CIVIL

Infrastructure Servicing Assessment

for

Proposed Land Lease Community, Anambah

for Thirdi Anambah Pty Ltd

NL222055-02 / 16 January 2025 / Revision A

Report Document Control

Project: Propose Land Lease Community, Anambah

Project Ref: NL222055-02

Document Ref: E04

File Name: NL222055-02_E04 LLC_Infrastructure Servicing Assessment [A].docx

Client: Thirdi Anambah Pty Ltd

Title: Infrastructure Servicing Assessment

Revision History:

Revision	Report Status	Issue Date	Prepared	Reviewed
A	Issued for Approval	15/12/2024	AK	LM

Prepared:

Andrew Killen
Civil Engineer

Reviewed:

Lach McRae
Principal | Senior Civil & Environmental Engineer

Limitation Statement

Northrop Consulting Engineers Pty Ltd (Northrop) has been retained to prepare this report based on specific instructions, scope of work and purpose pursuant to a contract with its client. It has been prepared in accordance with the usual care and thoroughness of the consulting profession for the use by Thirdi Anambah Pty Ltd. The report is based on generally accepted practices and standards applicable to the scope of work at the time it was prepared. No other warranty, express or implied, is made as to the professional advice included in this report.

Except where expressly permitted in writing or required by law, no third party may use or rely on this report unless otherwise agreed in writing by Northrop.

Where this report indicates that information has been provided to Northrop by third parties, Northrop has made no independent verification of this information except as expressly stated in the report. Northrop is not liable for any inaccuracies in or omissions to that information.

The report was prepared on the dates shown and is based on the conditions and information received at the time of preparation.

This report should be read in full, with reference made to all sources. No responsibility is accepted for use of any part of this report in any other context or for any other purpose. Northrop does not purport to give legal advice or financial advice. Appropriate specialist advice should be obtained where required.

To the extent permitted by law, Northrop expressly excludes any liability for any loss, damage, cost or expenses suffered by any third party relating to or resulting from the use of, or reliance on, any information contained in this report.

Contents

Appendices

1. Introduction

Northrop Consulting Engineers has been engaged by Thirdi Anambah Pty Ltd to prepare an infrastructure servicing assessment to support a development application (DA) for a proposed Land Lease Community (LLC) at Anambah. This report provides an overview of the servicing requirements for sewer, water, electrical, and road access for the development site.

1.1 The Development

The proposed LLC is situated within Lot 177 DP874171, approximately 3.5km north of the New England Highway. The proponent seeks to release approximately 300 relocatable home sites along with associated community facilities across an ultimate development footprint of approximately 22.5 hectares.

The proposed development adjoins a proposed residential subdivision also to be developed by Thirdi, which forms part of the broader Anambah Urban Release Area (AURA). At time of writing, separate development applications for the masterplan and Stage 1 of the residential subdivision are currently before Maitland City Council (MCC). It is understood that the proponent intends for the LLC to be serviced via lead in infrastructure consistent with the utility and road alignments proposed for the adjoining subdivision, but potentially constructed independently, dependent on timing of that development. As such, consideration has been given to interim servicing arrangements where required. The location and extent of the LLC development and adjoining Thirdi residential subdivision are illustrated in Figure 1.

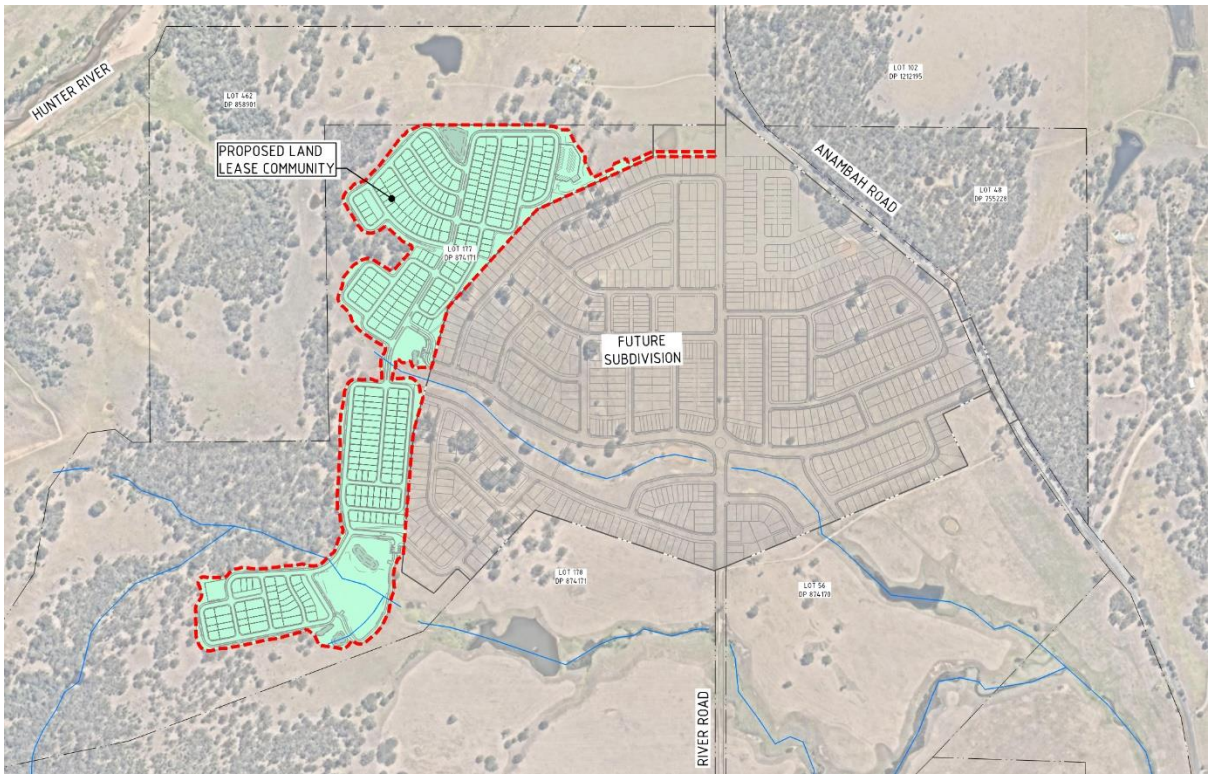


Figure 1 – Subject Site.

1.2 Site Description

The subject site is located within rural land west of Anambah Road. The natural landform slopes moderately at grades between 5 and 10%. The site is traversed by two watercourses at the southern and centre of the site, with a ridgeline dividing the northern portion of the development. Site elevations

range from RL65.0 at the western and south-western development boundary to RL35.0 within the watercourses. Existing vegetation consists primarily of cleared pastureland with scattered vegetation with some remnant bushland along the western boundary.

2. Potable Water

2.1 Existing and Proposed Infrastructure

The development is currently remote from water infrastructure. The nearest supply infrastructure is located within the Wyndella Estate, approximately 2km to the south. The Wyndella Estate network is supplied from trunk mains along the New England Highway which supply a booster pump station, known as WPS Wyndella 1, location on River Road.

A water servicing strategy has been prepared for the broader AURA (ADWJ, dated October 2023). Due to varying elevation within the AURA, two supply zones are proposed, a low-level zone (LLZ) below RL41.0 and high-level zone (HLZ) for higher elevations. To ensure adequate pressure for the HLZ, the existing Windella 1 WPS is to be replaced.

Dependent on timing of development within the AURA, an interim servicing arrangement is proposed to service the Thirdi subdivision at the northern end of the AURA. Under this arrangement, dual watermains will be constructed along the River Road corridor, supplying the LLZ and HLZ. Under current subdivision staging, the new booster pump station will not be required until Stage 2 of the subdivision as all Stage 1 lots are intended to be within the LLZ.

2.2 Estimated Water Demand

Water demands for the proposed LLC development have been estimated in accordance with the Water Supply Code of Australia (WSA03) Hunter Water Edition. For this assessment, individual relocatable home sites were assumed to have an annual demand consistent with residential flats/units. Calculated design water demands are summarised in Table 1.

Table 1 – Design Water Demands.

Demand Category	Per site, assumed equivalent to residential flats/units
Average Annual Demand Rate	130 kL/year/site
Sites	332
Peak Hour on Average Day Demand*	2.43 L/s
Peak Hour on Peak Day Demand*	7.74 L/s
Peak Hour on Extreme Day Demand*	8.87 L/s
95th Percentile Peak Hour Demand*	6.24 L/s
Firefighting Allowance	Excluded – fire flows are assumed to be managed on site.

* Includes allowance for unaccounted water equivalent to 15% of average day demand.

2.3 Proposed Servicing

The LLC will incorporate a private reticulation and fire hydrant network internally. Dependent on timing of the adjoining Thirdi subdivision development, a lead in watermains will need to extended along River Road, supplied from the existing DN150 water main at the River Road culdesac. Noting the length of lead in required and potential difficulties managing water age it has been assumed that this connection will be a reduced size main utilised for potable water only. Onsite tanks would then utilised

for firefighting and would be required until a dedicated fire connection to the subdivision supply network can be made.

Based on the concept earthworks design for the development, the lowest relocatable home site is situated at approximately RL44.0 and the highest at RL64.0. All relocatable home sites are therefore above the RL41.0 threshold and will require boosting to meet HWC's minimum servicing pressures. In the event the upgraded Wyndella 1 booster pump station has not been completed, onsite pressure boosting measures such as break tanks will be required. Alternatively, if the HLZ supply main has been completed, the LLC can be supplied directly from that main. Final sizing of lead in watermains will be undertaken as part of the detailed design. Hunter Water's minimum pressure requirements are summarised in Table 2. The proposed water servicing arrangement is illustrated in Appendix A, Exhibit 1.

Table 2 – HWC water servicing pressure requirements.

