

Traffic Impact Assessment

Proposed 32 Lot Residential Subdivision

Prepared for
Enid Hall

Site address
Lot 4
DP 834254
510 Beach Road, Berry, NSW, 2535

Date
17th February 2020

allen price & scarratts pty ltd
land and development consultants

Surveying



Town Planning



Civil Engineering



Project Management



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Nowra Office: 75 Plunkett Street, Nowra NSW 2541 • PO Box 73, Nowra 2541

Kiama Office: 1/28 Bong Bong Street, Kiama NSW 2533 • PO Box 209, Kiama 2533

tel 02 4421 6544 • fax 02 4422 1821 • email consultants@allenprice.com.au

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Traffic Impact Assessment

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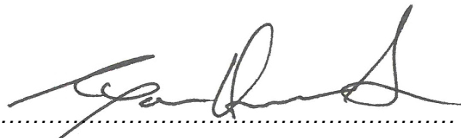
Location

Lot 4
DP 834254
510 Beach Road, Berry, NSW, 2535

Prepared by

Allen, Price & Scarratts Pty Ltd
Land and Development Consultants
75 Plunkett Street
NOWRA NSW 2541

Author



Ryan Howes
Senior Civil Engineer
MIEAust, BEng Civil (Hons 1)

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Table of Revisions

Rev	Date	Details
0	February 2020	Issued for Approval

1.0 Introduction

This report has been prepared to support a Development Application on behalf of Enid Hall over the land known as 510 Beach Road, Berry. The proposed development is a 32 lot residential subdivision.

Allen, Price & Scarratts Pty Ltd have been engaged to prepare this Traffic Impact Assessment to address matters including traffic generation impacts, turning warrant assessment and access/egress including the impacts of this proposal on the local street network.

2.0 Site & Locality

Lot 4 DP 834254 (Approx. 74.85 ha) is located on the southern side of Beach Road approximately 6km east of the Berry township. The land is zoned RU1 Primary Production and E2 Environmental Conservation and the proposed development is located wholly within the RU1 zone.



Figure 1 - Location Plan –510 Beach Road, Berry

Lot 4 currently has a single dwelling with driveway access point as shown in Figure 1 above. The remainder of the site is undulating farmland that crests to sheet drainage to the north-west and north-east.

3.0 Proposed Development

The proposal is to subdivide the land into 32 lots (31 residential lots and 1 residue). To support the development, it is proposed to construct an approximately 1km long internal road that loops to have two intersections with Beach Rd.

From a traffic perspective, the proposal includes:

- Removal of existing driveway access to Beach Road;

- Provision of a public access road;
- Provision two intersections onto Beach Road

A copy of the site plan is provided in the Appendices.

4.0 Traffic Generation Estimations

A comparison table highlighting pre and post development vehicle movements is seen below. Based on RMS Technical Direction TDT 2013/04 (see extract below), the existing dwelling is expected to generate (on average) 7.4 vehicle trips per dwelling per day and 0.78 vehicle trips per dwelling in a peak hour.

Low density residential dwellings

Eleven surveys were conducted in 2010, six within the Sydney urban area and five within regional NSW. The results of the surveys were as follows:

Rates
Daily vehicle trips = 10.7 per dwelling in Sydney, 7.4 per dwelling in regional areas
Weekday average evening peak hour vehicle trips = 0.99 per dwelling in Sydney (maximum 1.39), 0.78 per dwelling in regional areas (maximum 0.90).
Weekday average morning peak hour vehicle trips = 0.95 per dwelling in Sydney (maximum 1.32), 0.71 per dwelling in regional areas (maximum 0.85).
(The above rates do not include trips made internal to the subdivision, which may add up to an additional 25%).

Table 1: "Traffic Generation"

	Total Pre-Development Traffic Generation Per Day	Total Pre-Development Weekday Peaks		Total Post-Development Traffic Generation Per Day	Total Post-Development Weekday Peaks	
		AM	PM		AM	PM
Vehicle Movements	7.4	0.71	0.78	229.4	22.01	24.18

It is clear this is a large traffic increase for the area, however the generation will also be split in direction (eastbound vs westbound) as well as distributed between the two intersections. This will be further examined and compared to existing traffic flow rates in Section 6.0.

5.0 Site Access Location and Sight Distances

The proposed intersection locations are as per the site plan in Appendix A. The governing standard for sight distance at road intersections is Austroads Part 4A. It is also noted that the posted speed limit in this area is 90km/h. Austraffic was engaged to prepare a traffic study (06/02/20 to 12/02/20) with data collection approximately 90m East of the western-most lot boundary (approx. location of the western road intersection). Output data from this study is included in Appendix B showing an 85th percentile speed of 93.3km/h. It can be seen this agrees closely to the posted speed limit and therefore the 90km/h figures in Austroads Part 4A are appropriate for use.

A survey of sight distances from the proposed intersections was undertaken on Wednesday 5th February 2020. It is noted that Austroads Part 4A requires sight distances to be measured 5m from the edge line or 7m from the intersection conflict point (Austroads Part 4A Section 3.2.2). It was found on site however that due to extensive trees/vegetation along the road edge it was not possible to assess the sight distance at

this offset. The sight distance location was therefore shifted to the edge of bitumen to assess the road vertical and horizontal geometry. To provide adequate sight distance at construction stage it is therefore required to clear a triangular area from a) the sight distance point to b) the conflict point to c) the observation point 7m along the proposed internal road from the conflict point . Measurements were taken using a trundle wheel and the sight distance observation markers at the required heights per Figure 3.2 of Austroads Part 4A. Distances were found to be

Western Proposed Intersection

- East – 317m disappearing over crest
- West – measurement terminated at 400m

Eastern Proposed Intersection

- East – 296m to second crest
- West – measurement terminated at 400m

The required sight distance as per Austroads Part 4A Table 3.2 for a 90km/h zone is 214m (226m desirable). Therefore, the proposed intersection locations when appropriate cleared and banks excavated will far exceed the minimum sight distance requirements.



Figure 2 – Western Intersection – Looking East – SISD 317m



Figure 3 – Western Intersection – Looking West – SISD >400m



Figure 4 – Eastern Intersection – Looking East – SISD 296m



Figure 5 – Eastern Intersection – Looking West – SSD >400m

Further to the proposed intersections, the access road has two major bends proposed of radius 99m and 49m. Based on the worst case scenario of 49m radius and containing sight lines within the road reserve the SSD is measured off the Preliminary Engineering Plans in Appendix C as 51.9m. Based on Austroads Part 3 Table 5.5 the desirable minimum SSD for a 50km/h zone is 55m. It is noted this area requires a further grade correction of approximately -8%, yielding a final desirable SSD of 50m. Applying the same procedure to the R99 bend yields a desirable SSD of 52m which is met easily around this large bend. As such it is considered that internal Safe Stopping Distances are satisfactory. Plans showing sight distance arcs around these curves are included in the Appendix C Preliminary Engineering plan set.

6.0 Existing traffic volumes and traffic impacts from the proposed development on the road network

Austraffic was engaged to prepare a traffic study (06/02/20 to 12/02/20) with data collection approximately 90m East of the western-most lot boundary (approx. location of the western road intersection). Output data from this study is included in Appendix B with a summary of the Weekday Average Count data available below.

It is noted that peak vehicle data from Tuesday the 11th is excluded as a statistical outlier (ie peak traffic of 173veh/h). It is suspected that this is due to Coolangatta Rd being closed due to flooding. Further it is found that the distribution split between West and Eastbound is approximately 55:45 respectively. As such the same distribution is applied to the Peak Post-development rates calculated in Section 4.

Table 2: "Traffic Count Data"

Pre-Development	AADT (Two-Way)		898
	Eastbound	AM Peak (veh/h)	27
		PM Peak (veh/h)	29
	Westbound	AM Peak (veh/h)	32
		PM Peak (veh/h)	35
Post-Development	AADT (Two-Way)		1,120 (25% increase)
	Eastbound	AM Peak (veh/h)	37 (37% increase)
		PM Peak (veh/h)	40 (38% increase)
	Westbound	AM Peak (veh/h)	44 (38% increase)
		PM Peak (veh/h)	48 (37% increase)

It can be seen then that there is a statistically significant traffic increase as a result of the proposed development. However, as the existing traffic count and peak rates are so low this is not considered to adversely impact the local road network.

Shoalhaven City Council has advised 3% traffic growth is the adopted typical growth for extra-urban areas. Using this forecast to our traffic generation figures over 10 years yields:

Table 3: "2030 Forecast Traffic Count Data"

2030 Forecast	AADT (Two-Way)		1,505
	Eastbound	AM Peak (veh/h)	50
		PM Peak (veh/h)	68
	Westbound	AM Peak (veh/h)	60
		PM Peak (veh/h)	65

Due to the tourism nature of the Shoalhaven, it is expected that traffic volumes during Easter and Christmas periods will be somewhat higher than the average for the year.

A factor of 10% has been added to peak hour traffic volumes to account for the seasonality factor. It is expected that holiday traffic is more spread out throughout the day and doesn't result in peaks that correspond with the traditional morning and afternoon peaks. Integrating this seasonality into the 2030 Forecast Traffic Count Data yields an ultimate design traffic per Table 4 below.

Table 4: "2030 Forecast Traffic Count Data"

2030 Forecast	AADT (Two-Way)		1,656
	Eastbound	AM Peak (veh/h)	55
		PM Peak (veh/h)	75
	Westbound	AM Peak (veh/h)	66
		PM Peak (veh/h)	72

The above data in Table 4 is what will be used for turning warrant analysis of the future intersections.

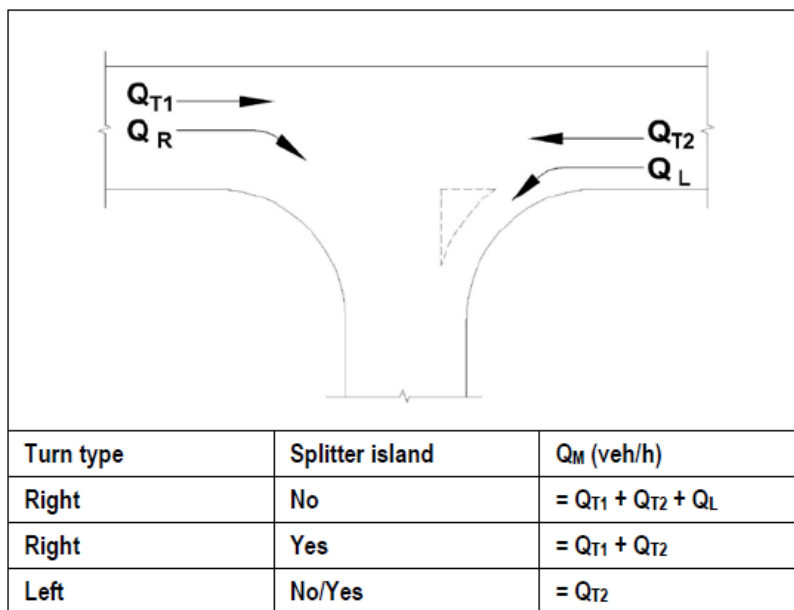
7.0 Turning Warrants Assessment

Austrroads Guide to Traffic Management Part 6 details Intersections, Interchanges and Crossing requirements at roadway intersections. AGTM Part 6 Figure 2.25 lists the turning warrant charts as applicable to unsignalized intersections for various design speeds. As the existing speed zone is 90km/h and V85 is assessed as 93.3km/h it is considered appropriate to adopt 90km/h as the design speed. To understand the distribution of the increased traffic and its impacts on the local road network, some assumptions need to be made about the direction of the various traffic movements that will occur during a peak hour.

The following assumptions are made:

- in the AM peak hour, 75% of vehicles are outbound from the subdivision whilst the remaining 25% of vehicle trips are inbound;
- in the PM peak, 75% of vehicles are inbound to the subdivision whilst the remaining 25% of vehicle trips are outbound;
- 55% of trips will be to/from the west towards Berry with 45% of trips being to/from the east towards Seven Mile Beach, Gerringong and Shoalhaven Heads (per existing distribution)
- Traffic will split at a ratio of 60/40 between the two intersections internally, hence reducing the peak flow into or out of the subdivision by diluting across the nearest intersection for any particular dwelling. As such the peak flows will be assessed for the worst case of 60%

It can be seen that the relevant equations for a two-lane two-way road for right and left turns are:



In the AM peak:

$$Q_{T1} = 55$$

$$Q_{T2} = 66$$

$$Q_R = 2$$

$$Q_L = 2$$

In the PM peak:

$$Q_{T1} = 72$$

$$Q_{T2} = 75$$

$$Q_R = 6$$

$$Q_L = 5$$

Based on the above traffic numbers, the Intersection Warrants require the following intersection treatments:

