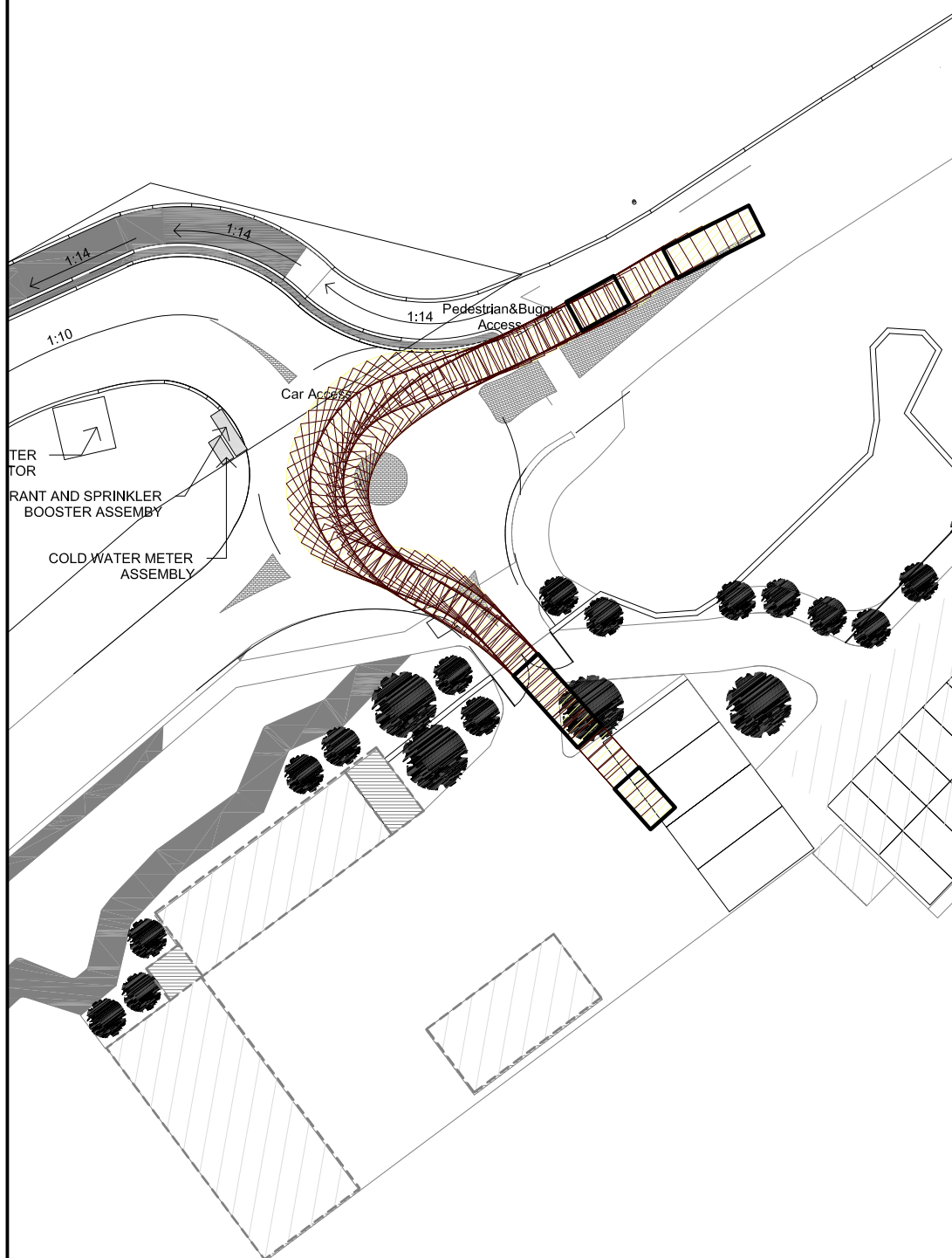
LEGEND

This drawing has been prepared using vehicle modelling computer software AutoTrack V5.00a in conjunction with AutoCAD 2013. The vehicle used is based upon vehicle data provided by Austroads and incorporates a reasonable degree of tolerance. However, it is not possible to account for all vehicle types/characteristics and/or driver ability.