Parameter	Pressure (m)
Maximum pressure all applications.	60
Minimum Pressure for a peak hour flow on a peak day.	20
Minimum Pressure for a peak hour flow on an extreme day.	12
Minimum Pressure for a peak hour flow on an 95th percentile peak day plus fire fighting flow (at location of fire flow).	15
Minimum Pressure for a peak hour flow on an 95th percentile peak day plus fire fighting flow (other than location of fire flow).	3

3. Wastewater

3.1 Existing and Proposed Infrastructure

The development site is currently remote from sewer services.

A wastewater servicing strategy has been prepared for the broader AURA (ADWJ, dated 11/01/2024). Ultimately, the AURA will be serviced via a network of 5 wastewater pump stations pumping to a barometric loop and gravity main near the intersection of Anambah Road and Cagney Road, Rutherford. Completion of these works are dependent on significant development occurring within the adjoining land to the south and as such, an interim servicing arrangement has been developed for the Thirdi-owned portion of the AURA.

The interim arrangement involves construction of two of the five wastewater pump stations within the Thirdi site. In the absence of a downstream wastewater network, the downstream pump station will pump along River Road via a temporary rising main, discharging to existing trunk gravity sewer mains near the intersection of River Road and the New England Highway.

3.2 Estimated Sewer Loading

Due to topography, the proposed LLC will be split into 4 wastewater sub-catchments, delineated in Appendix A, Exhibit 2. All sub-catchments are proposed to discharge to a single point of connection to the subdivision sewer network.

Sewer loadings for the combined development have been estimated in accordance with the Gravity Sewerage Code of Australia Hunter Water Edition (WSA02). The primary parameters used to estimate sewer flows are as follows:

- Equivalent tenements (ET) = 0.67 ET/relocatable home site
- Average dry weather flow (ADWF) = 0.011 L/s/ET
- Storm allowance (SA) = 0.58 L/s/hectare

Estimated sewer loadings are summarised in Table 3.

Table 3 – Estimated Sewer Loading.

Total Sites	ET	ADWF	Peaking Ratio 'r'	PDWF	Storm Allowance	PWWF
332	222	2.45 L/s	2.86	7.00 L/s	13.05 L/s (22.5 ha)	20.05 L/s

3.3 Proposed Sewer Servicing

Lead-in gravity sewer mains to the development will extend from the proposed WWPS to a point of connection along the east-west entry road.

Individual relocatable home sites will be serviced via a private sanitary sewer network. Sub-catchments 2, 3 and 4 will drain to private pump stations pumping to a single point of connection to the subdivision gravity sewer network, whereas sub-catchment 1 will drain directly via gravity. Proposed sewer servicing is illustrated in Appendix A, Exhibit 2.

4. Electricity

A preliminary review of electrical infrastructure for the broader subdivision and LLC is included in Appendix B with summary provided below.

Gosforth and Anambah are currently serviced by the Rutherford Zone Substation. There are two 11kV feeders from this substation that approach the subject site. Feeder 29878 extends along the New England Highway, via Lochinvar and then along Windermere Road. From there the feeder crosses the Hunter River in two locations, before looping back around and following Anambah Road, terminating just south of the Thirdi subdivision site. Preliminary advice from Ausgrid has indicated this feeder has no spare capacity and is unable to facilitate new connections. In addition, the section of high voltage feeders bordering the site is only in 2-phase configuration and will require approximately 1km of new 11kV conductors to provide a 3-phase supply.

A second feeder, 29876 extends north along Anambah Road from the New England Highway, terminating just north of Anambah House. The two ends are connected by overhead power without high voltage lines.

For a new development with underground reticulation, Ausgrid will require an 11kV interconnection so that customer supply can be maintained during feeder maintenance and unplanned outages, known as N-1 contingency. There is a risk that if a supply is sought from feeder 29876, Ausgrid may not consider feeder 29878 as a suitable N-1 interconnection due to the limited capacity and may request a new feeder be installed from the Rutherford zone substation. The approximate length of this feeder would be approximately 7km.

Preliminary discussions with Ausgrid have also highlighted the Rutherford Zone substation is approaching full capacity, necessitating future augmentation with an additional substation somewhere between Rutherford and Branxton. The timing for this substation is unknown, however design and planning may take up to 10 years.

In the event there is insufficient capacity within either feeder and/or the zone substation, more extensive upgrades will be required, which are outlined further in Appendix B. A further enquiry with Ausgrid is strongly recommended to determine up to date capacity to cater for the development. It should be noted that capacity is allocated on a “first come first served” basis and other developments have the potential to use up spare capacity.

5. Road Access

Primary vehicular access for the LLC will be via a sealed access road extending from Anambah Road. The primary access road is intended to follow the alignment of the future east-west subdivision road, with provisions made for the road to be progressively widened in future to suit the requirements of the subdivision. In the event the LLC proceeds prior to Stage 1 of the subdivision, intersection works will likely be required on Anambah Road dependent on traffic volumes.

Anambah Road is flood prone and the LLC will require an emergency flood access via River Road, consistent with flood evacuation requirements for the Thirdi subdivision and broader AURA.

An all-weather access track is also proposed to serve as a secondary access to the LLC, primarily for bushfire access, along with an access road from River Road to the HWC wastewater pump station. As above, these accesses will be constructed on a similar alignment to the future subdivision roads and will be progressively replaced by permanent roads as the subdivision is developed. Details of the proposed lead in roads are provided in Appendix A Exhibit 3(a)-3(i) and summarised in Table 4.

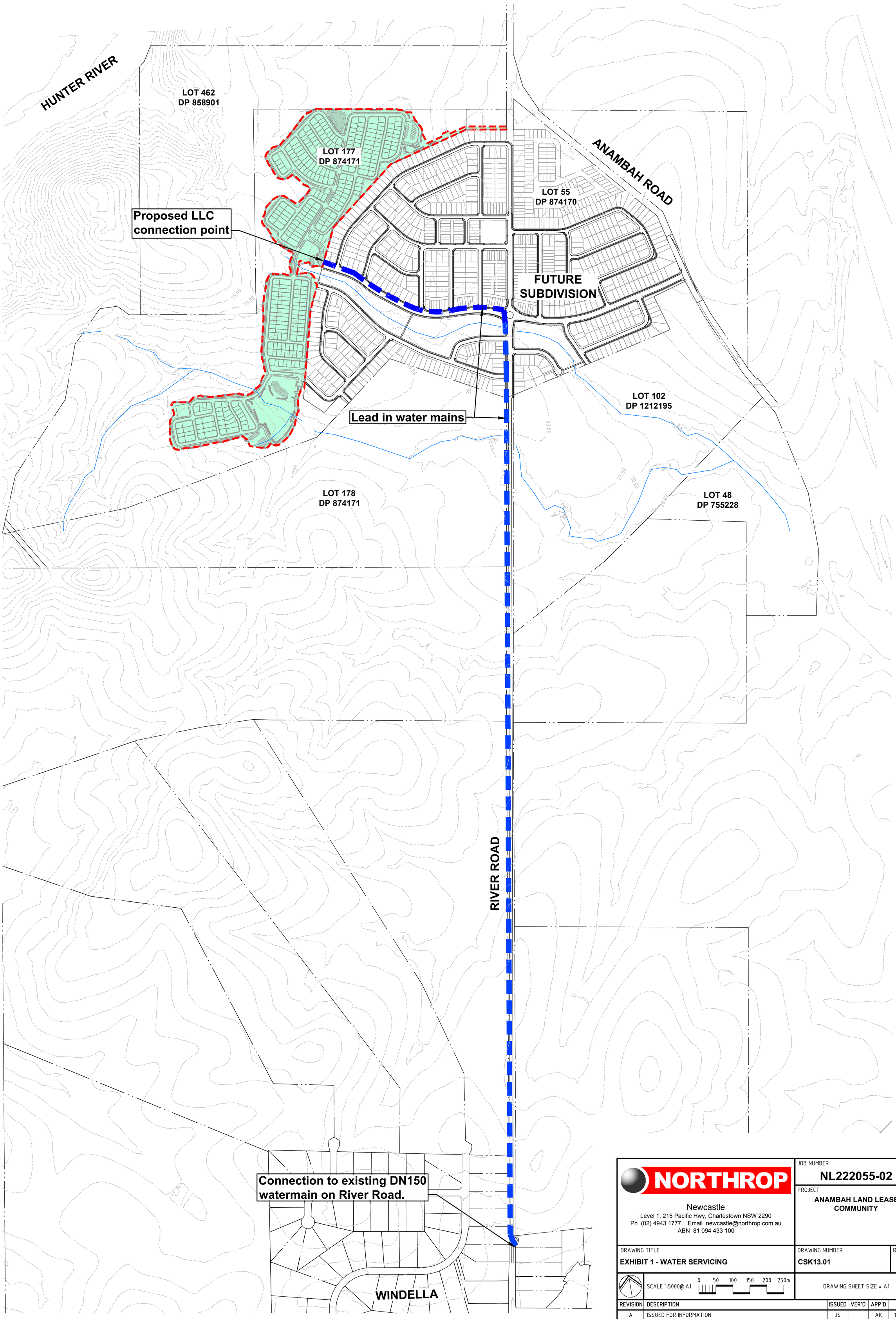
Table 4 – Lead in road infrastructure.

Lead in Road	Road Description	Approximate Road Length
Main entry road between Anambah Road and LLC northern entry, including road widening on Anambah Road for intersection works.	8 metre-wide sealed carriageway, kerb and gutter	1,130 m
River Road flood egress / access road	6 metre-wide sealed carriageway	2,710 m
Access track between River Road and secondary LLC entry road	Minimum 4 metre-wide all-weather access track	720 m
Access track from River Road to HWC wastewater pump station	Minimum 4 metre-wide all-weather access track	150 m

6. Conclusion

A preliminary assessment of water, sewer, electricity and road access has been undertaken to support a development application for a proposed land lease community at Anambah. It is considered there is sufficient ability to provide infrastructure to the development either prior to or in conjunction with the adjoining residential development. Detailed assessment of infrastructure capacity to cater for the LLC will be required post-DA to determine the final extent of lead in works.