Left Turn Treatment in the AM Peak

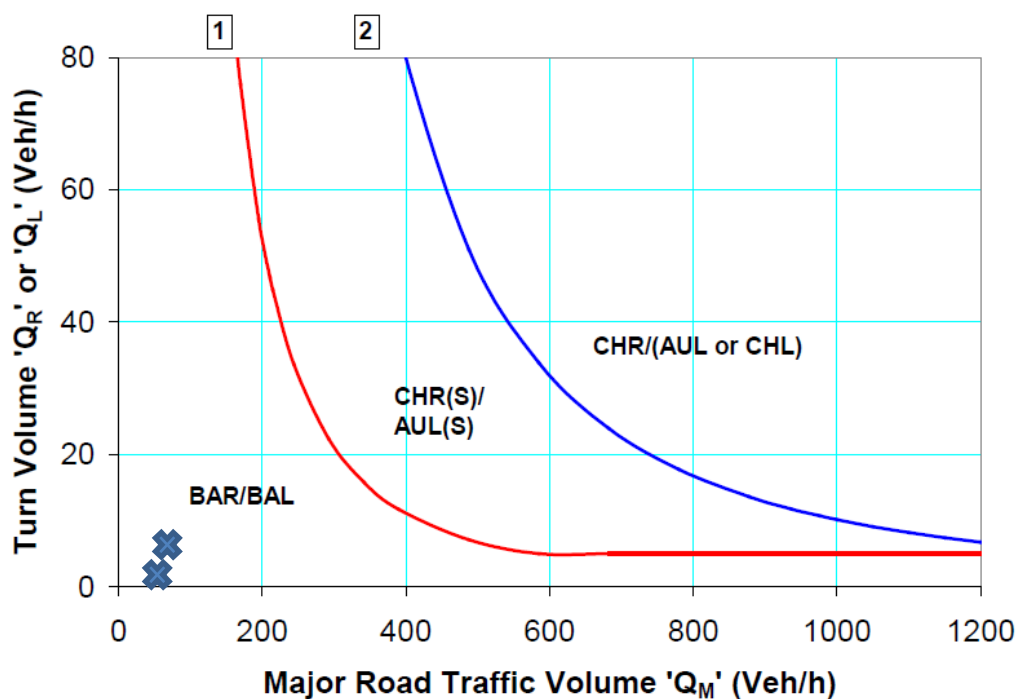
$Q_M = Q_{T2} = 66$ vehicles

$Q_L = 2$ vehicles

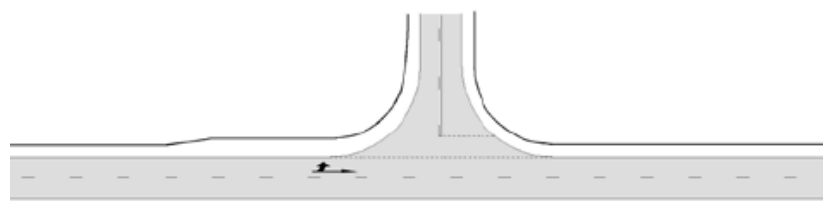
Left Turn Treatment in the PM Peak

$Q_M = Q_{T2} = 75$ vehicles

$Q_L = 5$ vehicles



Due to the low through volumes and low turning volumes, the left turn intersection treatment that is required is a rural BAL configuration as shown on the figure below, taken from Figure 4.1 of *Austrroads Guide to Road Design - Part 4A: Unsignalised and Signalised Intersections*:



Even with a significant increase in both through and turning traffic (even a doubling of both movements), a BAL intersection treatment is adequate for the future subdivision. It is further noted this arrangement is used at several existing access points along Beach Road.

Right Turn Treatment in the AM Peak

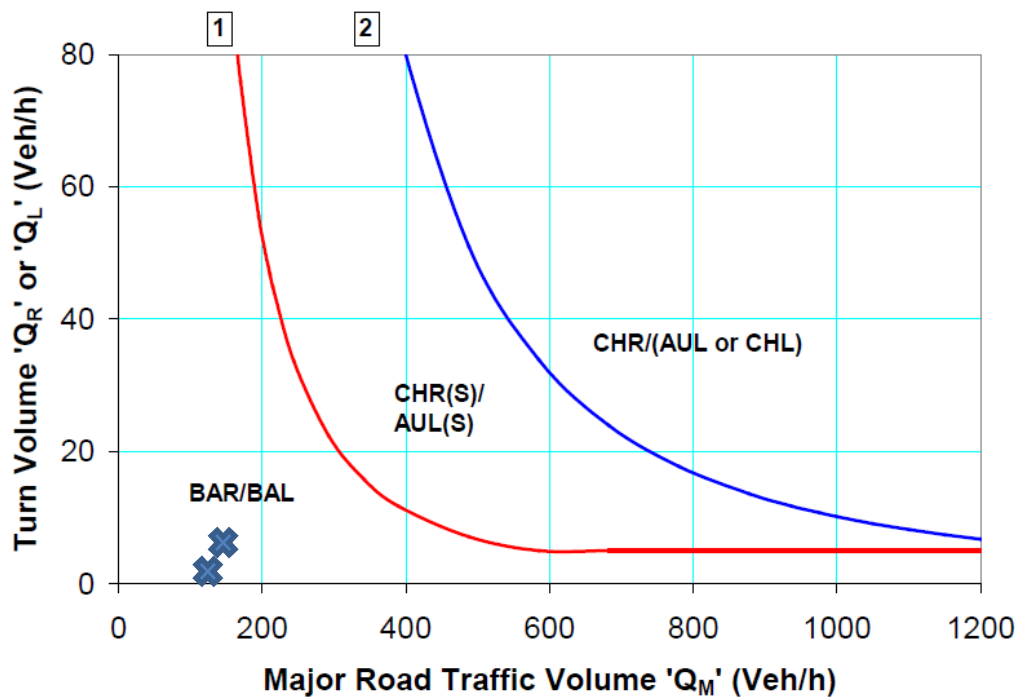
$$Q_M = Q_{T1} + Q_{T2} + Q_L = 123 \text{ vehicles}$$

$$Q_R = 2 \text{ vehicle}$$

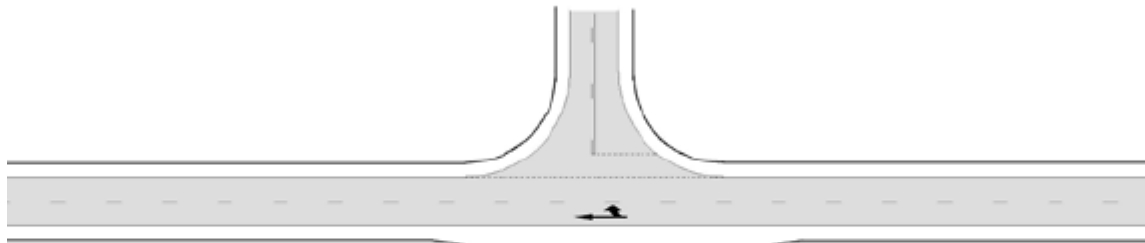
Right Turn Treatment in the PM Peak

$$Q_M = Q_{T1} + Q_{T2} + Q_L = 152 \text{ vehicles}$$

$$Q_R = 6 \text{ vehicles}$$



Due to the low through volumes and low turning volumes, the right turn intersection treatment that is required is a rural BAR configuration as shown on the figure below, taken from Figure 4.1 of *Austroads Guide to Road Design - Part 4A: Unsignalised and Signalised Intersections*:



**Basic Right Turn (BAR)
on the Major Road (Two-Lane, Two-Way Road)**

Even with a significant increase in both through and turning traffic, a BAR intersection treatment is adequate for the future subdivision. It is further noted this arrangement is used at several existing access points along Beach Road.

8.0 Passenger and Cyclist Requirements

External to the subdivision, there are limited pedestrian destinations in the vicinity of the site.

Cyclists do utilise Beach Rd and the narrow (or non-existent) shoulders do provide some safety issues for the road which has a 90km/hour speed limit.

It is proposed that within the subdivision, pedestrians and cyclists would utilise the road carriageway as the road environment will be pedestrian friendly and a “low speed” environment.

Beyond the subdivision boundaries, it is not warranted to create additional pedestrian connections along Beach Rd. It is also not warranted that shoulder widening be carried out to facilitate cyclists beyond the extent of any proposed intersection roadworks.

Where roadworks are undertaken eg intersection upgrades, sufficient shoulder widening to cater for cyclists can be incorporated into the works.

9.0 Signposting and Linemarking

All intersections and internal roads will be signposted and linemarked to the appropriate standards at the time the design is completed.

All sign posting and linemarking will be approved by SCC as the Roads Authority through the Traffic Committee process prior to construction.

10.0 Street Lighting

All intersections and internal roads will be provided with street lighting to the appropriate standards of SCC and Endeavour Energy at the time the design is completed.

11.0 Public Transport Requirements

Shoalbus operates public bus services and school services along Beach Rd.

Public bus route 705 utilises Beach Rd although there are no dedicated bus stops along this section of the route. A map of the 705 route is shown in the figure below.



A timetable for the bus route is also attached below which indicates:

- Three bus services (one in the AM and two in the PM) travel from Nowra to Berry to Gerringong on School Days and School Holiday Days
- Three bus services (one in the AM and two in the PM) travel from Gerringong to Berry to Nowra on School Days and School Holiday Days
- No weekend bus services pass the site
-

Route 705 Nowra to Gerringong/Gerroa/Berry

Monday to Friday						Saturday	
map ref	Route Number	705	705	705	705	705	705
	Trip number	31	32	33	34	35	27
		am	am	pm	pm	pm	am
A	Stocklands	....	....	12:48	H2:33	S2:41	8:30
B	Nowra Bus Terminal	S8:00	H8:45	1:00	H2:40	S3:00	8:35
C	Nowra (Post Office)	S8:02	H8:47	1:02	H2:41	S3:02	8:37
D	Shoalhaven Hospital	....	....	1:04	H2:43	S3:04	8:38
E	Bomaderry TAFE (Hwy)	S8:06	H8:51	1:08	H2:47	S3:08	....
10	Victoria St	S*	H*	*	*	S*	....
11	Albany Lane	S*	H*	*	*	S*	....
12	Berry (Bus Zone)	S9:00	H9:00	1:20	H*	S3:53	9:40
13	North St	S*	H*	*	*	S*	....
14	Gerroa	S9:08	H9:08	1:28	H*	S4:08	....
15	Mayflower	S9:15	H9:15	1:35	H*	....	....
16	Gerringong	S9:19	H9:19	1:39	H*	S4:16	....
	Werri Beach	On request					....

Route 705 Berry/Gerroa/Gerringong to Nowra

Monday to Friday						Saturday	
map ref	Route Number	705	705	705	705	705	705
	Trip number	32	33	34+	27	28	
		am	pm	pm	am	pm	
16	Werri Beach	On request			....	....	
15	Mayflower	#9:15	#1:35	#3:45	....	....	
14	Gerringong	#9:19	#1:39	#3:49	....	....	
13	Gerroa	#9:24	#1:44	#3:54	....	....	
12	North St	#9:34	#1:54	#*	....	....	
11	Berry (Bus Zone)	#9:36	#1:56	#4:00	9:40	12:17	
10	Albany Lane	#9:37	#1:55	#*	....	....	
9	Victoria St	#9:39	#1:57	#*	....	....	
8	Bomaderry TAFE (Hwy)	9:49	2:07	*	....	....	
7	Stocklands	9:55	2:13	*	10:00	12:58	
6	Nowra Bus Terminal	10:01	2:19	*	10:05	1:03	
5	Nowra (Post Office)	On request			On request		
4	Shoalhaven Hospital	On request			On request		

Hail driver for your ride



Please Hail Driver

Hail and ride operates on all our services. All you need to do to catch the bus is to stand in a safe place and clearly signal the driver in a location that is safe for the bus to stop.

Explanations

- # Shoal Shopper on-demand service. Please refer to supplementary information on this page.
- * Bus sets down only as required, does not pick up passengers.
- + Trip 34 goes via Shoalhaven Heads.
- H Bus operates on **School Holidays Days only**.
- S Bus operates on **School Days only**.
- No Service.
- ♿ This service is usually operated by a wheelchair accessible bus.

Shoalbus also operates school services for various local schools that utilise Beach Rd.

Discussions have been held previously with Shoalbus over their requirements for a new subdivision along Beach Rd and the following advice was provided:

- Some services stop on the shoulder of Beach Rd;
- Some services drive into the subdivision;
- Beach Rd has limited opportunities for stopping and buses often stop partially in the roadway;
- At the minimum, a bus layby area should be provided to collect passengers safely off Beach Rd.

It is therefore proposed an included in the attached Appendix C Preliminary Engineering plans that a bus layby on Beach Rd be provided.

12.0 State Environmental Planning Policy (Infrastructure) 2007

State Environmental Planning Policy (Infrastructure) 2007 (SEPP Infrastructure) specifies the following:

104 Traffic-generating development

(1) This clause applies to development specified in Column 1 of the Table to Schedule 3 that involves:

- (a) new premises of the relevant size or capacity, or*
- (b) an enlargement or extension of existing premises, being an alteration or addition of the relevant size or capacity.*

(2) In this clause, relevant size or capacity means:

- (a) in relation to development on a site that has direct vehicular or pedestrian access to any road—the size or capacity specified opposite that development in Column 2 of the Table to Schedule 3, or*
- (b) in relation to development on a site that has direct vehicular or pedestrian access to a classified road or to a road that connects to a classified road where the access (measured along the alignment of the connecting road) is within 90m of the connection—the size or capacity specified opposite that development in Column 3 of the Table to Schedule 3.*

(3) Before determining a development application for development to which this clause applies, the consent authority must:

- (a) give written notice of the application to the RTA within 7 days after the application is made, and*
- (b) take into consideration:*
 - (i) any submission that the RTA provides in response to that notice within 21 days after the notice was given (unless, before the 21 days have passed, the RTA advises that it will not be making a submission), and*
 - (ii) the accessibility of the site concerned, including:*
 - (A) the efficiency of movement of people and freight to and from the site and the extent of multi-purpose trips, and*
 - (B) the potential to minimise the need for travel by car and to maximise movement of freight in containers or bulk freight by rail, and*
 - (iii) any potential traffic safety, road congestion or parking implications of the development.*

(4) The consent authority must give the RTA a copy of the determination of the application within 7 days after the determination is made.

Schedule 3 of the SEPP contains the following table:

Column 1	Column 2	Column 3
Purpose of development Note: The development may be the erection of new premises or the enlargement or extension of existing premises	Size or capacity-site with access to any road	Size or capacity-site with access to classified road or to road that connects to classified road (if access within 90m of connection, measured along alignment of connecting road)
Subdivision of Land	200 or more allotments including opening of a public road (N/A – development does not exceed 200 lots)	50 or more allotments (N/A – development does not exceed 50 lots and not fronting classified road)

The proposed development does not meet any of the conditions in the above table therefore a DA is not required to be submitted to the RTA (RMS).

12.0 Conclusions

The proposed development will generate statistically significant additional traffic movements to and from the site. It is noted, however, that as the traffic volumes are already quite low it is not considered to be a significant impact to the local road network.