SWEPT PATH ANALYSIS OF 14.5m BUSES

SP 1



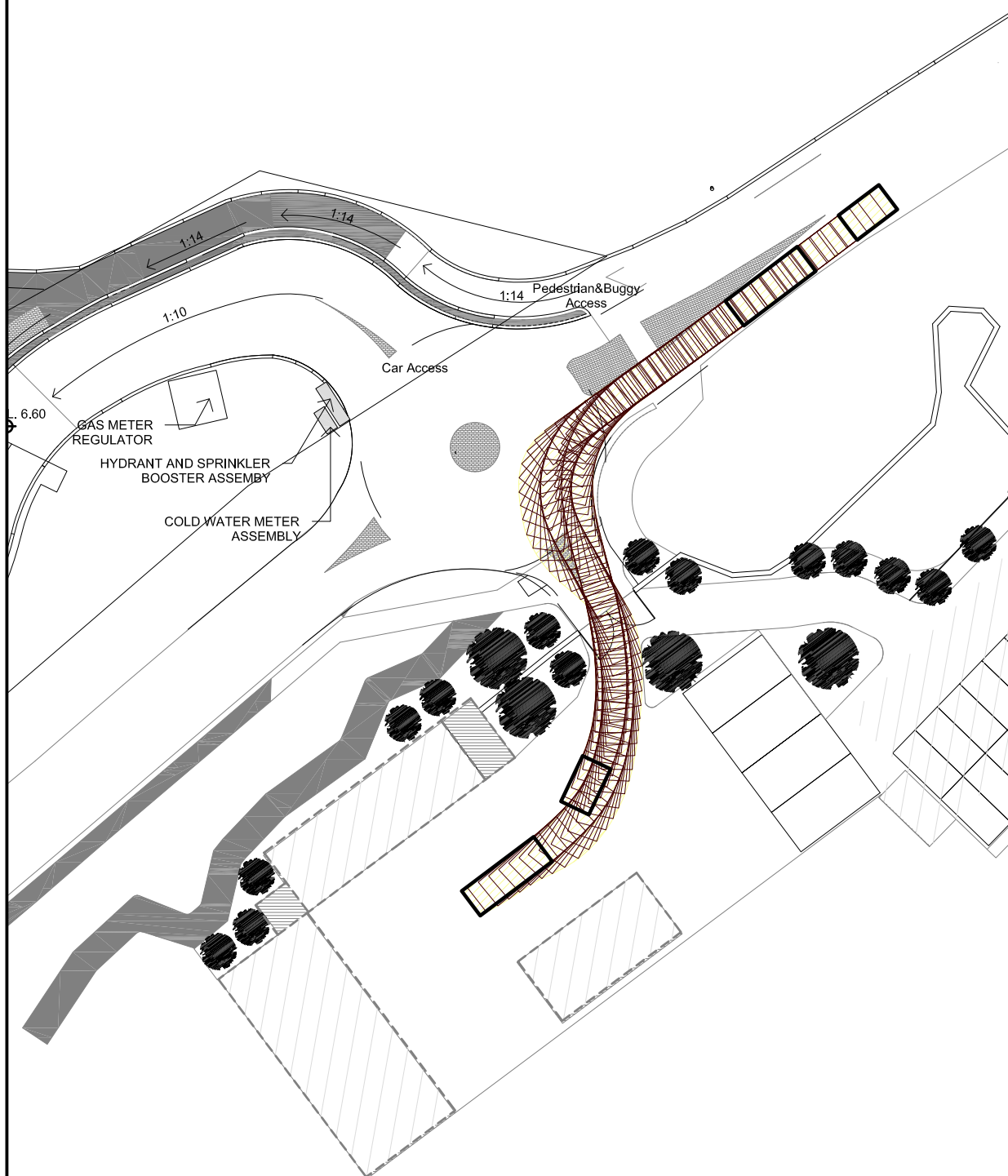
LEGEND

This drawing has been prepared using vehicle modelling computer software AutoTrack V5.00a in conjunction with AutoCAD 2013. The vehicle used is based upon vehicle data provided by Austroads and incorporates a reasonable degree of tolerance. However, it is not possible to account for all vehicle types/characteristics and/or driver ability.