Appendix A – Exhibits



NORTHROP

Newcastle
Level 1, 215 Pacific Hwy, Charlestown NSW 2290
Ph (02) 4943 1777 Email newcastle@northrop.com.au
ABN 81 094 433 100

JOB NUMBER
NL222055-02

PROJECT
ANAMBAH LAND LEASE COMMUNITY

DRAWING TITLE
EXHIBIT 1 - WATER SERVICING

DRAWING NUMBER
CSK13.01

REVISION
A

SCALE 1:5000@ A1 — 0 50 100 150 200 250m

DRAWING SHEET SIZE = A1

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
A	ISSUED FOR INFORMATION	JS		AK	11.12.24

Proposed Private Pump Station.

SEWER CATCHMENT 2 10.85 ha

ANAMBAH ROAD

LOT 55 DP 874170

Private Gravity Sewer Main.

Proposed LLC Sewer Connection.

SEWER CATCHMENT 1 1.55 ha

LOT 462 DP 858901

LOT 177 DP 874171

Hunter Water Gravity Sewer Main.

75.00

70.00

65.00

60.00

55.00

40.00

35.00

30.00

Proposed WWPS.

LOT 102 DP 1212195

SEWER CATCHMENT 3 4.89 ha

SEWER CATCHMENT 4 5.07 ha

Proposed Private Pump Station.

LOT 178 DP 874171

RIVER ROAD

Proposed Sewer Rising Main via River Road.

Proposed Private Pump Station.

NORTHROP

Newcastle
Level 1, 215 Pacific Hwy, Charlestown NSW 2290
Ph (02) 4943 1777 Email newcastle@northrop.com.au
ABN 81 094 433 100

JOB NUMBER: NL222055-02

PROJECT: ANAMBAH LAND LEASE COMMUNITY

DRAWING TITLE: EXHIBIT 2 - SEWER SERVICING

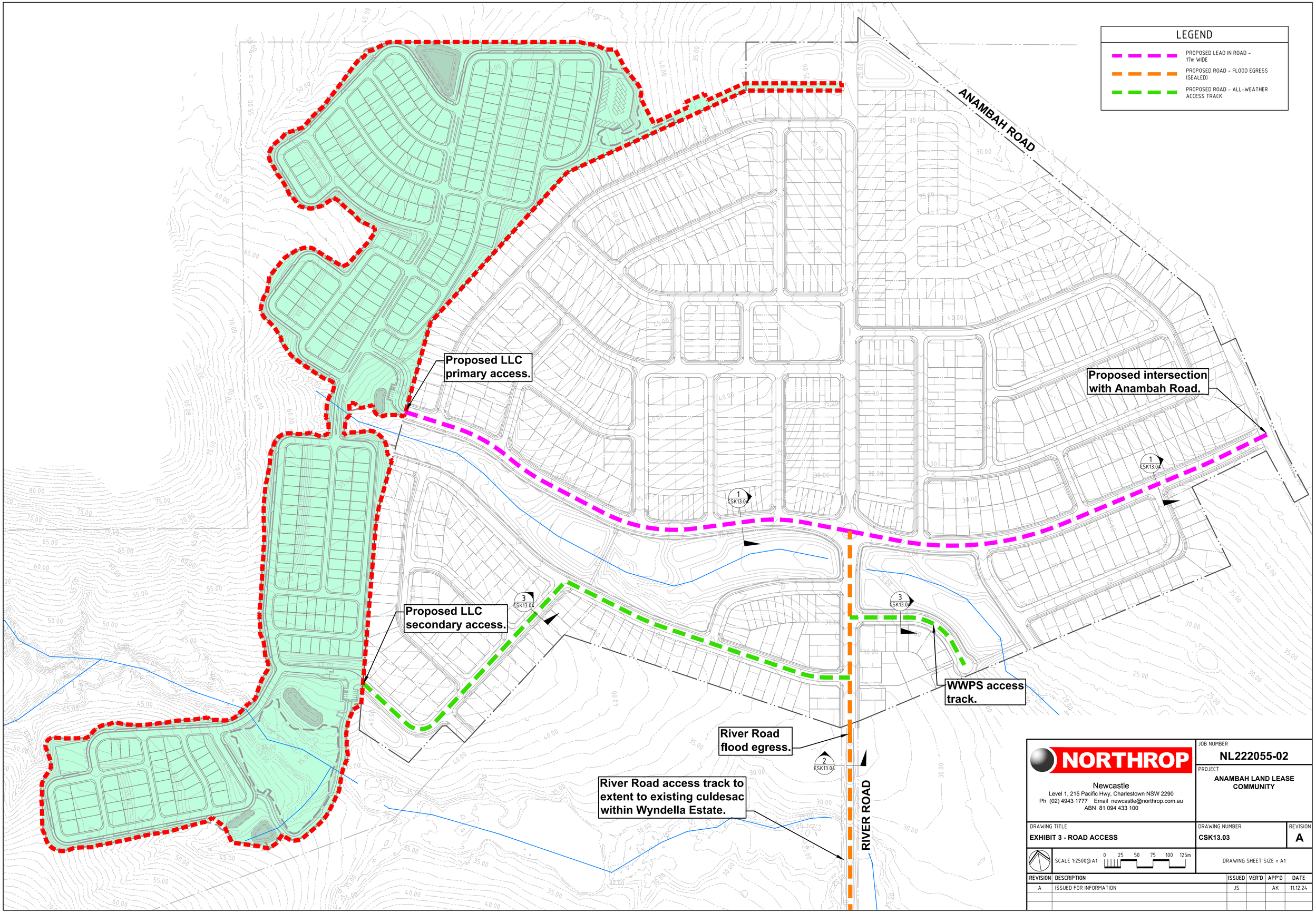
DRAWING NUMBER: CSK13.02

REVISION: A

SCALE 1:2000@ A1 (0 20 40 60 80 100m)

DRAWING SHEET SIZE = A1

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
A	ISSUED FOR INFORMATION	JS		AK	11.12.24



NORTHROP

Newcastle
Level 1, 215 Pacific Hwy, Charlestown NSW 2290
Ph (02) 4943 1777 Email newcastle@northrop.com.au
ABN 81 094 433 100

JOB NUMBER
NL222055-02

PROJECT
ANAMBAH LAND LEASE COMMUNITY

DRAWING TITLE
EXHIBIT 3 - ROAD ACCESS

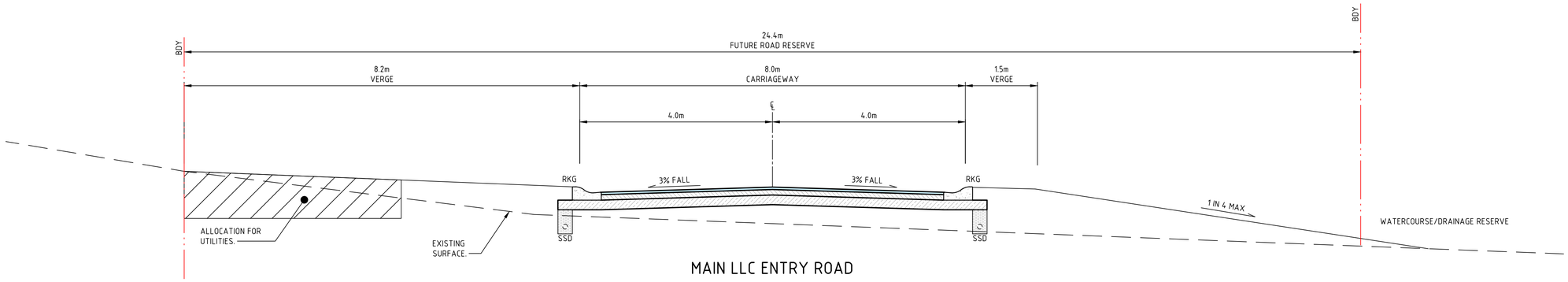
DRAWING NUMBER
CSK13.03

REVISION
A

SCALE 1:2500@ A1 0 25 50 75 100 125m

DRAWING SHEET SIZE = A1

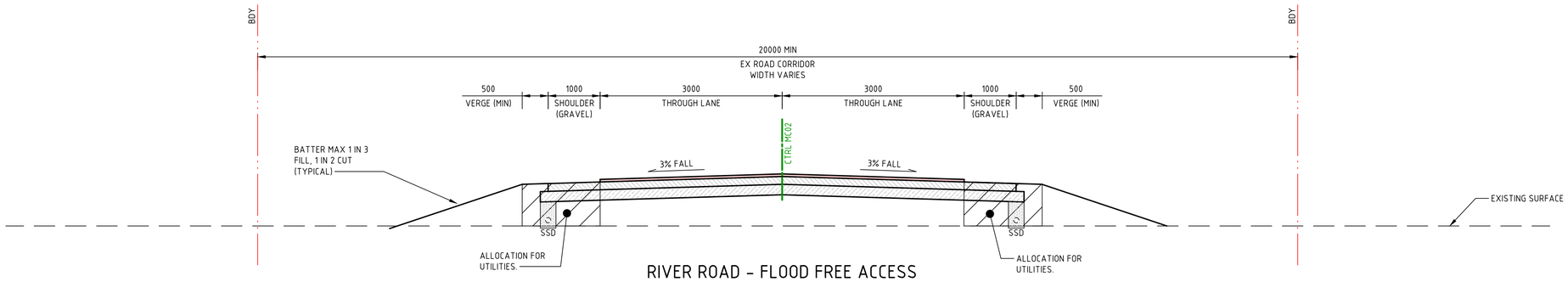
REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
A	ISSUED FOR INFORMATION	JS		AK	11.12.24