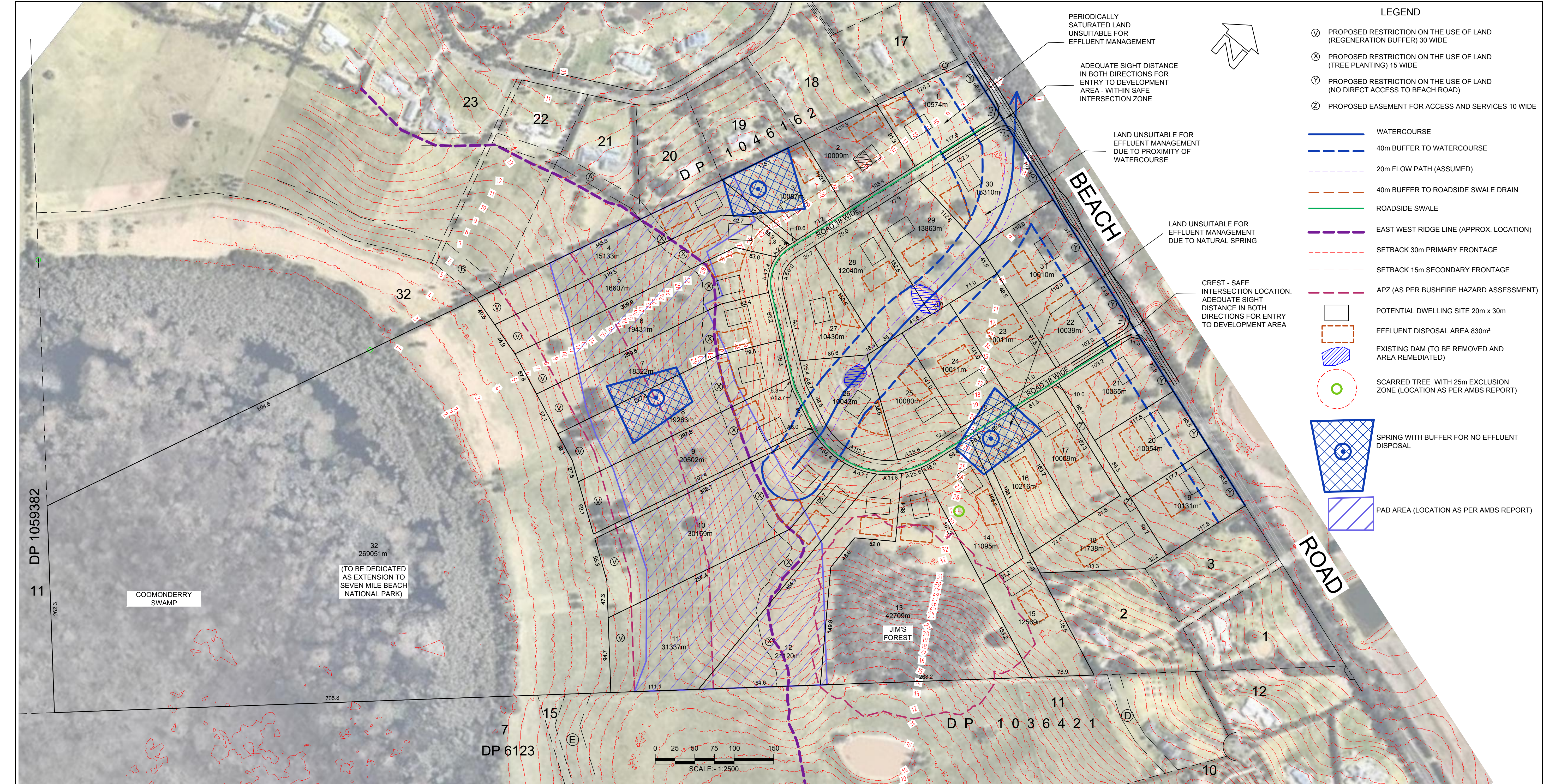
The development is not classified as Traffic Generating (under SEPP Infrastructure 2007) and a future DA is not required to be referred to the RMS for comment prior to determination.

Detailed assessment of council DCP chapters will be included in the Statement of Environmental Effects.

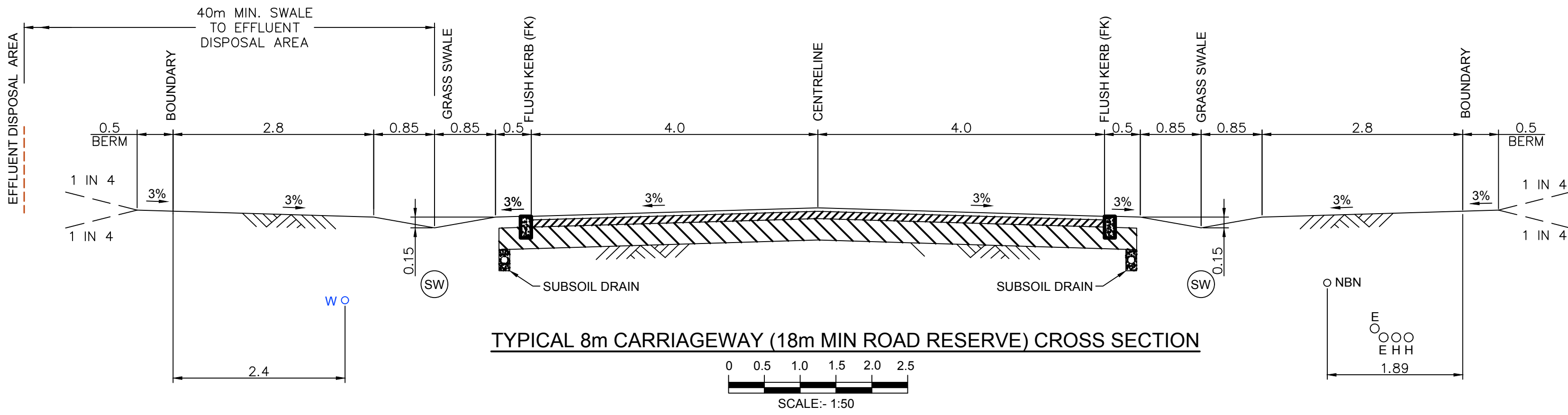
A BAR/BAL arrangement will be required at both intersections onto Beach Road. Further, a bus bay is proposed along the Beach Road alignment integrated with the BAR/BAL intersection upgrades in accordance with the original re-zoning proposal. Preliminary layouts are included in Appendix C

In conclusion it is considered the proposed development will not generate a level of traffic that will adversely impact the local road network. Furthermore, it will provide suitable and safe access and egress for the traffic that it generates.

Appendix A Site Plan



- LEGEND**
- PROPOSED RESTRICTION ON THE USE OF LAND (REGENERATION BUFFER) 30 WIDE
 - PROPOSED RESTRICTION ON THE USE OF LAND (TREE PLANTING) 15 WIDE
 - PROPOSED RESTRICTION ON THE USE OF LAND (NO DIRECT ACCESS TO BEACH ROAD)
 - PROPOSED EASEMENT FOR ACCESS AND SERVICES 10 WIDE
 - WATERCOURSE
 - 40m BUFFER TO WATERCOURSE
 - 20m FLOW PATH (ASSUMED)
 - 40m BUFFER TO ROADSIDE SWALE DRAIN
 - ROADSIDE SWALE
 - EAST WEST RIDGE LINE (APPROX. LOCATION)
 - SETBACK 30m PRIMARY FRONTAGE
 - SETBACK 15m SECONDARY FRONTAGE
 - APZ (AS PER BUSHFIRE HAZARD ASSESSMENT)
 - POTENTIAL DWELLING SITE 20m x 30m
 - EFFLUENT DISPOSAL AREA 830m²
 - EXISTING DAM (TO BE REMOVED AND AREA REMEDIATED)
 - SCARRED TREE WITH 25m EXCLUSION ZONE (LOCATION AS PER AMBS REPORT)
 - SPRING WITH BUFFER FOR NO EFFLUENT DISPOSAL
 - PAD AREA (LOCATION AS PER AMBS REPORT)



- EXISTING EASEMENTS - ADJACENT SUBDIVISION**
- (A) RESTRICTION ON THE USE OF LAND (TREE PLANTING) 15 WIDE (DP 1046162)
 - (B) RESTRICTION ON THE USE OF LAND (REGENERATION BUFFER) 30 WIDE (DP 1046162)
 - (C) RESTRICTION ON THE USE OF LAND (REGENERATION BUFFER) 8 WIDE & VARIABLE (DP 1046162)
 - (D) RESTRICTION ON THE USE OF LAND (TREE PLANTING) 15 WIDE (DP 1036421)
 - (E) RESTRICTION ON THE USE OF LAND (REGENERATION BUFFER) 30 WIDE (DP 1036421)

PROPOSED SUBDIVISION



M:\Projects\20000\27000s\N27074\Drawings\N27074-01 Proposed Site Plan And Subdivision.dwg

NOTE: CONTOURS HAVE BEEN DERIVED FROM DATA AVAILABLE FROM NSW GOVT SPATIAL SERVICES AND SHOULD BE VIEWED AS APPROXIMATE ONLY AND SUBJECT TO SURVEY.

CONTOUR INTERVAL - 1.0m

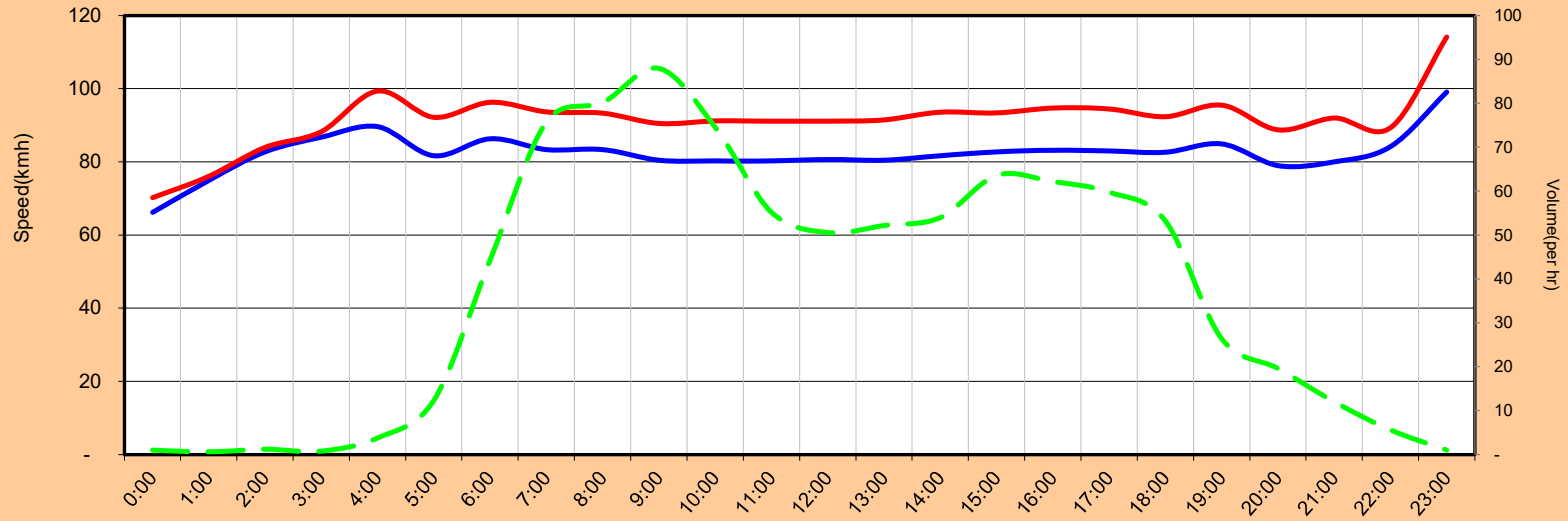
RATIO: AS NOTED (AT A1 ORIGINAL)	DATUM: AUSTRALIAN HEIGHT DATUM	SURVEY	APS	REV	DESCRIPTION	BY	DATE	 allen price & scarratts pty ltd land and development consultants Nowra Branch: 75 Plunkett Street, Nowra NSW 2541 Kiama Branch: 5/125 Terralong Street, Kiama NSW 2533 phone: (02) 4421 6544 fax: (02) 4422 1821 consultants@allenprice.com.au www.allenprice.com.au	PROPOSED RESIDENTIAL SUBDIVISION OVER LOT 4 DP 834254 AT 510 BEACH ROAD, BERRY FOR ENID HALL (RICHARD HALL AND ROBYN BATES)	DRAWING STATUS PRELIMINARY NOT TO BE USED FOR CONSTRUCTION PURPOSES		
	ORIGIN: SSM RL	DESIGN								DRAWING NUMBER N27074-01	SHEET 2 OF 2	REVISION P0
		DRAWN	DS									
		CHECK'D	MP									
		DATE OF PLAN: NOVEMBER 2018										

Appendix B
Austraffic Study Extracts

Volume & Speed Data (All Vehicles)