**SWEPT PATH ANALYSIS
OF A TRUCK AND DOG
TRAILER**

SP 2



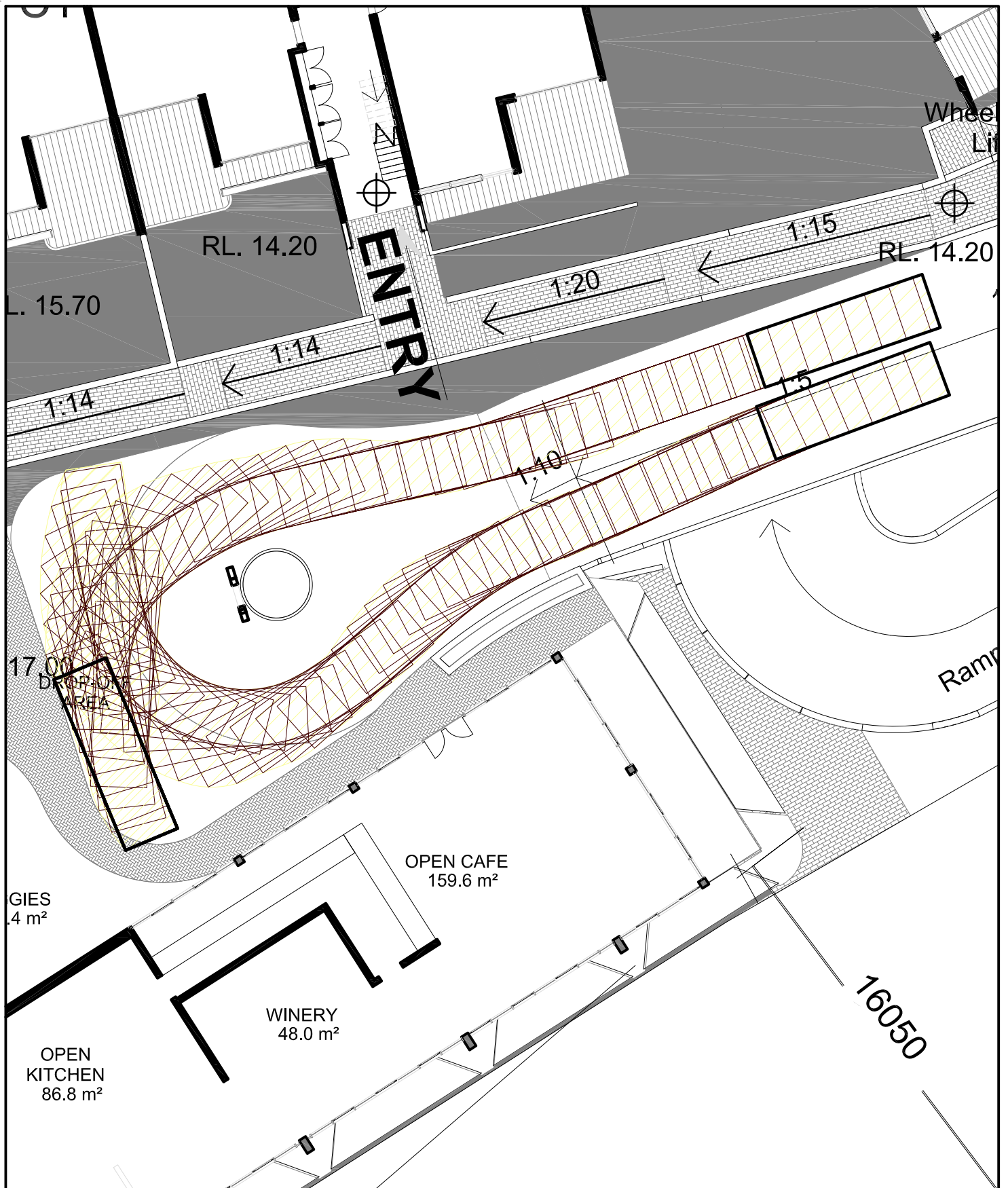
LEGEND

This drawing has been prepared using vehicle modelling computer software AutoTrack V5.00a in conjunction with AutoCAD 2013. The vehicle used is based upon vehicle data provided by Austroads and incorporates a reasonable degree of tolerance. However, it is not possible to account for all vehicle types/characteristics and/or driver ability.