MAIN LLC ENTRY ROAD

SECTION 1 CSK13.03

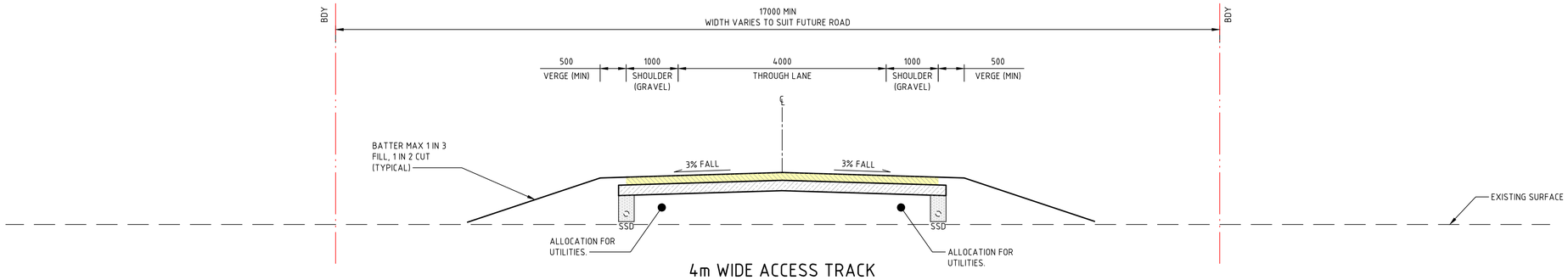
SCALE 1:50



RIVER ROAD - FLOOD FREE ACCESS

SECTION 2 CSK13.03

SCALE 1:50



4m WIDE ACCESS TRACK

SECTION 3 CSK13.03

SCALE 1:50

NORTHROP
Newcastle
Level 1, 215 Pacific Hwy, Charlestown NSW 2290
Ph (02) 4943 1777 Email newcastle@northrop.com.au
ABN 81 094 433 100

JOB NUMBER
NL222055-02

PROJECT
ANAMBAH LAND LEASE COMMUNITY

DRAWING TITLE
EXHIBIT 3(a) - ROAD ACCESS - TYPICAL ROAD CROSS-SECTIONS

DRAWING NUMBER
CSK13.04

REVISION
B

SCALE 1:2500@ A1 0 25 50 75 100 125m

DRAWING SHEET SIZE = A1

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
A	ISSUED FOR INFORMATION	JS		AK	11.12.24
B	REISSUED FOR INFORMATION	JS		AK	16.01.25

NORTHROP
Newcastle
Level 1, 215 Pacific Hwy, Charlestown NSW 2290
Ph (02) 4943 1777 Email newcastle@northrop.com.au
ABN 81 094 433 100

JOB NUMBER
NL222055-02

PROJECT
ANAMBAH LAND LEASE COMMUNITY

DRAWING TITLE
EXHIBIT 3(b) - ROAD SETOUT AND LONGITUDINAL SECTION - SHEET 1

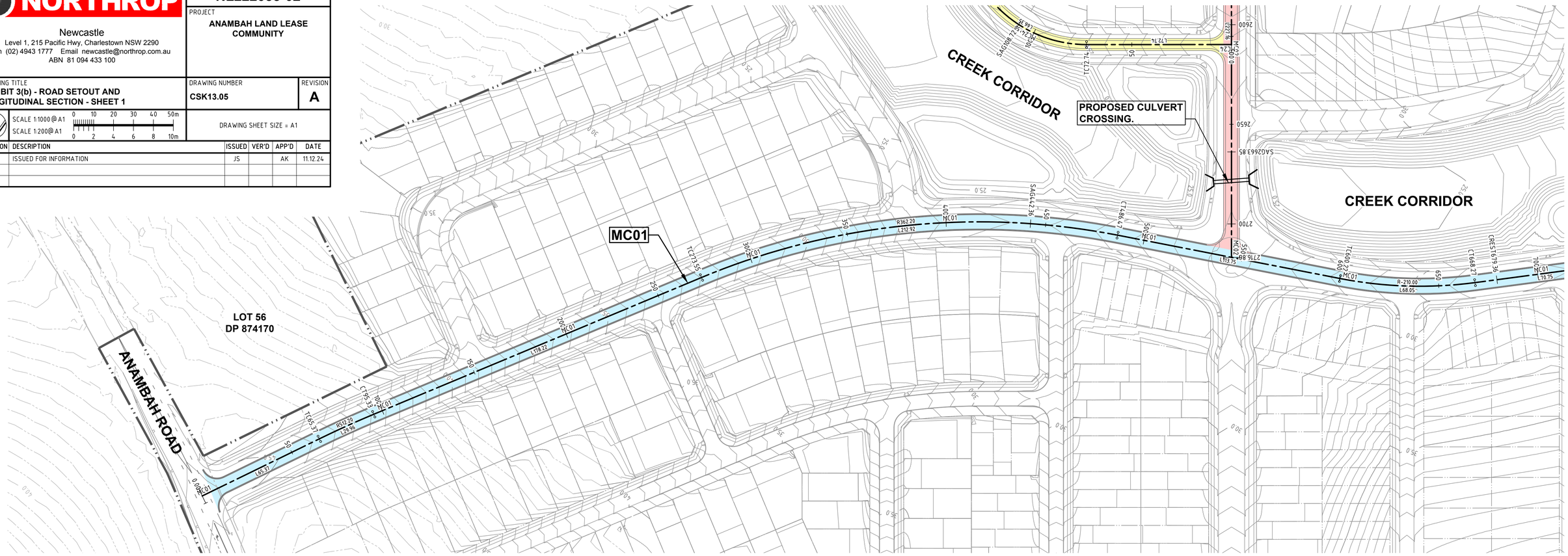
DRAWING NUMBER
CSK13.05

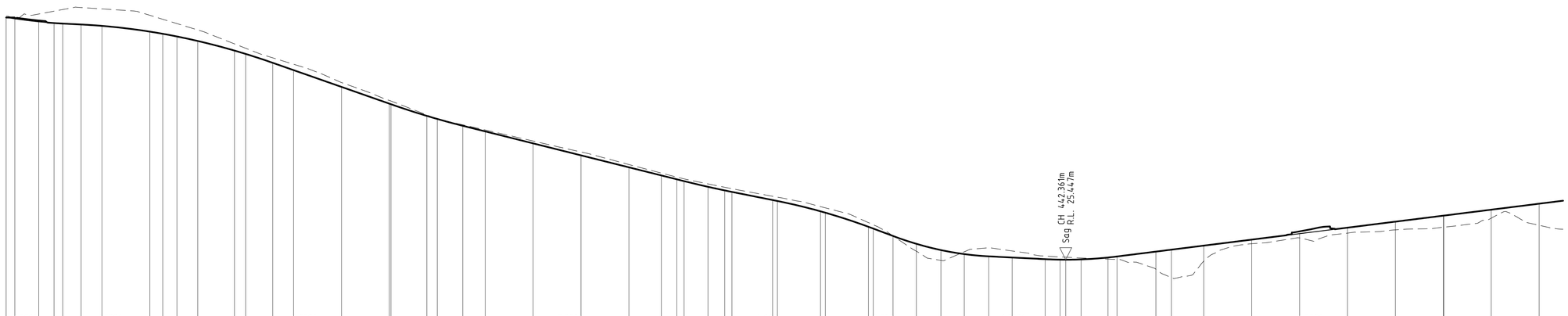
REVISION
A

SCALE 1:1000 @ A1 (0 10 20 30 40 50m)
SCALE 1:200 @ A1 (0 2 4 6 8 10m)

DRAWING SHEET SIZE = A1

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
A	ISSUED FOR INFORMATION	JS		AK	11.12.24





DESIGN GRADELINE: -3.00% | -1.00% | -7.00% | -5.00% | -4.00% | -7.50% | -1.00% | 2.50%

VERTICAL GEOMETRY: 20.0m V.C. | 80.0m V.C. | 30.0m V.C. | 20.0m V.C. | 40.0m V.C. | 40.0m V.C. | 30.0m V.C.

HORIZONTAL GEOMETRY: 512.2m RAD | 362.2m RAD | -210m RAD

DATUM RL 14.0

CHAINAGE	FINISHED SURFACE	EXISTING SURFACE
0	45.662	45.771
3.622	45.528	45.951
13.622	45.553	46.189
20	45.303	46.324
23.622	45.196	46.379
31.301	45.153	45.843
40	45.076	45.513
60	44.961	45.151
65.374	44.48	44.622
71.301	44.3	43.457
80	44.076	43.092
95.331	43.7	42.294
100	42.898	41.759
111.301	42.619	40.23
120	41.876	38.736
140	41.267	38.69
160	39.867	37.525
160.653	38.467	37.193
175.653	38.421	36.702
180	37.446	36.272
190.653	37.192	35.35
200	36.621	34.436
220	36.154	33.387
240	35.154	32.67
260	34.154	32.338
273.552	33.154	32.187
280	32.477	31.772
283.015	32.154	31.491
293.015	32.003	31.371
300	31.528	30.737
303.015	31.226	30.665
320	31.103	29.876
321.998	30.424	29.771
340	30.344	28.541
341.998	29.482	28.362
360	29.369	27.434
361.998	28.192	26.152
370.254	28.044	25.386
380	27.425	26.101
390.254	26.771	25.445
400	26.25	26.171
410.254	25.913	25.752
420	25.725	25.674
433.79	25.627	25.65
440	25.49	25.598
442.361	25.45	25.493
448.79	25.447	25.464
460	25.471	24.65
463.79	25.628	23.952
480	25.715	25.337
486.474	26.12	26.778
500	26.282	27.261
520	26.62	27.662
540	21.12	27.933
560	27.62	28.156
580	28.12	28.161
600	28.62	28.91
600.225	29.12	29.62
620	29.125	30.12
640	29.62	28.32