Average Speed 82.2
85th%ile 93.3
Vehicles/Day 898

Direction: Two ways
Day: WeekDay Avg
Week: Current



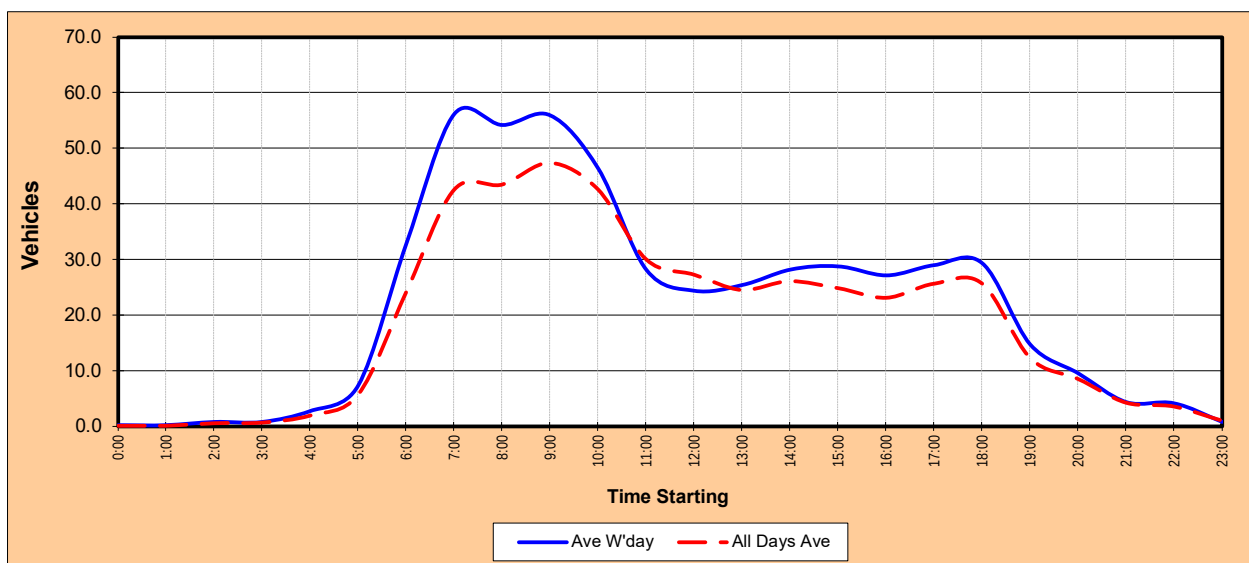
510 Beach Road

Berry

All Vehicles - Ave. Speed All Vehicles - 85th%ile Speed Volume per Period

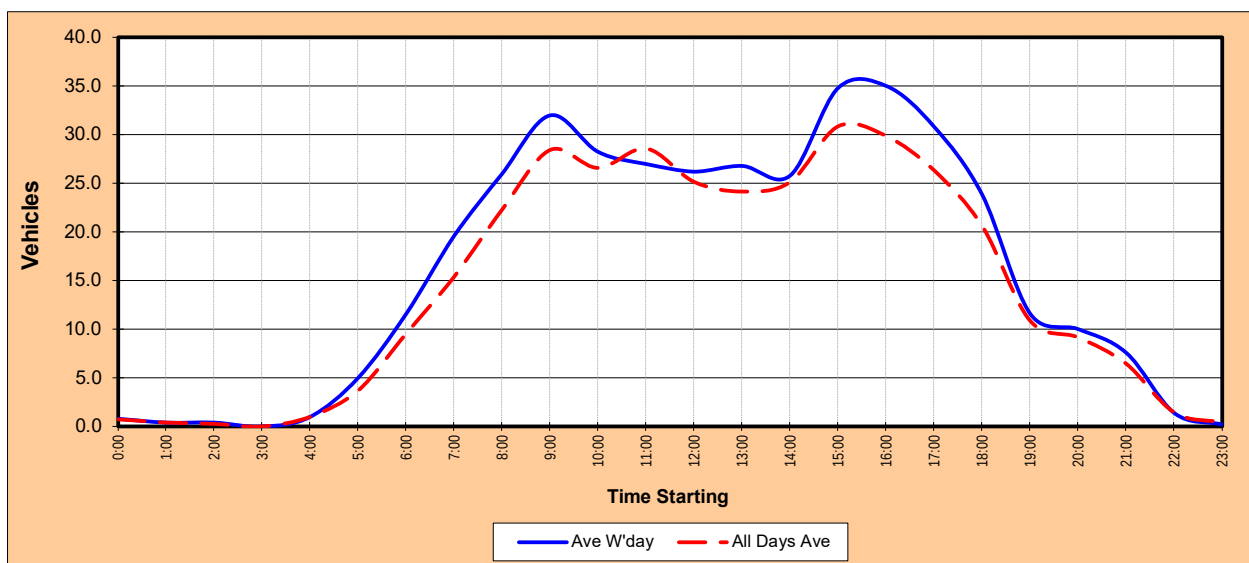
Road	510 Beach Road	Average Weekday	512
Location		All Day Average	447
Suburb	Berry	Weekday Heavy's	21.2%
Site No.	8986_1	All Day Heavy's	20.4%
Start Date	Thursday 06/02/2020		
Direction	Eastbound		

Starting Time	Day of Week							Ave W'day	All Days Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	10-Feb	11-Feb	12-Feb	6-Feb	7-Feb	8-Feb	9-Feb		
AM Peak	34	173	32	35	33	38	31		
PM Peak	59	38	27	33	37	35	39		
0:00	1	0	0	0	0	0	0	0	0
1:00	0	1	0	0	0	0	0	0	0
2:00	0	2	1	1	0	0	0	1	1
3:00	1	3	0	0	0	1	0	1	1
4:00	3	8	1	1	1	0	0	3	2
5:00	3	23	7	2	2	2	1	7	6
6:00	11	104	15	19	15	2	3	33	24
7:00	27	173	30	25	26	12	5	56	43
8:00	34	150	32	35	20	21	13	54	44
9:00	26	161	29	31	33	23	29	56	47
10:00	21	123	29	32	27	37	29	46	43
11:00	22	33	29	29	28	38	31	28	30
12:00	15	37	22	29	19	30	39	24	27
13:00	13	36	27	33	18	35	10	25	25
14:00	22	30	23	29	37	23	19	28	26
15:00	28	38	23	31	24	14	16	29	25
16:00	29	35	17	30	25	14	12	27	23
17:00	59	22	16	30	18	24	11	29	26
18:00	57	19	16	25	30	20	13	29	26
19:00	34	11	13	10	6	9	3	15	12
20:00	22	11	5	5	5	6	6	10	9
21:00	15	2	1	2	2	6	2	4	4
22:00	9	0	4	5	3	4	0	4	4
23:00	2	0	0	0	2	3	0	1	1
Total	454	1022	340	404	341	324	242	512	447
% Heavy's	22.9%	18.6%	25.6%	20.5%	23.2%	16.7%	17.4%	21.2%	20.4%



Road	510 Beach Road		
Location		Average Weekday	386
Suburb	Berry	All Day Average	347
Site No.	8986_1	Weekday Heavy's	18.3%
Start Date	Thursday 06/02/2020	All Day Heavy's	16.9%
Direction	Westbound		

Starting Time	Day of Week							Ave W'day	All Days Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	10-Feb	11-Feb	12-Feb	6-Feb	7-Feb	8-Feb	9-Feb		
AM Peak	39	56	23	29	28	37	28		
PM Peak	54	50	25	33	34	31	25		
0:00	2	2	0	0	0	0	1	1	1
1:00	2	0	0	0	0	0	1	0	0
2:00	1	1	0	0	0	0	0	0	0
3:00	0	0	0	0	0	0	0	0	0
4:00	0	1	1	1	2	1	1	1	1
5:00	6	7	6	4	2	0	1	5	4
6:00	15	18	11	9	5	6	3	12	10
7:00	19	28	23	16	12	5	5	20	15
8:00	39	35	21	21	14	17	9	26	22
9:00	29	56	18	29	28	17	22	32	28
10:00	19	56	20	23	23	24	21	28	27
11:00	22	48	21	25	19	37	28	27	29
12:00	23	42	17	27	22	20	25	26	25
13:00	22	37	25	20	30	25	10	27	24
14:00	27	40	19	21	22	31	16	26	25
15:00	37	50	20	33	34	23	19	35	31
16:00	44	44	24	30	33	27	7	35	30
17:00	54	42	14	22	22	20	10	31	26
18:00	49	19	18	19	14	14	11	24	21
19:00	26	10	7	9	6	11	7	12	11
20:00	16	8	6	13	7	5	9	10	9
21:00	18	4	3	6	7	1	6	8	6
22:00	2	1	0	1	3	1	2	1	1
23:00	1	0	0	0	0	1	1	0	0
Total	473	549	274	329	305	286	215	386	347
% Heavy's	19.0%	19.3%	24.1%	14.6%	14.1%	9.1%	14.9%	18.3%	16.9%



Appendix C

Preliminary Engineering Plans

PROPOSED RESIDENTIAL SUBDIVISION
PRELIMINARY PLANS
510 BEACH ROAD, BERRY



DRAWING SCHEDULE

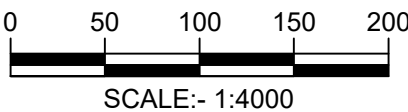
N27074-101	COVER SHEET
N27074-102	GENERAL ARRANGEMENT LAYOUT PLAN SHEET 01
N27074-103	GENERAL ARRANGEMENT LAYOUT PLAN SHEET 02
N27074-104	ROAD LONG SECTIONS PLAN SHEET 01
N27074-105	ROAD LONG SECTIONS PLAN SHEET 02
N27074-106	ROAD LONG SECTIONS PLAN SHEET 03
N27074-107	ROAD LONG SECTIONS PLAN SHEET 04
N27074-108	TYPICAL ROAD CROSS SECTIONS PLAN
N27074-109	STORMWATER DRAINAGE LAYOUT PLAN SHEET 01
N27074-110	STORMWATER DRAINAGE LAYOUT PLAN SHEET 02
N27074-111	INTERSECTION AND BUS BAY LAYOUT PLAN
N27074-112	INTERSECTION 01 LAYOUT PLAN
N27074-113	INTERSECTION 02 LAYOUT PLAN
N27074-114	SIGHT LINE 01 LAYOUT PLAN
N27074-115	SIGHT LINE 02 LAYOUT PLAN
N27074-116	INTERSECTION 01 VEHICLE MOVEMENT PLAN
N27074-117	INTERSECTION 02 VEHICLE MOVEMENT PLAN

BEWARE!

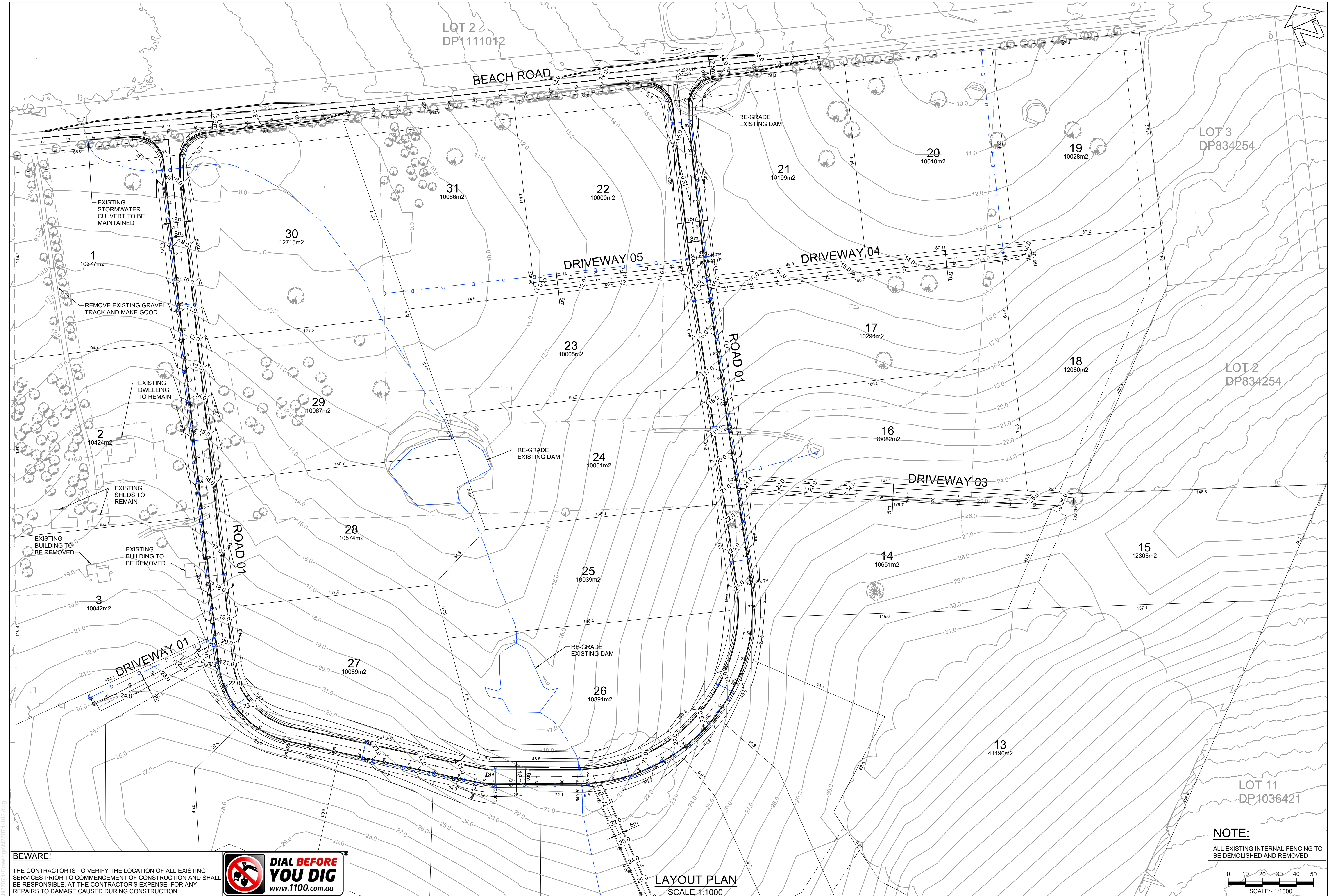
THE CONTRACTOR IS TO VERIFY THE LOCATION OF ALL EXISTING SERVICES PRIOR TO COMMENCEMENT OF CONSTRUCTION AND SHALL BE RESPONSIBLE, AT THE CONTRACTOR'S EXPENSE, FOR ANY REPAIRS TO DAMAGE CAUSED DURING CONSTRUCTION.