SWEPT PATH ANALYSIS OF A TRUCK AND DOG TRAILER

SP 3



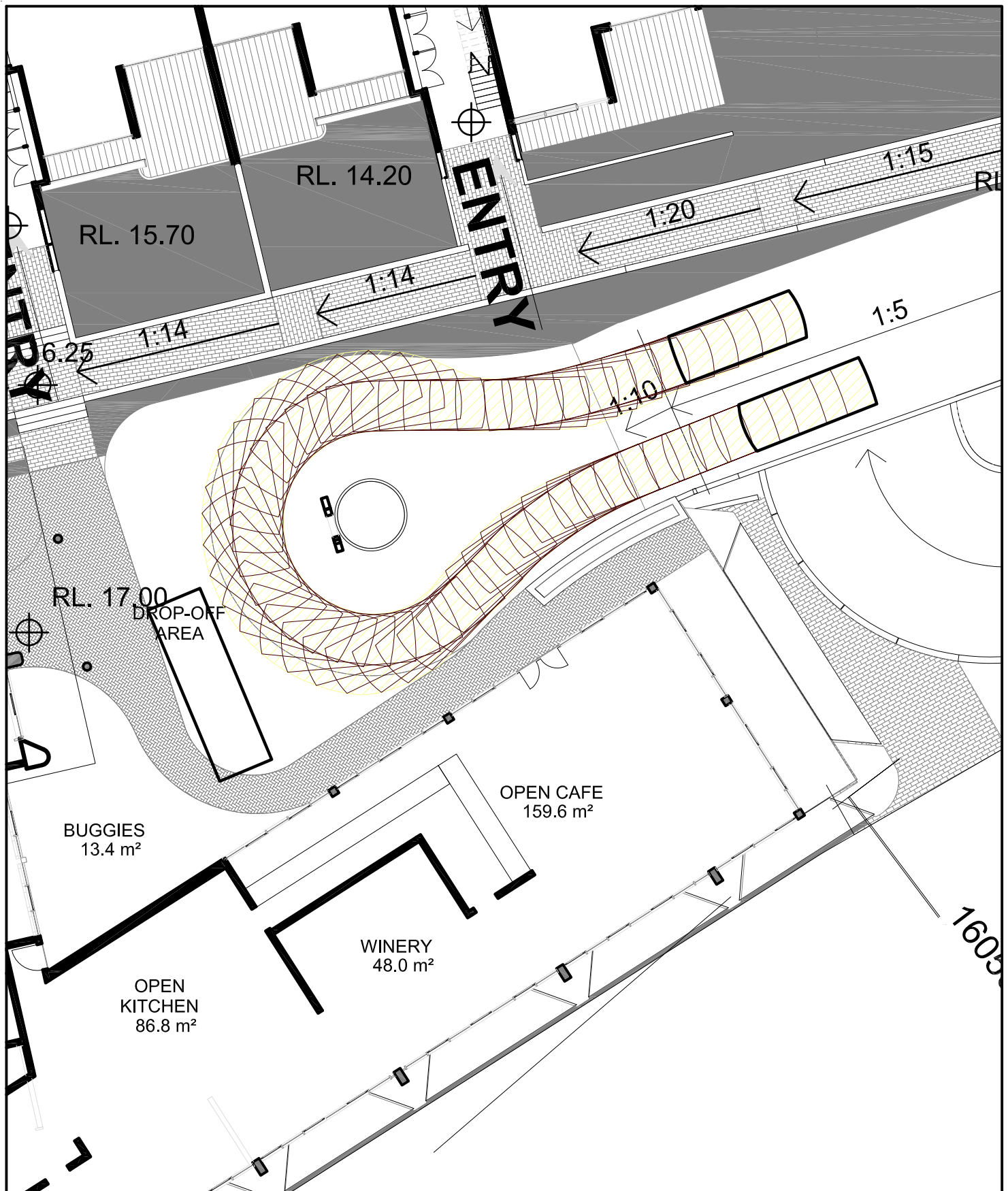
LEGEND

This drawing has been prepared using vehicle modelling computer software AutoTrack V5.00a in conjunction with AutoCAD 2013. The vehicle used is based upon vehicle data provided by Austroads and incorporates a reasonable degree of tolerance. However, it is not possible to account for all vehicle types/characteristics and/or driver ability.



**SWEPT PATH ANALYSIS
OF A 7m MINIBUS ENTERING
AND EXITING THE SITE**

SP 4



LEGEND

This drawing has been prepared using vehicle modelling computer software AutoTrack V5.00a in conjunction with AutoCAD 2013. The vehicle used is based upon vehicle data provided by Austroads and incorporates a reasonable degree of tolerance. However, it is not possible to account for all vehicle types/characteristics and/or driver ability.