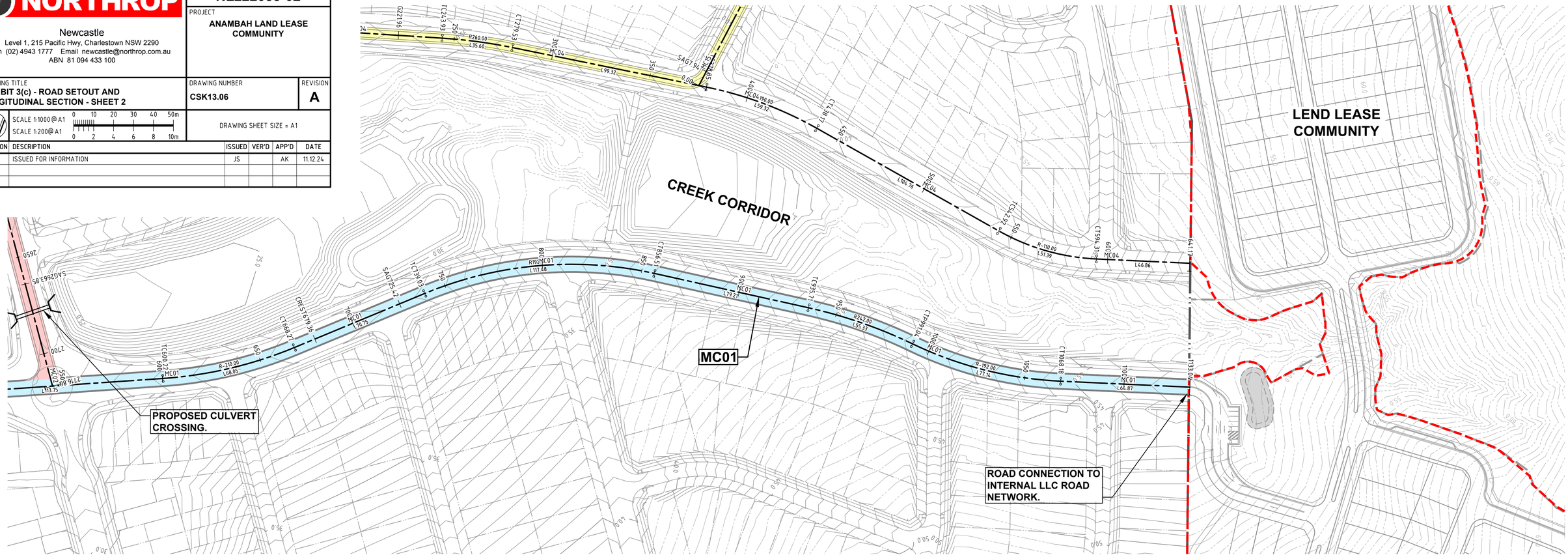
LONGITUDINAL SECTION ALONG MC01

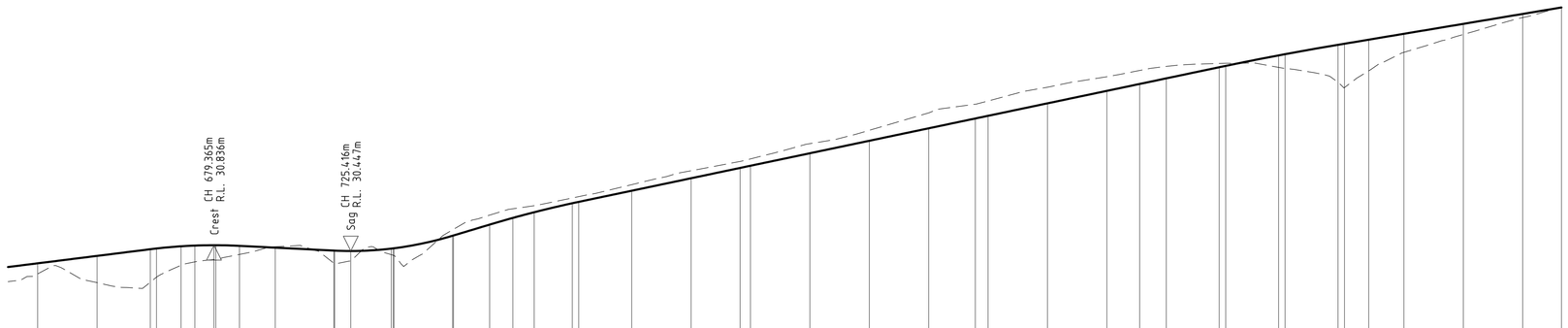
HORIZONTAL SCALE 1:1000@A1
VERTICAL SCALE 1:200@A1

NORTHROP
Newcastle
Level 1, 215 Pacific Hwy, Charlestown NSW 2290
Ph (02) 4943 1777 Email newcastle@northrop.com.au
ABN 81 094 433 100

JOB NUMBER	NL222055-02
PROJECT	ANAMBAH LAND LEASE COMMUNITY
DRAWING TITLE	EXHIBIT 3(c) - ROAD SETOUT AND LONGITUDINAL SECTION - SHEET 2
DRAWING NUMBER	CSK13.06
REVISION	A
SCALE	SCALE 1:1000 @ A1 (0 10 20 30 40 50m); SCALE 1:200 @ A1 (0 2 4 6 8 10m)
DRAWING SHEET SIZE	A1

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
A	ISSUED FOR INFORMATION	JS		AK	11.12.24





DESIGN GRADELINE: 2.50% | -1.00% | 6.00% | 4.20% | 3.34%

VERTICAL GEOMETRY: 30.0m V.C. | 40.0m V.C. | 30.0m V.C. | 40.0m V.C.

HORIZONTAL GEOMETRY: -210m RAD | 192m RAD | 242m RAD | -192m RAD

DATUM RL 18.0

CHAINAGE	FINISHED SURFACE	EXISTING SURFACE
620	29.62	28.91
640	30.12	28.32
657.936	30.568	28.351
660	30.617	28.686
668.273	30.764	29.485
672.936	30.812	29.717
679.365	30.836	29.878
680	30.836	29.892
687.936	30.793	30.217
700	30.673	30.737
719.702	30.476	29.63
720	30.473	29.589
725.416	30.447	29.791
739.027	30.609	30.204
739.702	30.626	30.162
740	30.633	30.143
759.702	31.476	31.873
760	31.493	31.908
772.186	32.225	32.86
780	32.675	33.286
787.186	33.057	33.494
800	33.661	34.013
802.186	33.755	34.104
820	34.503	34.909
840	35.343	35.846
856.507	36.036	36.473
860	36.183	36.644
880	37.023	37.668
900	37.863	38.567
920	38.703	39.74
935.715	39.363	40.324
940	39.543	40.538
960	40.383	41.465
980	41.223	42.174
991.041	41.687	42.594
1000	42.063	42.868
1017.814	42.811	43.071
1020	42.902	43.08
1037.814	43.608	42.808
1040	43.69	42.723
1057.814	44.319	41.81
1060	44.392	41.446
1068.176	44.665	42.57
1080	45.06	43.814
1100	45.728	45.016
1120	46.397	46.15
1133.044	46.832	46.837

LONGITUDINAL SECTION ALONG MC01

HORIZONTAL SCALE 1:1000@A1
VERTICAL SCALE 1:200@A1

NORTHROP
Newcastle
Level 1, 215 Pacific Hwy, Charlestown NSW 2290
Ph (02) 4943 1777 Email newcastle@northrop.com.au
ABN 81 094 433 100