SITE LAYOUT PLAN
SCALE 1:4000



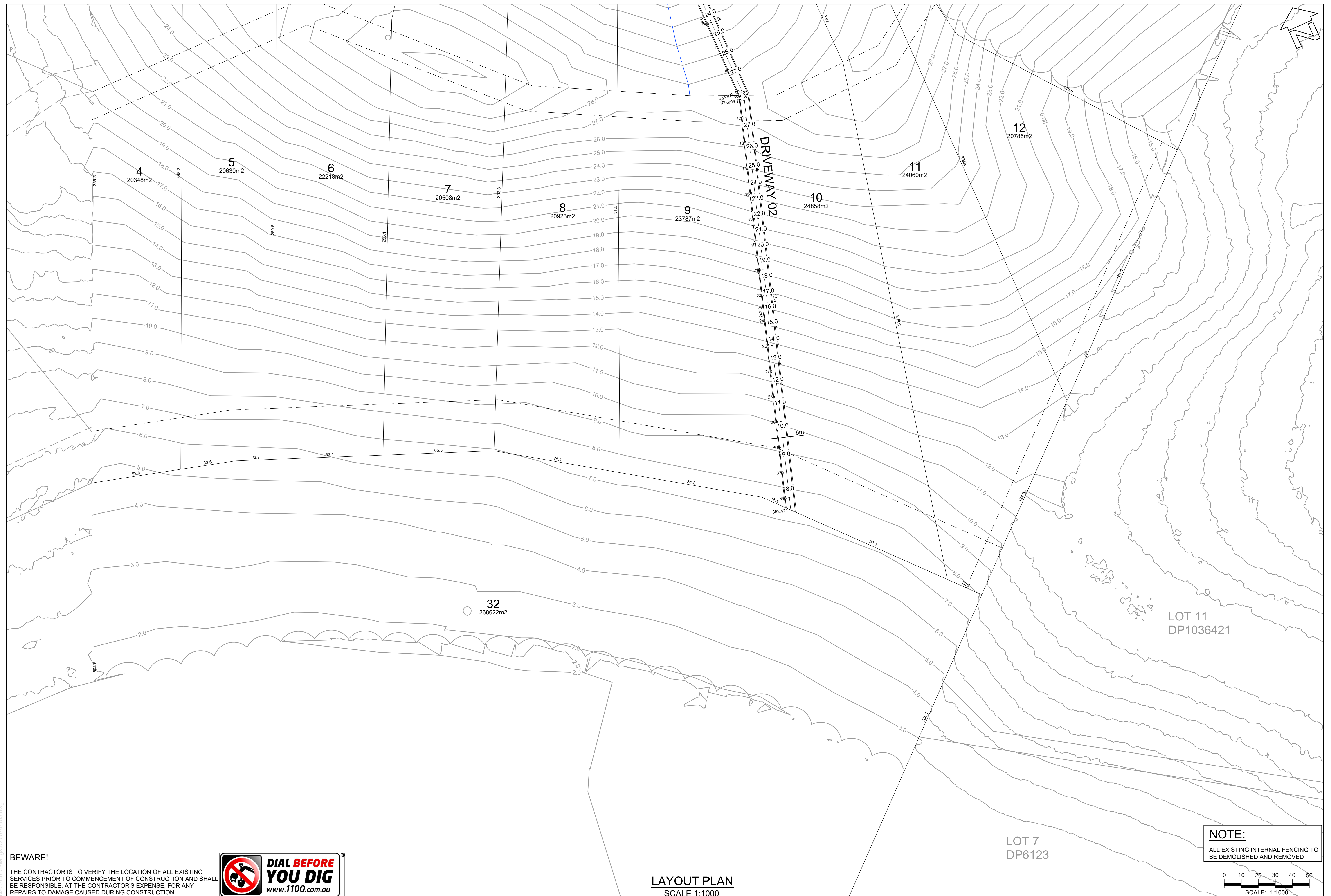
RATIO: 1:4000 (AT A1 ORIGINAL)	DATUM: AUSTRALIAN HEIGHT DATUM ORIGIN: SSM RL DATE OF PLAN: FEBRUARY 2020	SURVEY	APS	REV	DESCRIPTION	BY	DATE	 allen price & scarratts pty ltd land and development consultants Nowra Office: 75 Plunkett Street, Nowra NSW 2541 Kiama Office: 1/28 Bong Bong Street, Kiama NSW 2533 phone: (02) 4421 6544 consultants@allenprice.com.au www.allenprice.com.au	COVER SHEET AND INDEX PLAN PROPOSED RESIDENTIAL SUBDIVISION OVER LOT 4 DP 834254 AT 510 BEACH ROAD, BERRY FOR ENID HALL (RICHARD HALL AND ROBYN BATES)	DRAWING STATUS PRELIMINARY NOT TO BE USED FOR CONSTRUCTION PURPOSES		
		DESIGN	CJG							DRAWING NUMBER N27074-101	SHEET OF 17	REVISION P0



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RATIO: 1:1000 (AT A1 ORIGINAL)		DATUM: AUSTRALIAN HEIGHT DATUM ORIGIN: SSM RL DATE OF PLAN: FEBRUARY 2020		SURVEY DESIGN DRAWN CHECK'D	APS CJG CJG MP	REV =	DESCRIPTION	BY	DATE	allen price & scarratts pty ltd land and development consultants Nowra Office: 75 Plunkett Street, Nowra NSW 2541 Kiama Office: 1/28 Bong Bong Street, Kiama NSW 2533 phone: (02) 4421 6544 consultants@allenprice.com.au www.allenprice.com.au		GENERAL ARRANGEMENT LAYOUT PLAN SHEET 01 PROPOSED RESIDENTIAL SUBDIVISION OVER LOT 4 DP 834254 AT 510 BEACH ROAD, BERRY FOR ENID HALL (RICHARD HALL AND ROBYN BATES)		DRAWING STATUS PRELIMINARY NOT TO BE USED FOR CONSTRUCTION PURPOSES		DRAWING NUMBER N27074-102	SHEET OF 2 17	REVISION P0
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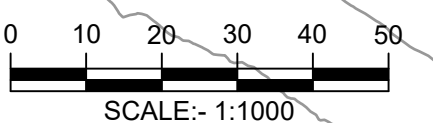
BEWARE!

THE CONTRACTOR IS TO VERIFY THE LOCATION OF ALL EXISTING SERVICES PRIOR TO COMMENCEMENT OF CONSTRUCTION AND SHALL BE RESPONSIBLE, AT THE CONTRACTOR'S EXPENSE, FOR ANY REPAIRS TO DAMAGE CAUSED DURING CONSTRUCTION.



LAYOUT PLAN
SCALE 1:1000

NOTE:
ALL EXISTING INTERNAL FENCING TO
BE DEMOLISHED AND REMOVED

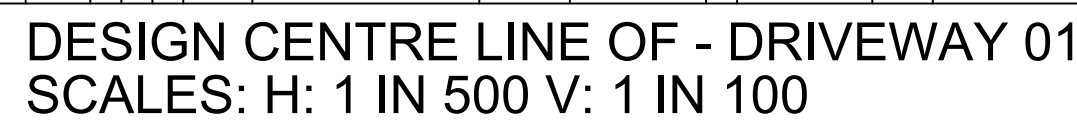


RATIO: 1:1000 (AT A1 ORIGINAL)	DATUM: AUSTRALIAN HEIGHT DATUM	SURVEY	APS	REV	DESCRIPTION	BY	DATE	 allen price & scarratts Pty Ltd land and development consultants Nowra Office: 75 Plunkett Street, Nowra NSW 2541 Kiama Office: 1/28 Bong Bong Street, Kiama NSW 2533 phone: (02) 4421 6544 consultants@allenprice.com.au www.allenprice.com.au	GENERAL ARRANGEMENT LAYOUT PLAN SHEET 02 PROPOSED RESIDENTIAL SUBDIVISION OVER LOT 4 DP 834254 AT 510 BEACH ROAD, BERRY FOR ENID HALL (RICHARD HALL AND ROBYN BATES)	DRAWING STATUS PRELIMINARY NOT TO BE USED FOR CONSTRUCTION PURPOSES		
	ORIGIN: SSM RL	DESIGN	CJG							DRAWING NUMBER N27074-103	SHEET 3 OF 17	REVISION P0
	DATE OF PLAN: FEBRUARY 2020		DRAWN	CJG								
			CHECK'D	MP								



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SURVEY	APS
DESIGN	CJG
DRAWN	CJG
CHECK'D	MP

aps allen price & scarratts Pty Ltd
land and development consultants
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Kiama Office: 1/28 Bong Bong Street, Kiama NSW 2533
phone: (02) 4421 6544
consultants@allenprice.com.au www.allenprice.com.au

DRAWING STATUS		
PRELIMINARY NOT TO BE USED FOR CONSTRUCTION PURPOSES		
DRAWING NUMBER	SHEET	REVISION
N27074-105	5	P0
	OF 17	

	R.L. 3.30	-4.88%	
DESIGN CENTRE LINE	8.476	7.744	7.382
EXISTING LEVELS	8.456	7.747	7.382
CHAINAGE	330.000	345.000	362.424

DESIGN CENTRE LINE OF - DRIVEWAY 02
 SCALES: H: 1 IN 500 V: 1 IN 100

CHAINAGE	EXISTING LEVELS	DESIGN CENTRE LINE
0.000	21.014	20.925
4.080	21.271	20.851
4.081	21.271	20.851
5.362	21.321	20.839
6.581	21.403	20.850
9.081	21.541	20.937
15.000	21.804	21.248
30.000	22.614	22.036
45.000	23.367	22.824
55.000	23.767	23.349
60.000	23.938	23.597
75.000	24.423	24.162
90.000	24.803	24.460
95.000	24.785	24.500
105.000	24.767	24.550
120.000	24.738	24.625
135.000	24.743	24.700
150.000	24.807	24.775
165.000	24.911	24.850
170.000	24.999	24.875
180.000	25.221	25.073
185.000	25.382	25.284
195.000	25.929	25.928
200.000	26.006	26.361
202.465	26.593	26.593

DESIGN CENTRE LINE OF - DRIVEWAY 03
 SCALES: H: 1 IN 500 V: 1 IN 100

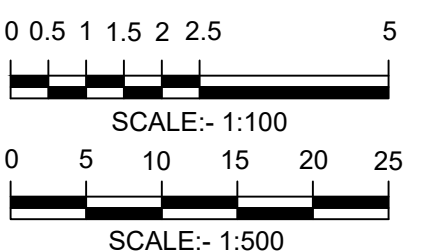
CHAINAGE	EXISTING LEVELS	DESIGN CENTRE LINE
0.00	19.475	20.280
4.207	19.807	20.170
8.432	19.904	20.154
12.658	20.004	20.171
16.884	20.202	20.306
21.110	20.660	20.775
25.336		
29.562		
33.788	21.828	21.989
38.014		
42.240	23.104	23.202
46.466		
50.692	24.380	24.416
54.918		
59.144	25.627	25.630
63.370		
67.596	26.875	26.844
71.822		
76.048	27.125	27.086
80.274		
84.500		
88.726	27.601	27.651
92.952	27.622	27.673
97.178	27.675	27.700
101.404	27.678	27.700
105.630	27.706	27.691
109.856		
114.082		
118.308	27.451	27.328
122.534		
126.760	27.211	27.115
130.986		
135.212		
139.438	26.330	26.245
143.664		
147.890	26.249	26.166
152.116		
156.342		
160.568		
164.794	25.210	24.947
169.020	25.098	24.853
173.246		
177.472		
181.698	21.612	21.679
185.924		
190.150		
194.376	19.847	20.043
198.602		
202.828		
207.054	18.289	18.408
211.280		
215.506		
219.732	16.812	16.772
223.958		
228.184		
232.410		
236.636	15.335	15.136
240.862		
245.088		
249.314	13.867	13.631
253.540		
257.766		
261.992	12.608	12.389
266.218		
270.444		
274.670	11.372	11.278
278.896		
283.122		
287.348	10.650	10.611
291.574		
295.800	10.169	10.182
299.026		
303.252		
307.478	9.447	9.595
311.704	9.160	9.242
315.930		
320.156		
324.382	8.738	8.768
328.608		
332.834	8.456	8.476

DESIGN CENTRE LINE OF - DRIVEWAY 02
 SCALES: H: 1 IN 500 V: 1 IN 100

BEWARE!