**SWEPT PATH ANALYSIS
OF A 99th PERCENTILE
VEHICLE ENTERING AND
EXITING THE SITE PAST A
WAITING MINIBUS**

SP 5

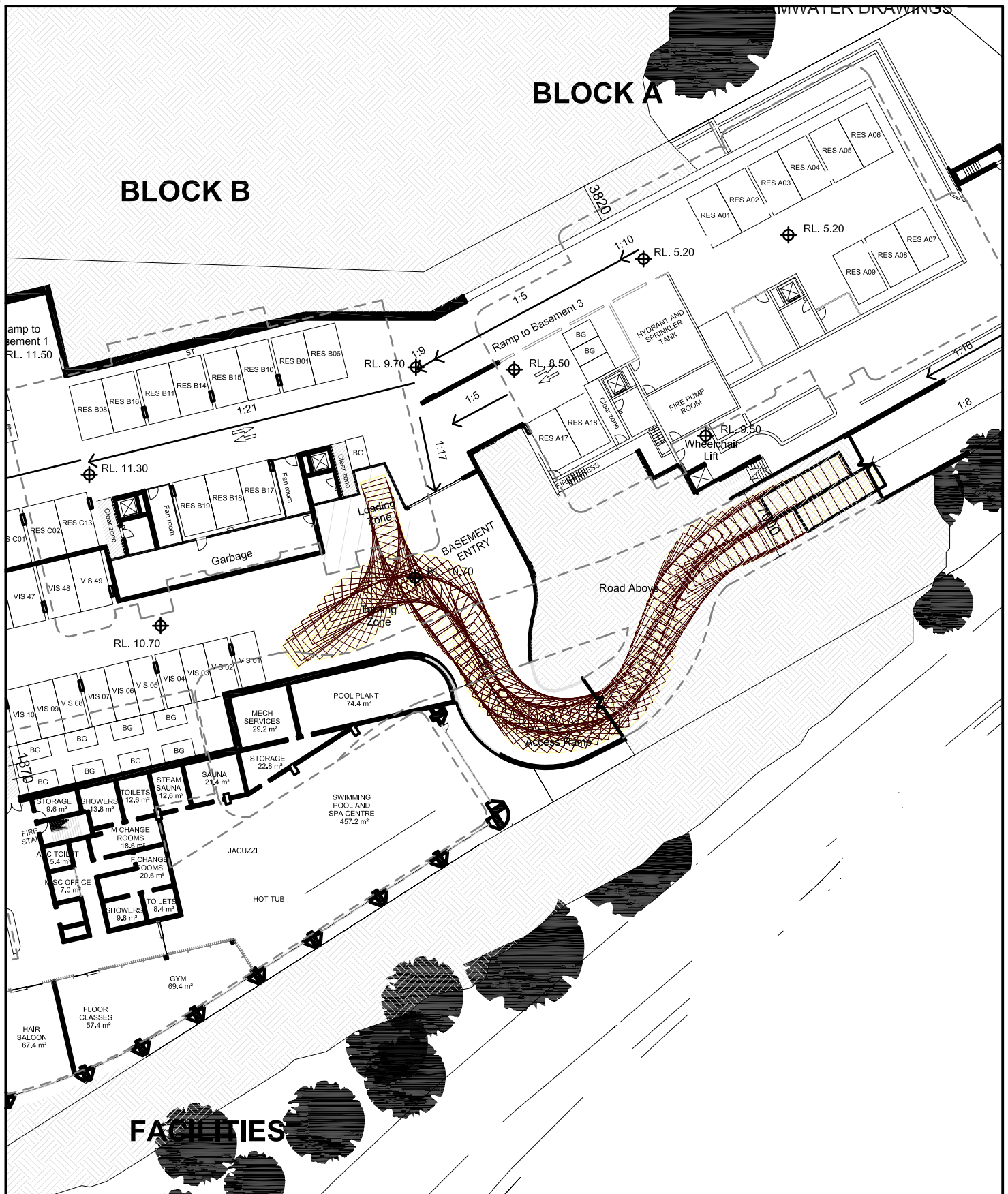
[illegible]

BLOCK A

This drawing has been prepared using vehicle modelling computer software AutoTrack V5.00a in conjunction with AutoCAD 2013. The vehicle used is based upon vehicle data provided by Austroads and incorporates a reasonable degree of tolerance. However, it is not possible to account for all vehicle types/characteristics and/or driver ability.