JOB NUMBER **NL222055-02**

PROJECT **ANAMBAH LAND LEASE COMMUNITY**

DRAWING TITLE **EXHIBIT 3(d) - ROAD SETOUT AND LONGITUDINAL SECTION - SHEET 3**

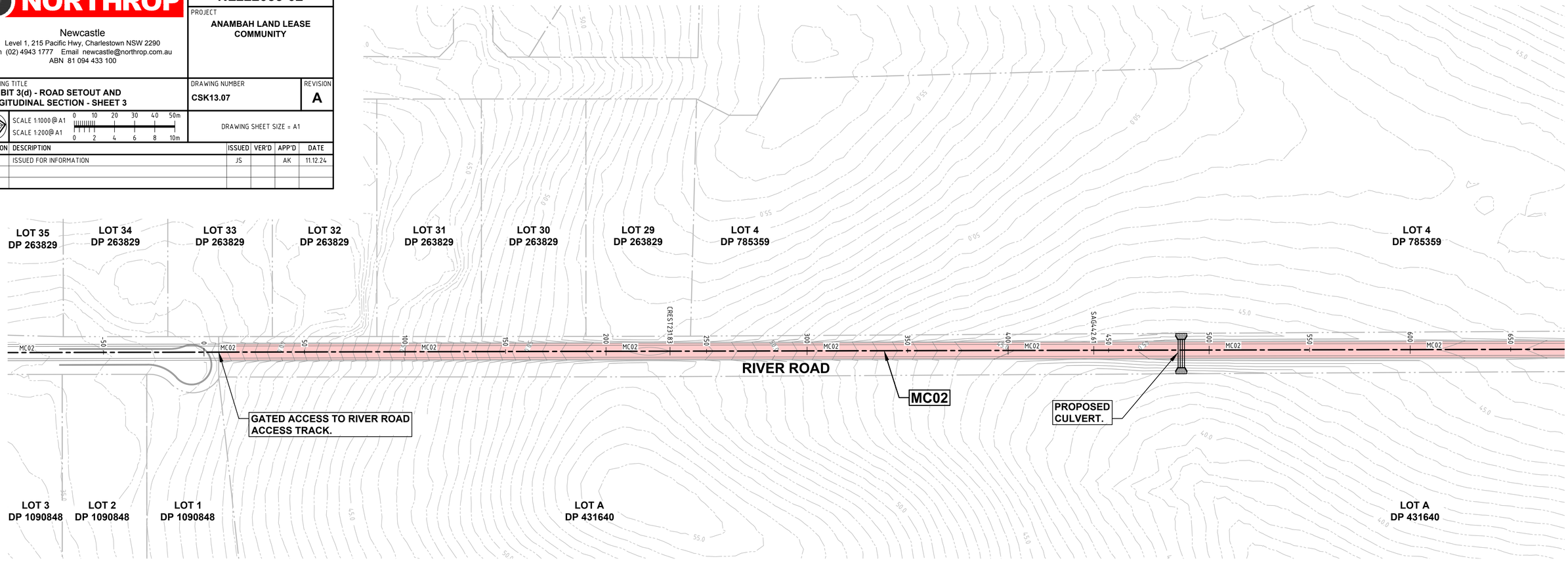
DRAWING NUMBER **CSK13.07**

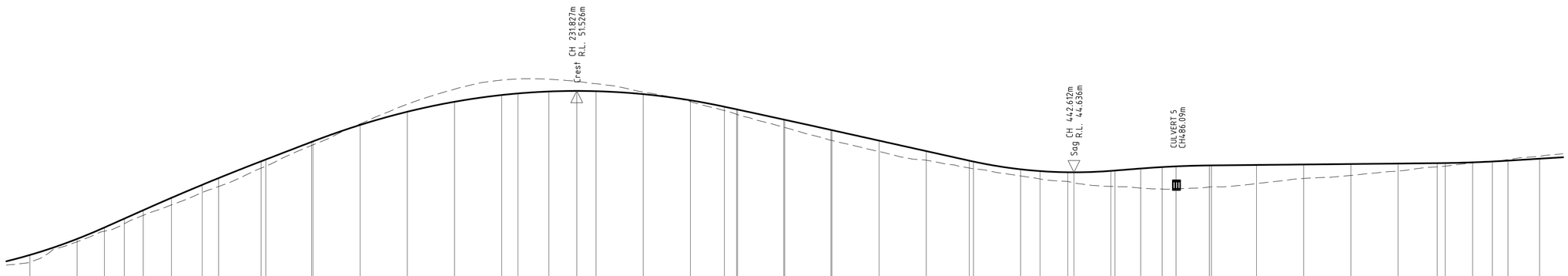
REVISION **A**

SCALE 1:1000 @ A1 (0 10 20 30 40 50m)
SCALE 1:200 @ A1 (0 2 4 6 8 10m)

DRAWING SHEET SIZE = A1

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
A	ISSUED FOR INFORMATION	JS		AK	11.12.24





DESIGN GRADELINE: 8.90% | 7.68% | -4.27% | -4.44% | 1.57% | 0.20% | 1.23%

VERTICAL GEOMETRY: 85.0m V.C. | 50.0m V.C. | 175.0m V.C. | 40.0m V.C. | 60.0m V.C. | 30.0m V.C. | 30.0m V.C.

HORIZONTAL GEOMETRY

DATUM RL 28.0

CHAINAGE	FINISHED SURFACE	EXISTING SURFACE
0	37.636	37.022
20	38.997	38.752
31.582	39.962	39.648
40	40.711	40.282
48.027	41.425	40.994
60	42.473	41.879
73.027	43.574	42.926
80	44.146	43.431
98.027	45.569	44.99
100	45.721	45.149
119.409	47.211	46.909
120	47.256	46.958
140	48.647	48.745
160	49.765	50.409
180	50.609	51.675
200	51.18	52.449
206.909	51.314	52.543
220	51.479	52.519
231.827	51.526	52.338
240	51.503	52.136
260	51.255	51.432
280	50.734	50.609
294.409	50.189	49.865
299.583	49.968	49.55
300	49.95	49.519
319.583	49.105	48.454
320	49.087	48.431
339.583	48.225	47.349
340	48.207	47.329
360	47.319	46.392
380	46.431	45.66
398.254	45.621	44.999
400	45.545	44.942
420	44.892	44.326
428.254	44.739	44.07
440	44.639	43.862
442.612	44.636	43.748
458.254	44.759	43.442
460	44.786	43.428
470.88	44.956	43.298
480	45.08	43.215
485.88	45.14	43.214
500	45.219	43.387
500.88	45.221	43.406
520	45.258	43.68
540	45.298	44.116
560	45.337	44.372
580	45.377	44.741
596.607	45.41	45.096
600	45.419	45.158
611.607	45.478	45.423
620	45.55	45.576
626.607	45.624	45.711
640	45.788	46.003

LONGITUDINAL SECTION ALONG MC02

HORIZONTAL SCALE 1:1000@A1
VERTICAL SCALE 1:200@A1

NORTHROP
Newcastle
Level 1, 215 Pacific Hwy, Charlestown NSW 2290
Ph (02) 4943 1777 Email newcastle@northrop.com.au
ABN 81 094 433 100

JOB NUMBER
NL222055-02

PROJECT
ANAMBAH LAND LEASE COMMUNITY

DRAWING TITLE
EXHIBIT 3(e) - ROAD SETOUT AND LONGITUDINAL SECTION - SHEET 4

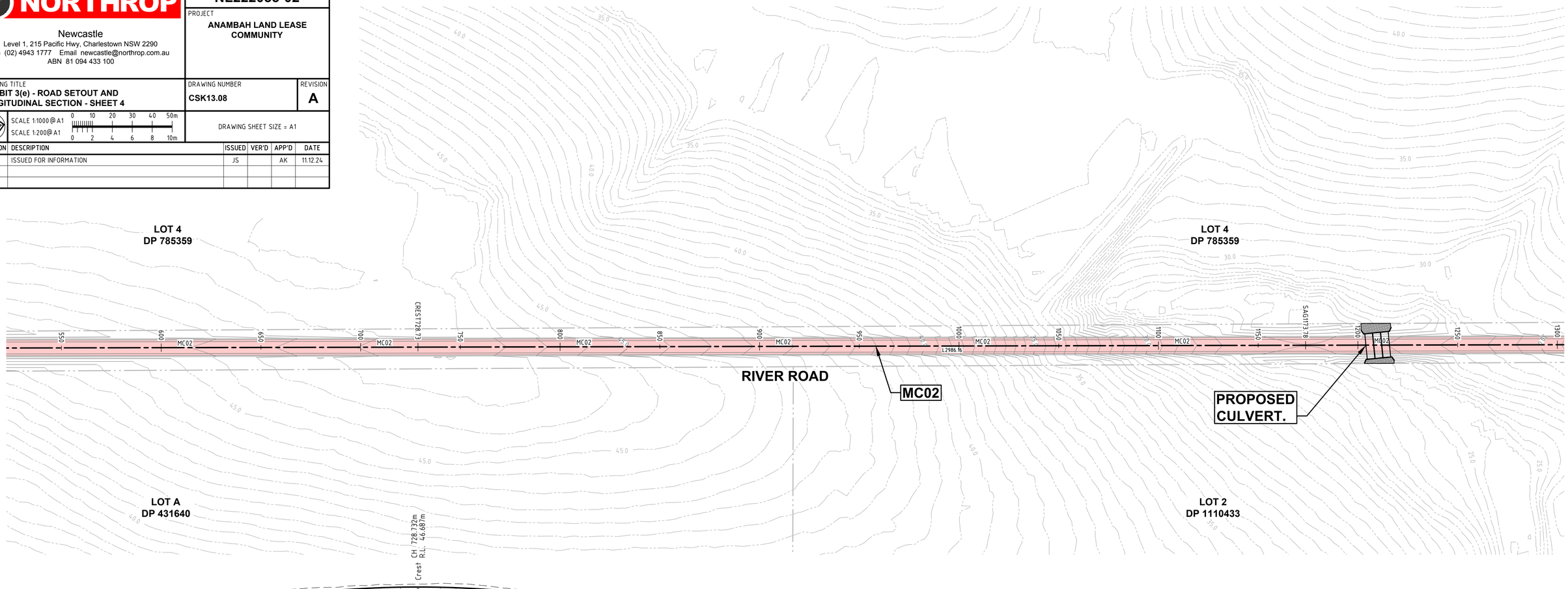
DRAWING NUMBER
CSK13.08

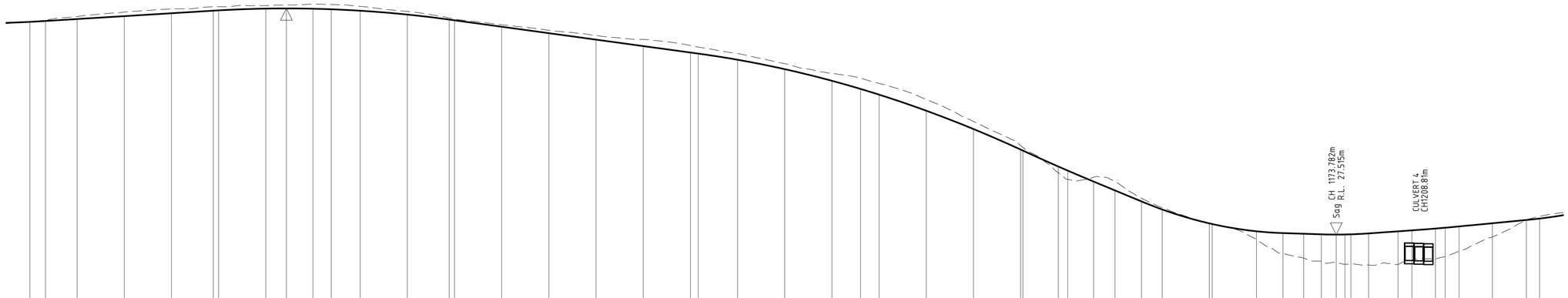
REVISION
A

SCALE 1:1000@A1 (0 10 20 30 40 50m)
SCALE 1:200@A1 (0 2 4 6 8 10m)

DRAWING SHEET SIZE = A1

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
A	ISSUED FOR INFORMATION	JS		AK	11.12.24





DESIGN GRADELINE: 1.23% | -2.73% | -9.21% | -8.30% | -0.65% | 1.41% | 1.92%

VERTICAL GEOMETRY: 30.0m V.C. | 100.0m V.C. | 137.7m V.C. | 30.0m V.C. | 60.0m V.C. | 20.0m V.C. | 20.0m V.C. | 30.0m V.C.