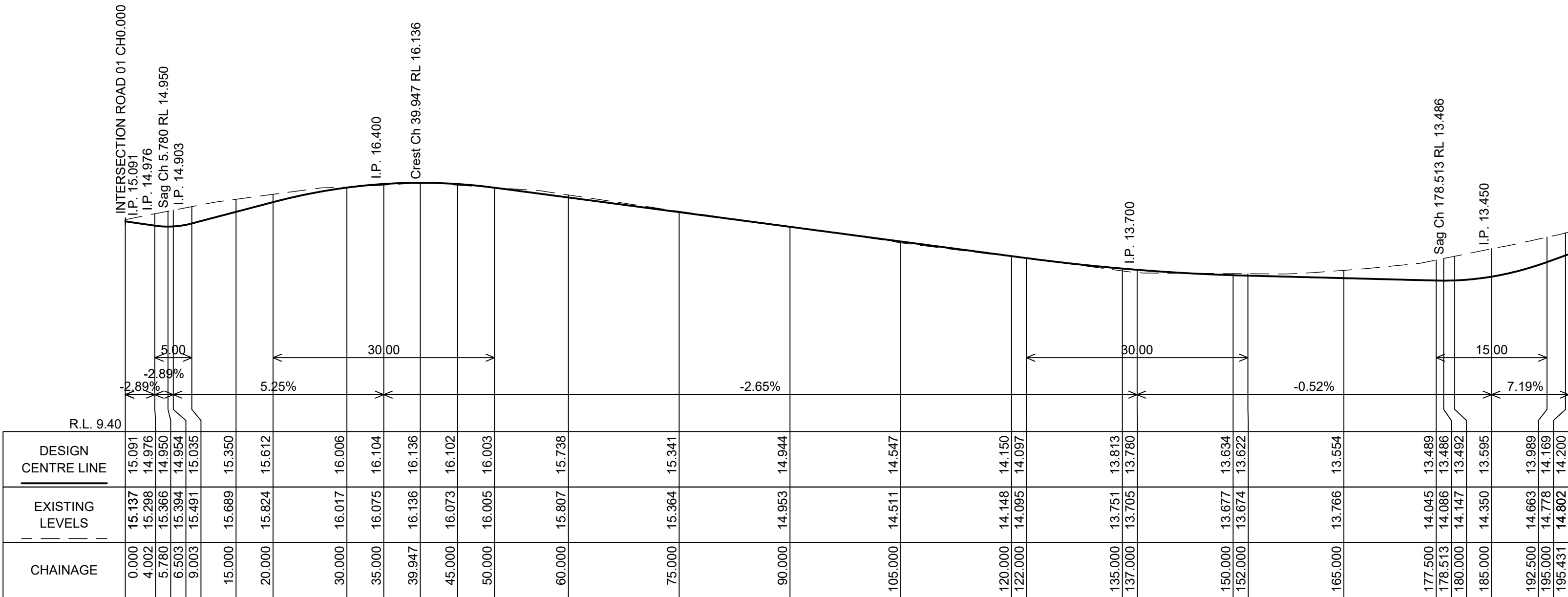
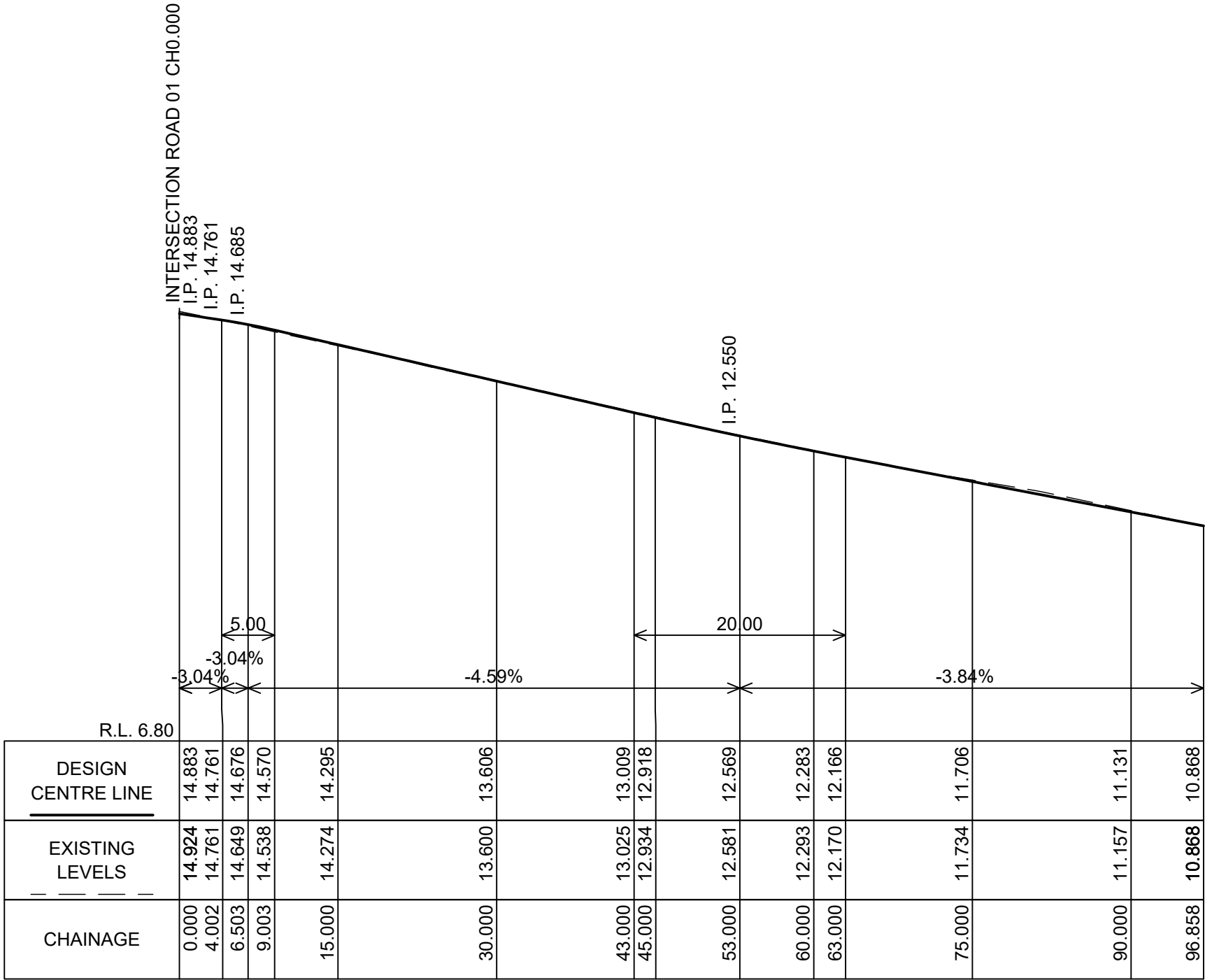


THE CONTRACTOR IS TO VERIFY THE LOCATION OF ALL EXISTING SERVICES PRIOR TO COMMENCEMENT OF CONSTRUCTION AND SHALL BE RESPONSIBLE, AT THE CONTRACTOR'S EXPENSE, FOR ANY REPAIRS TO DAMAGE CAUSED DURING CONSTRUCTION.



RATIO: 1:500H 1:100V (AT A1 ORIGINAL)	DATUM: AUSTRALIAN HEIGHT DATUM	SURVEY	APS	REV	DESCRIPTION	BY	DATE	 allen price & scarratts pty ltd land and development consultants Nowra Office: 75 Plunkett Street, Nowra NSW 2541 Kiama Office: 1/28 Bong Bong Street, Kiama NSW 2533 phone:(02) 4421 6544 consultants@allenprice.com.au www.allenprice.com.au	ROAD LONG SECTIONS PLAN SHEET 03 PROPOSED RESIDENTIAL SUBDIVISION OVER LOT 4 DP 834254 AT 510 BEACH ROAD, BERRY FOR ENID HALL (RICHARD HALL AND ROBYN BATES)	DRAWING STATUS PRELIMINARY NOT TO BE USED FOR CONSTRUCTION PURPOSES		
	ORIGIN: SSM RL	DESIGN	CJG	=						DRAWING NUMBER N27074-106	SHEET 6 REVISION OF 17 P0	
	DATE OF PLAN: FEBRUARY 2020	DRAWN	CJG									
		CHECK'D	MP									

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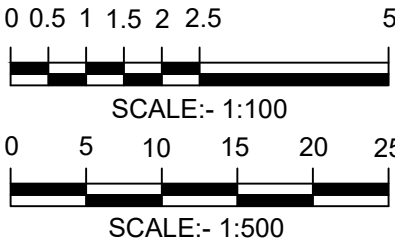


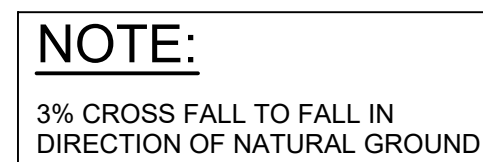
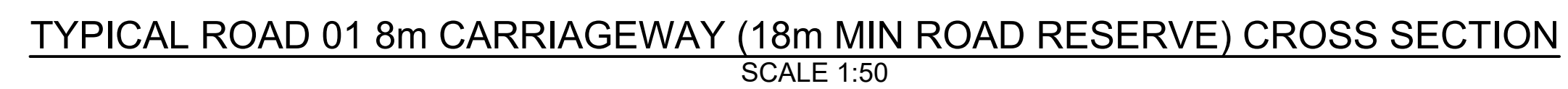
BEWARE!

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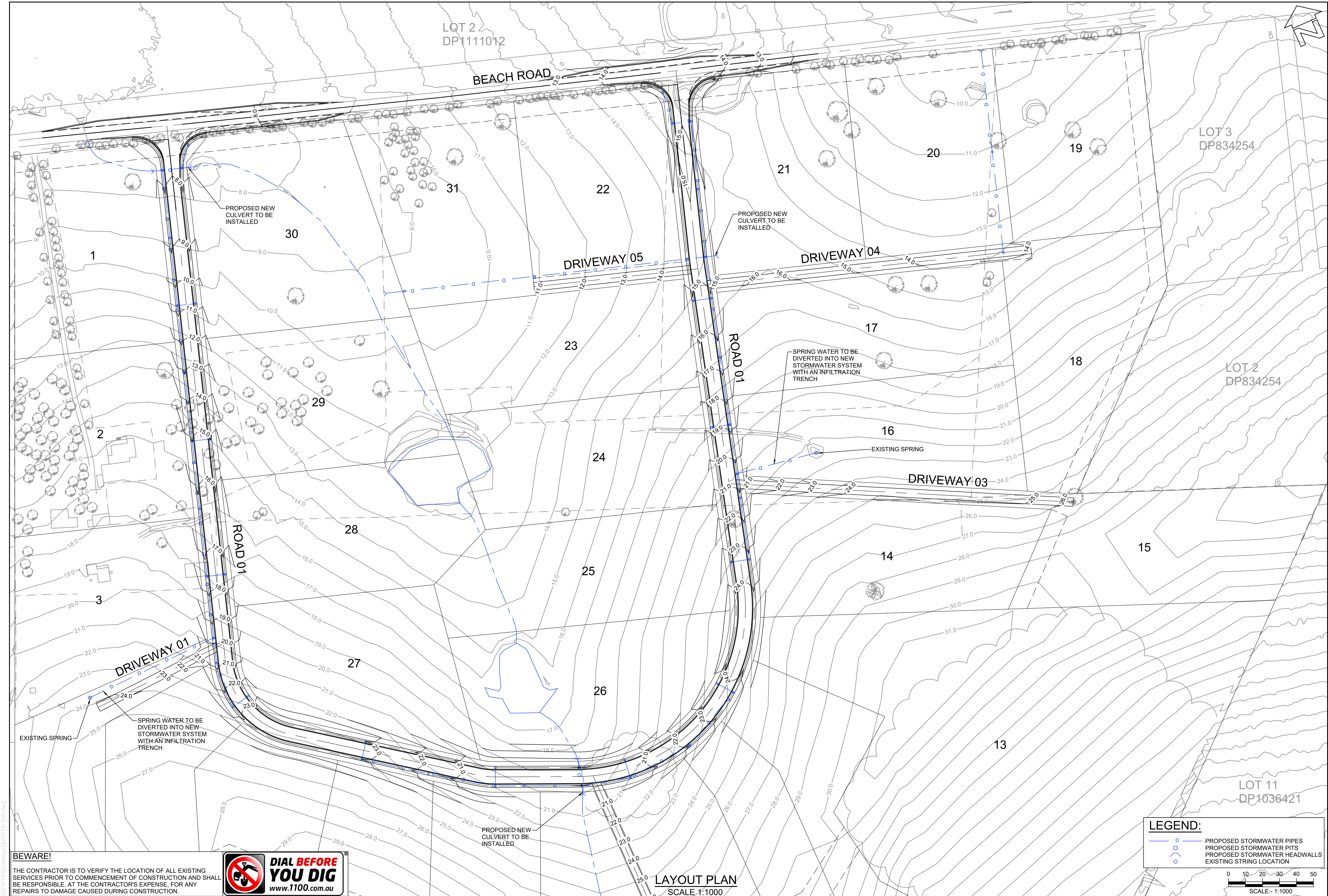


RATIO: 1:500H 1:100V (AT A1 ORIGINAL)	DATUM: AUSTRALIAN HEIGHT DATUM	SURVEY	APS	REV	DESCRIPTION	BY	DATE	 allen price & scarratts pty ltd land and development consultants Nowra Office: 75 Plunkett Street, Nowra NSW 2541 Kiama Office: 1/28 Bong Bong Street, Kiama NSW 2533 phone: (02) 4421 6544 consultants@allenprice.com.au www.allenprice.com.au	ROAD LONG SECTIONS PLAN SHEET 04 PROPOSED RESIDENTIAL SUBDIVISION OVER LOT 4 DP 834254 AT 510 BEACH ROAD, BERRY FOR ENID HALL (RICHARD HALL AND ROBYN BATES)	DRAWING STATUS PRELIMINARY NOT TO BE USED FOR CONSTRUCTION PURPOSES
	ORIGIN: SSM RL	DESIGN C/JG								DRAWING NUMBER N27074-107
	DATE OF PLAN: FEBRUARY 2020	DRAWN C/JG	CHECK'D MP							SHEET 7 OF 17 REVISION P0