SP 6



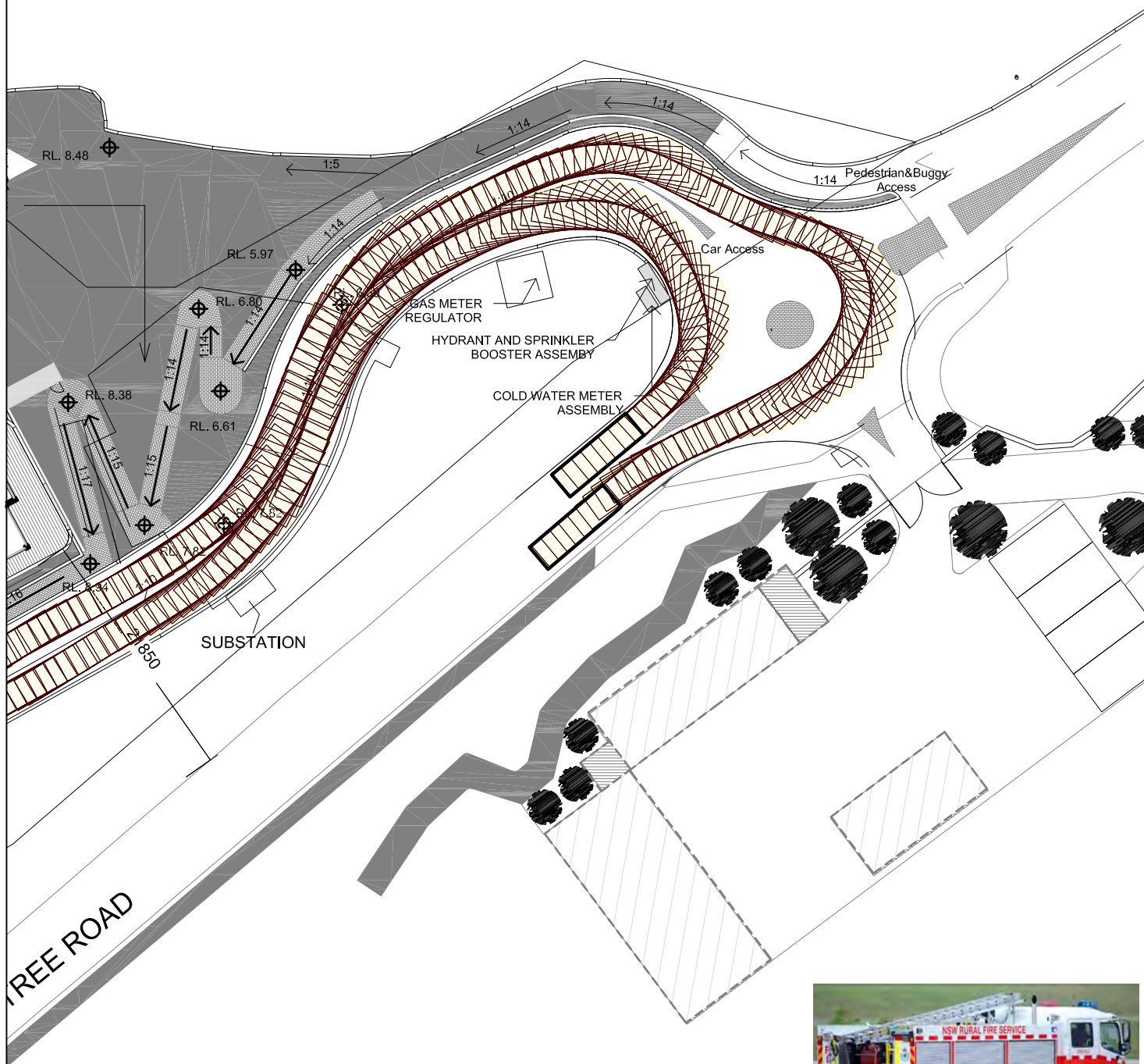
LEGEND

This drawing has been prepared using vehicle modelling computer software AutoTrack V5.00a in conjunction with AutoCAD 2013. The vehicle used is based upon vehicle data provided by Austroads and incorporates a reasonable degree of tolerance. However, it is not possible to account for all vehicle types/characteristics and/or driver ability.



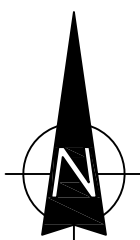
**SWEPT PATH ANALYSIS
OF AN 8.8m RIGID VEHICLE
ENTERING AND EXITING THE
SITE**

SP 7



LEGEND

This drawing has been prepared using vehicle modelling computer software AutoTrack V5.00a in conjunction with AutoCAD 2013. The vehicle used is based upon vehicle data provided by Austroads and incorporates a reasonable degree of tolerance. However, it is not possible to account for all vehicle types/characteristics and/or driver ability.



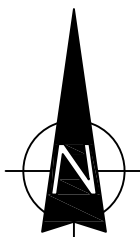
**SWEPT PATH ANALYSIS
OF AN 8.15m FIRE TENDER
ENTERING AND EXITING THE
SITE**

SP 8

DECKA



This drawing has been prepared using vehicle modelling computer software AutoTrack V5.00a in conjunction with AutoCAD 2013. The vehicle used is based upon vehicle data provided by Austroads and incorporates a reasonable degree of tolerance. However, it is not possible to account for all vehicle types/characteristics and/or driver ability.



SP 9