HORIZONTAL GEOMETRY

DATUM RL 15.0

CHAINAGE	FINISHED SURFACE	EXISTING SURFACE
620	45.55	45.576
626.607	45.624	45.711
640	45.788	46.003
660	46.034	46.376
680	46.279	46.649
697.74	46.497	46.831
700	46.524	46.832
720	46.672	46.929
728.732	46.687	46.987
740	46.662	47.059
747.74	46.615	47.019
760	46.493	46.86
780	46.167	46.433
797.74	45.744	45.88
800	45.682	45.802
820	45.136	45.306
840	44.589	44.83
860	44.042	44.392
880	43.496	44.063
900	42.949	43.539
903.312	42.858	43.414
920	42.337	42.866
940	41.539	42.006
960	40.552	41.174
972.137	39.862	40.783
980	39.378	40.335
1000	38.015	38.966
1020	36.463	37.109
1040	34.724	35.053
1040.962	34.635	34.905
1055.962	33.287	32.754
1060	32.936	32.196
1070.962	32.008	32.371
1080	31.257	32.016
1091.23	30.325	30.592
1100	29.646	29.799
1120	28.465	28.438
1121.23	28.409	28.4
1140	27.794	27.089
1151.23	27.641	25.915
1160	27.584	25.516
1167.497	27.536	25.267
1173.782	27.515	25.13
1177.497	27.522	25.002
1180	27.535	25.005
1187.497	27.612	24.928
1200	27.788	24.97
1205.87	27.871	25.344
1215.87	28.025	25.463
1220	28.096	25.459
1225.87	28.204	26.09
1240	28.475	27.322
1254.409	28.751	28.743
1260	28.872	29.062

LONGITUDINAL SECTION ALONG MC02

HORIZONTAL SCALE 1:1000@A1
VERTICAL SCALE 1:200@A1

NORTHROP
Newcastle
Level 1, 215 Pacific Hwy, Charlestown NSW 2290
Ph (02) 4943 1777 Email newcastle@northrop.com.au
ABN 81 094 433 100

JOB NUMBER
NL222055-02

PROJECT
ANAMBAH LAND LEASE COMMUNITY

DRAWING TITLE
EXHIBIT 3(f) - ROAD SETOUT AND LONGITUDINAL SECTION - SHEET 5

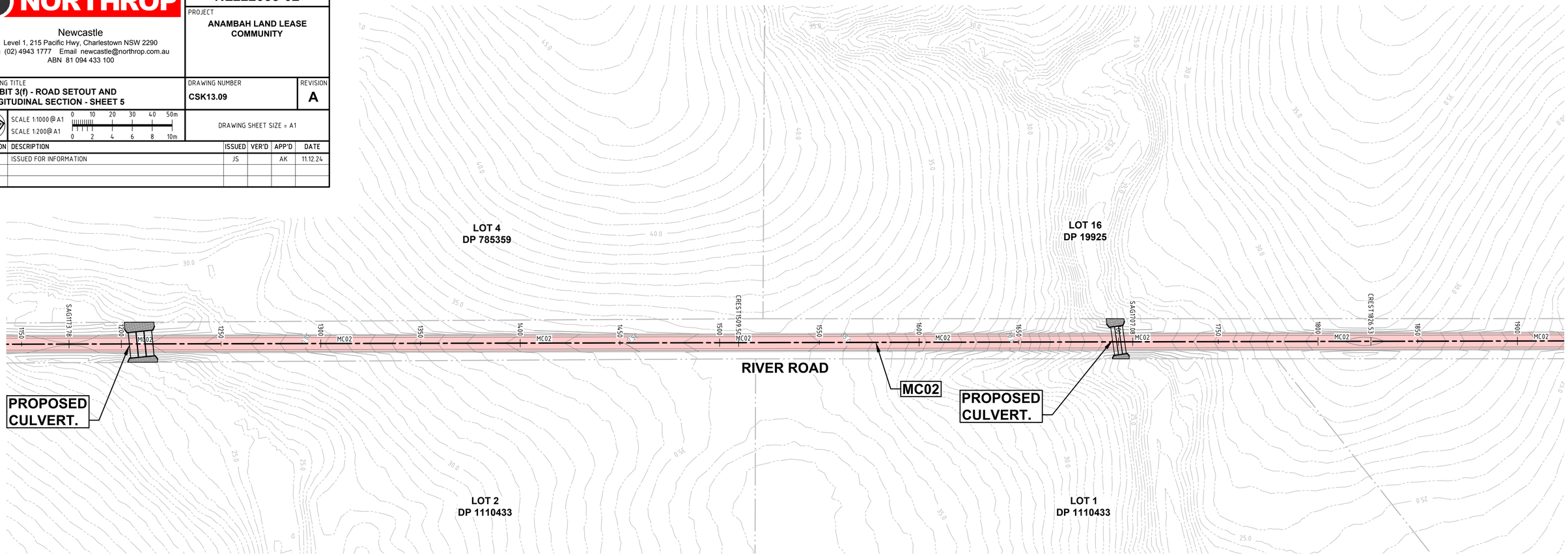
DRAWING NUMBER
CSK13.09

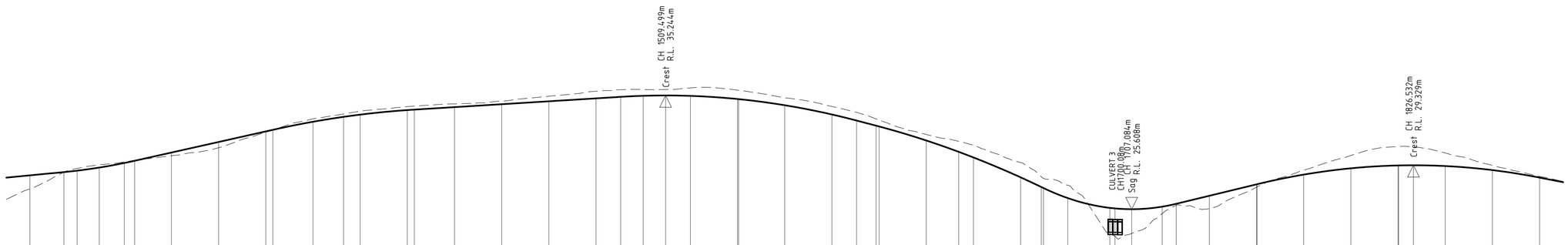
REVISION
A

SCALE 1:1000@A1 (0 10 20 30 40 50m)
SCALE 1:200@A1 (0 2 4 6 8 10m)

DRAWING SHEET SIZE = A1

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
A	ISSUED FOR INFORMATION	JS		AK	11.12.24





DESIGN GRADELINE: 1.92% | 4.48% | 1.24% | -5.25% | -9.59% | 4.84% | -3.93%

VERTICAL GEOMETRY: 30.0m V.C. | 60.0m V.C. | 100.0m V.C. | 70.0m V.C. | 56.3m V.C. | 120.0m V.C.

HORIZONTAL GEOMETRY

DATUM RL 14.0

CHAINAGE	FINISHED SURFACE	EXISTING SURFACE
1240	28.475	27.322
1254.409	28.751	28.743
1260	28.872	29.062
1269.409	29.135	29.363
1280	29.521	29.615
1284.409	29.711	29.76
1300	30.408	30.136
1320	31.304	30.815
1340	32.199	32.125
1342.976	32.332	32.307
1360	33.016	33.265
1372.976	33.432	33.675
1380	33.619	33.907
1400	34.006	34.301
1402.976	34.046	34.34
1420	34.256	34.53
1440	34.503	34.768
1460	34.75	35.181
1480	34.997	35.601
1490.443	35.126	35.731
1500	35.215	35.748
1509.499	35.244	35.752
1520	35.208	35.885
1540	34.943	35.696
1540.443	34.934	35.684
1560	34.417	35.052
1580	33.633	34.313
1590.443	33.12	33.814
1598.747	32.684	33.256
1600	32.618	33.15
1620	31.428	31.938
1633.747	30.467	31.356
1640	29.991	31.037
1660	28.306	29.561
1668.747	27.491	28.37
1669.69	27.4	28.218
1680	26.548	27.635
1697.827	25.718	23.526
1700	25.672	23.314
1707.084	25.608	23.549
1720	25.822	25.228
1725.965	26.065	25.926
1740	26.744	25.662
1760	27.712	27.475
1760.266	27.725	27.503
1780	28.538	28.914
1800	29.072	30.157
1820	29.314	30.915
1820.266	29.315	30.918
1826.532	29.329	30.886
1840	29.263	30.373
1860	28.92	29.316
1880	28.285	28.385

LONGITUDINAL SECTION ALONG MC02

HORIZONTAL SCALE 1:1000@A1
VERTICAL SCALE 1:200@A1

NORTHROP
Newcastle
Level 1, 215 Pacific Hwy, Charlestown NSW 2290
Ph (02) 4943 1777 Email newcastle@northrop.com.au
ABN 81 094 433 100