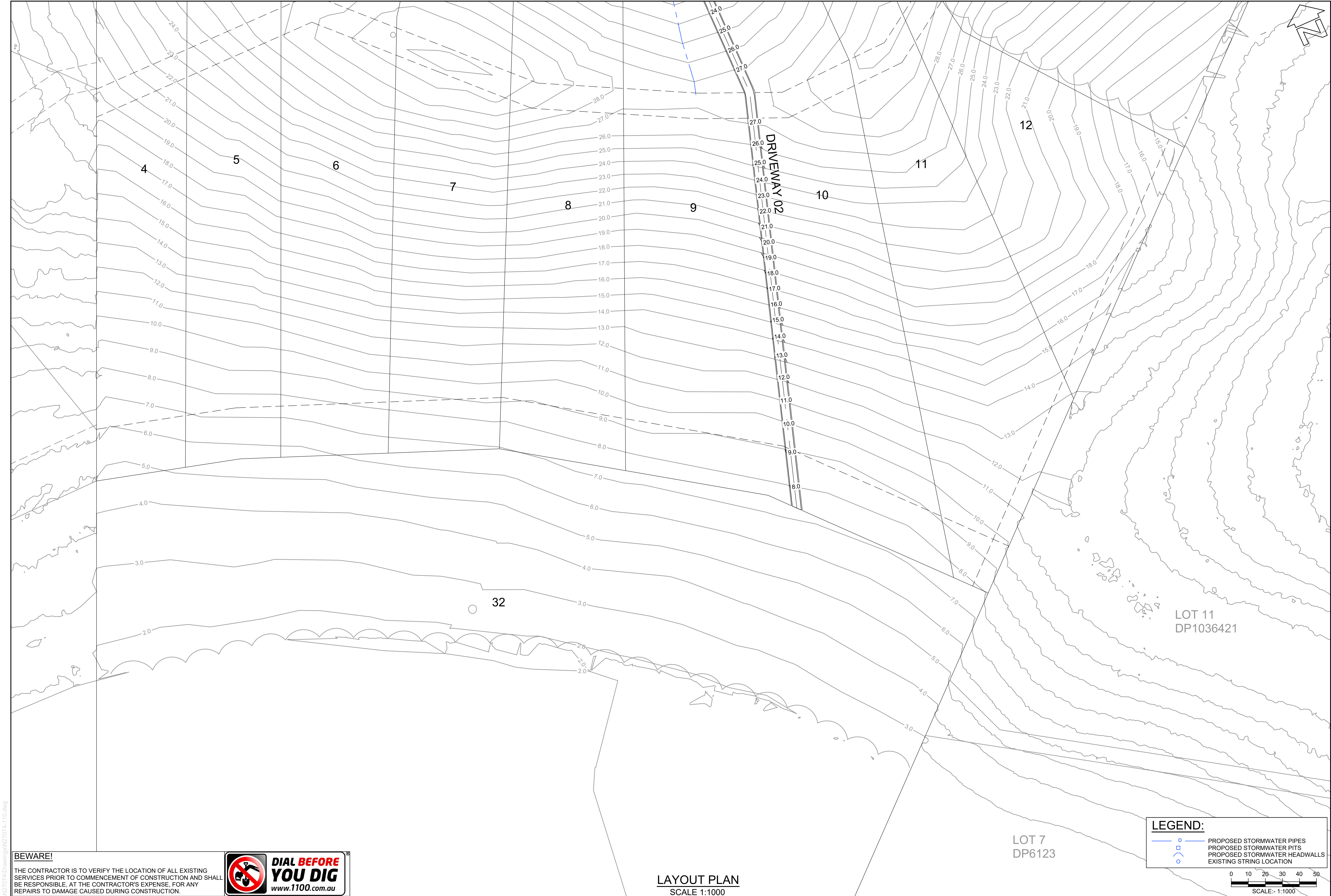
TYPICAL 5m DRIVEWAYS 01, 02, 03, 04 & 05 CROSS SECTION
SCALE 1:50



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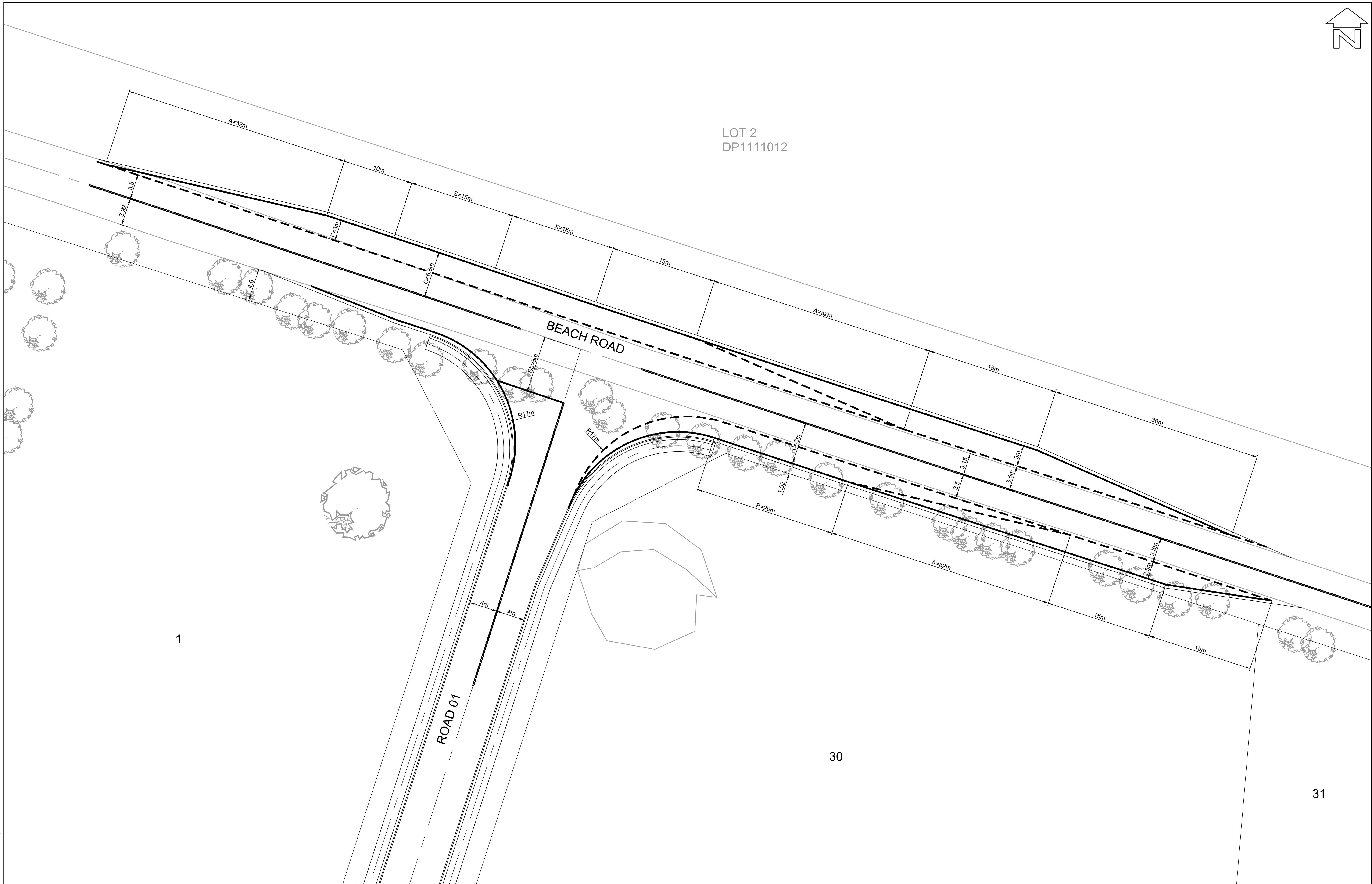
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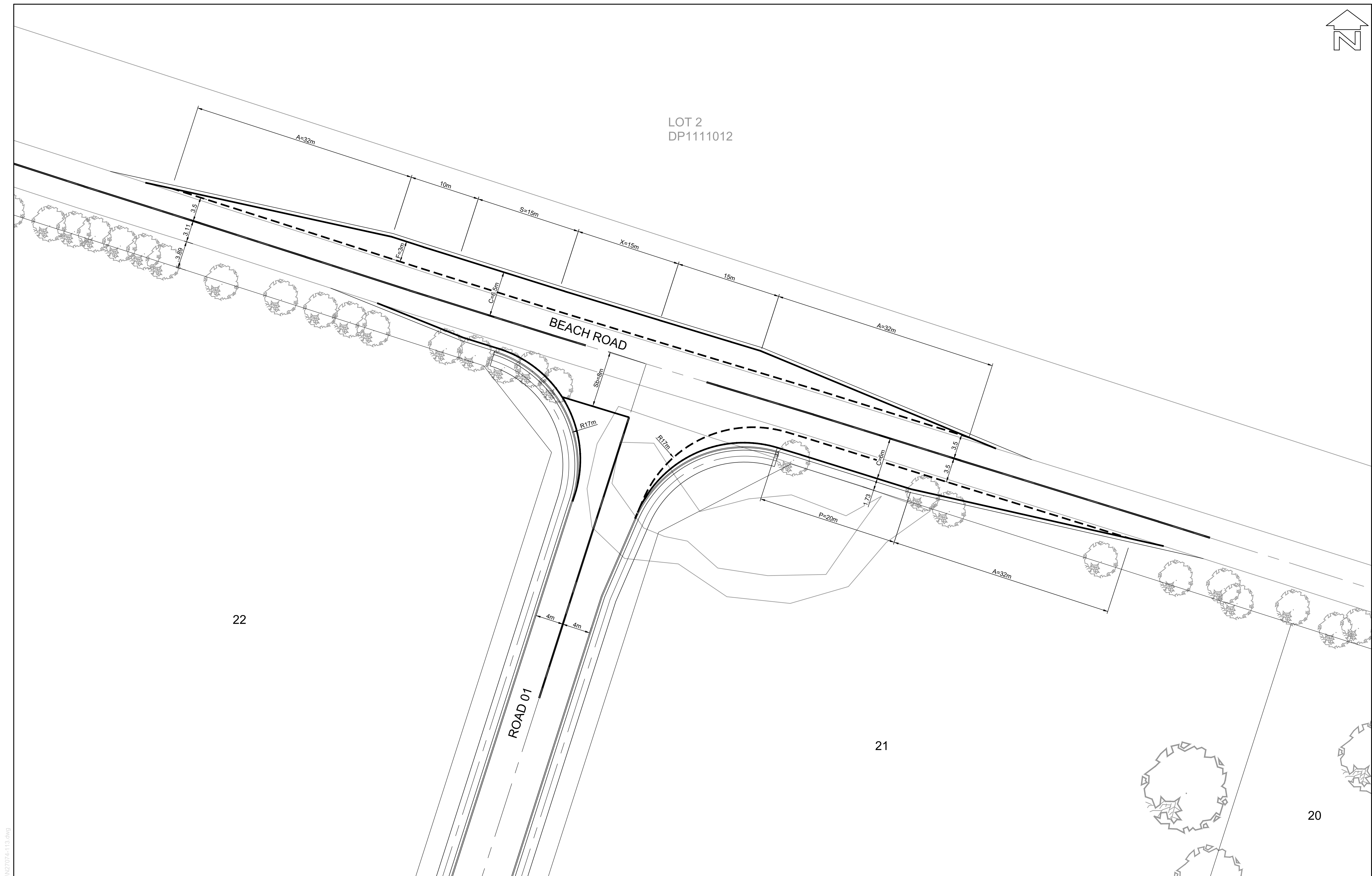
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											DRAWING NUMBER N27074-110	SHEET 10 OF 17 REVISION P0



THE CONTRACTOR IS TO VERIFY THE LOCATION OF ALL EXISTING SERVICES PRIOR TO COMMENCEMENT OF CONSTRUCTION AND SHALL BE RESPONSIBLE, AT THE CONTRACTOR'S EXPENSE, FOR ANY REPAIRS TO DAMAGE CAUSED DURING CONSTRUCTION.



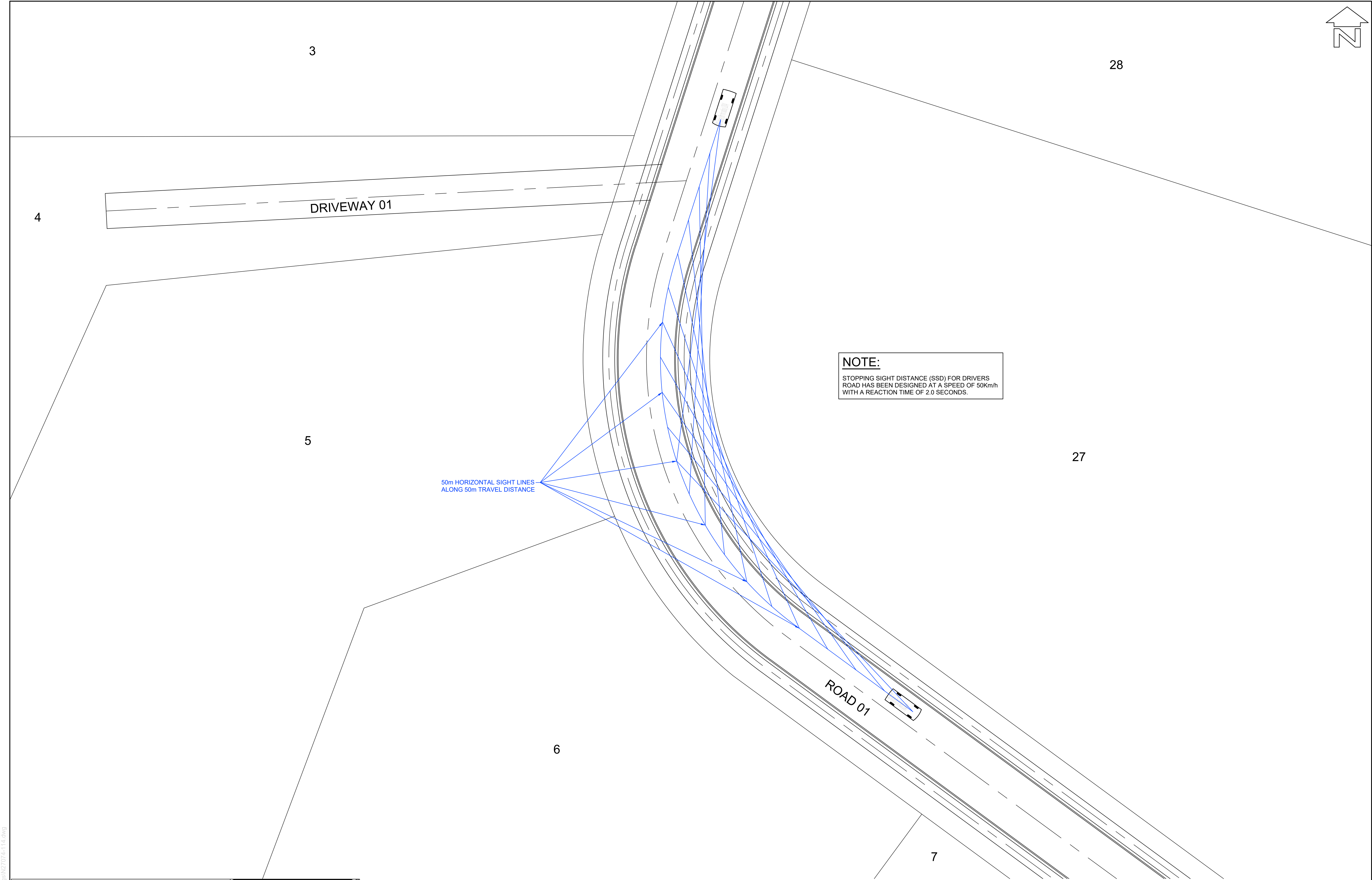
RATIO: 1:250 (AT A1 ORIGINAL)	DATUM: AUSTRALIAN HEIGHT DATUM	SURVEY	APS	REV	DESCRIPTION	BY	DATE	 allen price & scarratts pty ltd land and development consultants Nowra Branch: 75 Plunkett Street, Nowra NSW 2541 Kiama Branch: 5/125 Terralong Street, Kiama NSW 2533 phone: (02) 4421 6544 fax: (02) 4422 1821 consultants@allenprice.com.au www.allenprice.com.au	INTERSECTION 01 LAYOUT PLAN PROPOSED RESIDENTIAL SUBDIVISION OVER LOT 4 DP 834254 AT 510 BEACH ROAD, BERRY FOR ENID HALL (RICHARD HALL AND ROBYN BATES)	DRAWING STATUS PRELIMINARY NOT TO BE USED FOR CONSTRUCTION PURPOSES		
	ORIGIN: SSM RL	DESIGN	CJG	=						DRAWING NUMBER N27074-112	SHEET 12	REVISION
	DATE OF PLAN: FEBRUARY 2020	DRAWN	CJG								OF 17	P0
		CHECK'D	MP									



20

0 2.5 5 7.5 10
SCALE:- 1:250

DRAWING NUMBER	SHEET	13	REVISION
N27074-113	OF	17	P0



NOTE:
STOPPING SIGHT DISTANCE (SSD) FOR DRIVERS.
ROAD HAS BEEN DESIGNED AT A SPEED OF 50Km/h
WITH A REACTION TIME OF 2.0 SECONDS.

50m HORIZONTAL SIGHT LINES
ALONG 50m TRAVEL DISTANCE

LAYOUT PLAN
SCALE 1:250

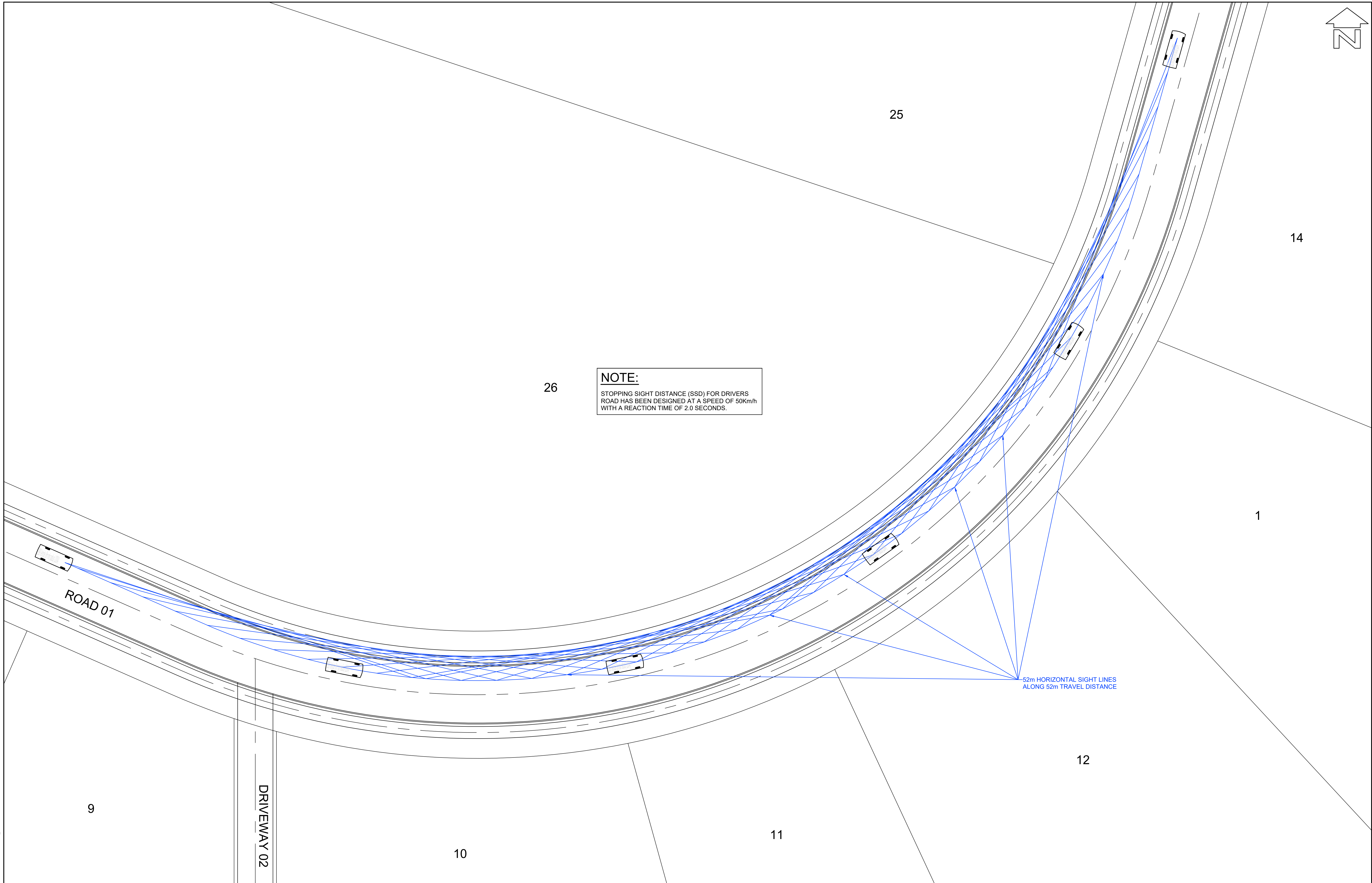


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RATIO: 1:250 (AT A1 ORIGINAL)	DATUM: AUSTRALIAN HEIGHT DATUM	SURVEY	APS	REV	DESCRIPTION	BY	DATE	 allen price & scarratts pty ltd land and development consultants Nowra Branch: 75 Plunkett Street, Nowra NSW 2541 Kiama Branch: 5/125 Terralong Street, Kiama NSW 2533 phone:(02) 4421 6544 fax:(02) 4422 1821 consultants@allenprice.com.au www.allenprice.com.au	SIGHT LINE 01 LAYOUT PLAN PROPOSED RESIDENTIAL SUBDIVISION OVER LOT 4 DP 834254 AT 510 BEACH ROAD, BERRY FOR ENID HALL (RICHARD HALL AND ROBYN BATES)			DRAWING STATUS		
	ORIGIN: SSM RL	DESIGN	CJG	=								PRELIMINARY NOT TO BE USED FOR CONSTRUCTION PURPOSES		
		DRAWN	CJG									DRAWING NUMBER		
	DATE OF PLAN: FEBRUARY 2020	CHECK'D	MP									N27074-114		
												SHEET 14 REVISION OF 17 P0		



STOPPING SIGHT DISTANCE (SSD) FOR DRIVERS
ROAD HAS BEEN DESIGNED AT A SPEED OF 50Km/h
WITH A REACTION TIME OF 2.0 SECONDS.

52m HORIZONTAL SIGHT LINES
ALONG 52m TRAVEL DISTANCE

ROAD 01

DRIVEWAY 02

10

11

12

LAYOUT PLAN
SCALE 1:250

BEWARE!

THE CONTRACTOR IS TO VERIFY THE LOCATION OF ALL EXISTING SERVICES PRIOR TO COMMENCEMENT OF CONSTRUCTION AND SHALL BE RESPONSIBLE, AT THE CONTRACTOR'S EXPENSE, FOR ANY REPAIRS TO DAMAGE CAUSED DURING CONSTRUCTION.



RATIO:

1:250

(AT A1 ORIGINAL)

DATUM: AUSTRALIAN HEIGHT DATUM ORIGIN: SSM RL
DATE OF PLAN: FEBRUARY 2020

SURVEY	APS
DESIGN	CJG
DRAWN	CJG
CHECK'D	MP

REV	=

DESCRIPTION

BY	DATE



allen price & scarratts pty ltd
land and development consultants

Nowra Branch: 75 Plunkett Street, Nowra NSW 2541
Kiama Branch: 5/125 Terralong Street, Kiama NSW 2533
phone: (02) 4421 6544 fax: (02) 4422 1821
consultants@allenprice.com.au www.allenprice.com.au

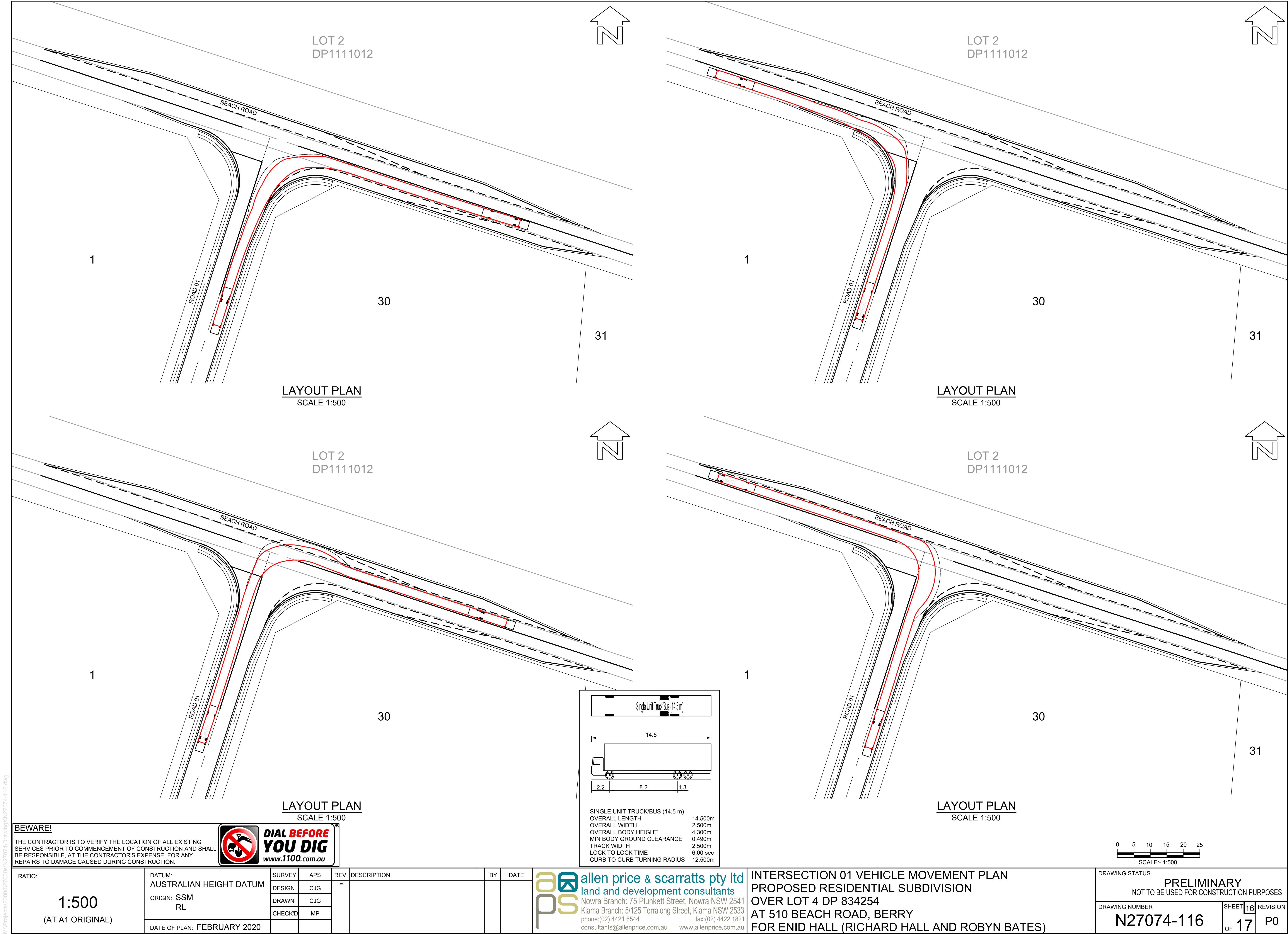
SIGHT LINE 02 LAYOUT PLAN
PROPOSED RESIDENTIAL SUBDIVISION
OVER LOT 4 DP 834254
AT 510 BEACH ROAD, BERRY
FOR ENID HALL (RICHARD HALL AND ROBYN BATES)

DRAWING STATUS

PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION PURPOSES

DRAWING NUMBER	SHEET	15	REVISION
N27074-115	OF	17	P0



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BEWARE!

THE CONTRACTOR IS TO VERIFY THE LOCATION OF ALL EXISTING SERVICES PRIOR TO COMMENCEMENT OF CONSTRUCTION AND SHALL BE RESPONSIBLE, AT THE CONTRACTOR'S EXPENSE, FOR ANY REPAIRS TO DAMAGE CAUSED DURING CONSTRUCTION.



RATIO: 1:500 (AT A1 ORIGINAL)	DATUM: AUSTRALIAN HEIGHT DATUM	SURVEY	APS	REV	DESCRIPTION	BY	DATE	 allen price & scarratts pty ltd land and development consultants Nowra Branch: 75 Plunkett Street, Nowra NSW 2541 Kiama Branch: 5/125 Terralong Street, Kiama NSW 2533 phone: (02) 4421 6544 fax: (02) 4422 1821 consultants@allenprice.com.au www.allenprice.com.au	INTERSECTION 01 VEHICLE MOVEMENT PLAN PROPOSED RESIDENTIAL SUBDIVISION OVER LOT 4 DP 834254 AT 510 BEACH ROAD, BERRY FOR ENID HALL (RICHARD HALL AND ROBYN BATES)	DRAWING STATUS PRELIMINARY NOT TO BE USED FOR CONSTRUCTION PURPOSES		
	ORIGIN: SSM RL	DESIGN	CJG	=						DRAWING NUMBER N27074-116	SHEET 16 OF 17	REVISION P0
	DATE OF PLAN: FEBRUARY 2020	DRAWN	CJG									
		CHECK'D	MP									