JOB NUMBER **NL222055-02**

PROJECT **ANAMBAH LAND LEASE COMMUNITY**

DRAWING TITLE **EXHIBIT 3(g) - ROAD SETOUT AND LONGITUDINAL SECTION - SHEET 6**

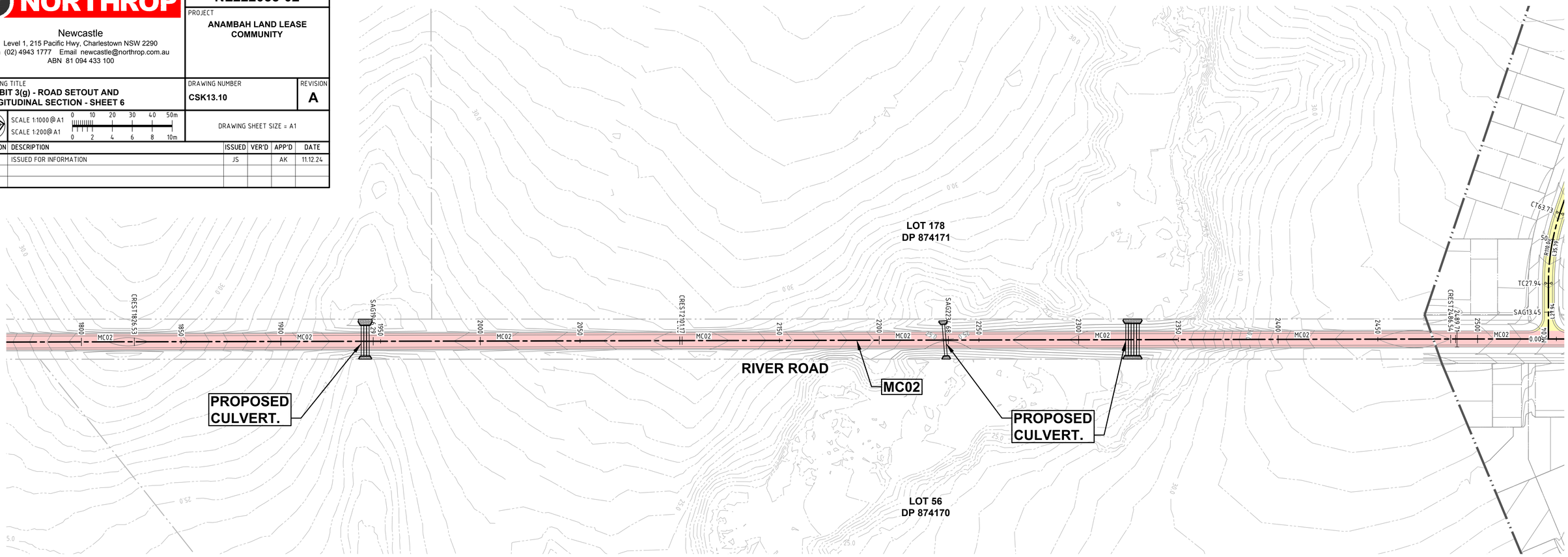
DRAWING NUMBER **CSK13.10**

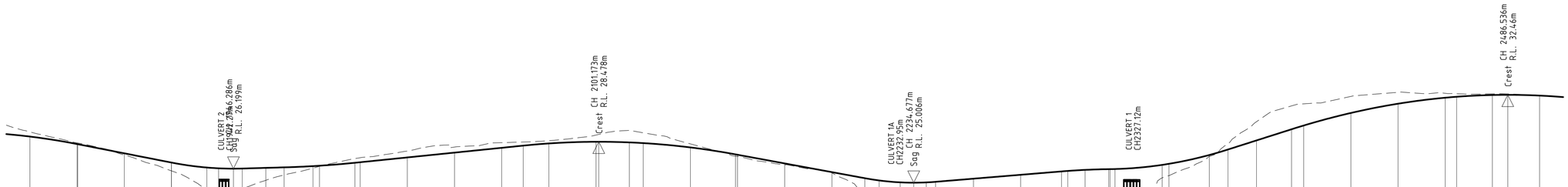
REVISION **A**

SCALE 1:1000@A1 (0 10 20 30 40 50m)
SCALE 1:200@A1 (0 2 4 6 8 10m)

DRAWING SHEET SIZE = A1

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
A	ISSUED FOR INFORMATION	JS		AK	11.12.24





DESIGN GRADELINE: -3.93% | 0.56% | 2.04% | -3.69% | 1.65% | 0.29% | 6.37% | -3.36%

VERTICAL GEOMETRY: 120.0m V.C. | 30.0m V.C. | 30.0m V.C. | 90.0m V.C. | 30.0m V.C. | 20.0m V.C. | 50.0m V.C. | 140.0m V.C.

HORIZONTAL GEOMETRY

DATUM RL 13.0

CHAINAGE	FINISHED SURFACE	EXISTING SURFACE
1860	28.92	29.316
1880	28.285	28.385
1880.266	28.274	28.375
1900	27.5	27.363
1920	26.715	26.01
1920.004	26.715	26.009
1935.004	26.294	24.444
1940	26.228	24.193
1946.286	26.199	24.275
1950.004	26.209	24.49
1960	26.265	25.208
1967.775	26.308	25.664
1980	26.413	26.243
1982.775	26.447	26.391
1997.775	26.697	27.051
2000	26.742	27.125
2020	27.15	27.693
2040	27.558	28.029
2060	27.965	28.402
2069.127	28.151	28.459
2080	28.336	28.567
2100	28.478	29.05
2101.173	28.478	29.105
2114.127	28.425	29.441
2120	28.365	29.242
2140	27.999	28.3
2159.127	27.41	27.254
2160	27.378	27.233
2180	26.64	26.512
2200	25.903	25.834
2213.945	25.389	23.923
2220	25.198	22.997
2228.945	25.036	22.898
2234.677	25.006	22.944
2240	25.032	23.21
2243.945	25.083	23.251
2260	25.347	23.276
2280	25.677	23.631
2297.336	25.963	23.985
2300	26.004	24.065
2307.336	26.094	24.212
2317.336	26.156	24.491
2317.897	26.158	24.497
2320	26.166	24.502
2340	26.518	25.415
2342.897	26.609	25.607
2360	27.357	27.229
2367.897	27.822	28.289
2380	28.593	30.182
2394.86	29.54	31.523
2400	29.858	31.696
2420	30.922	32.325
2440	31.708	32.675
2460	32.216	32.591
2464.86	32.297	32.556
2480	32.446	32.545
2486.536	32.46	32.539
2500	32.397	32.396

LONGITUDINAL SECTION ALONG MC02

HORIZONTAL SCALE 1:1000@A1
VERTICAL SCALE 1:200@A1

NORTHROP
Newcastle
Level 1, 215 Pacific Hwy, Charlestown NSW 2290
Ph (02) 4943 1777 Email newcastle@northrop.com.au
ABN 81 094 433 100

JOB NUMBER
NL222055-02

PROJECT
ANAMBAH LAND LEASE COMMUNITY

DRAWING TITLE
EXHIBIT 3(h) - ROAD SETOUT AND LONGITUDINAL SECTION - SHEET 7

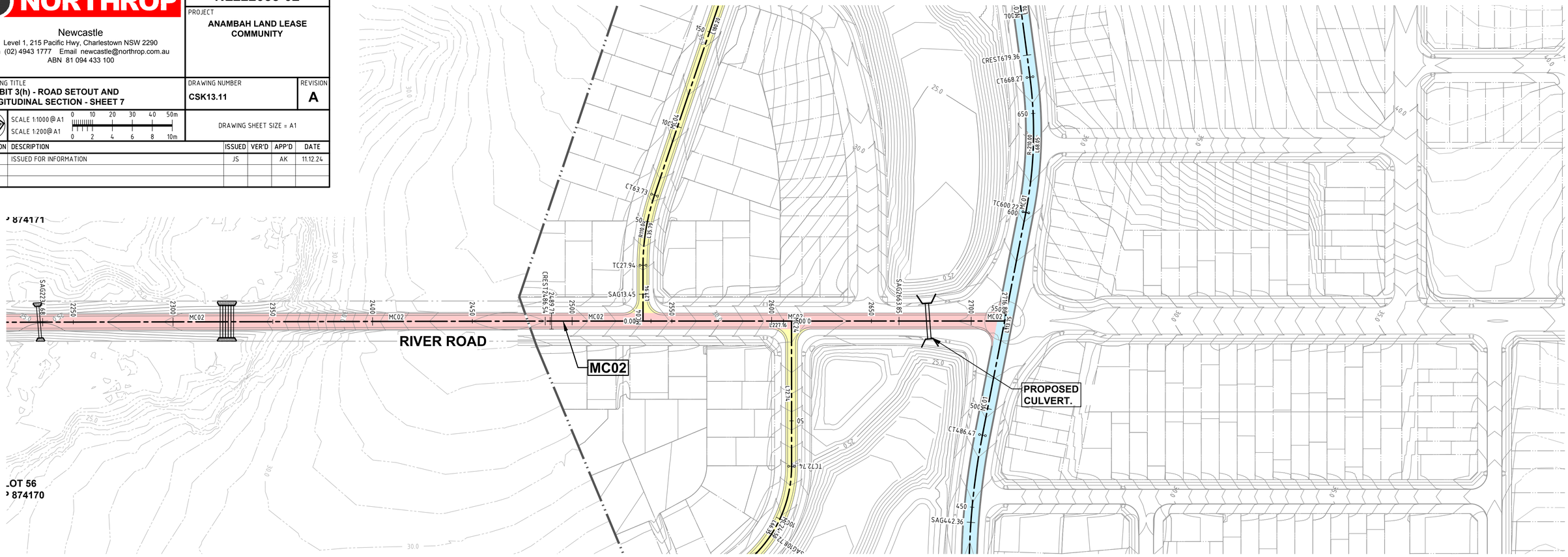
DRAWING NUMBER
CSK13.11

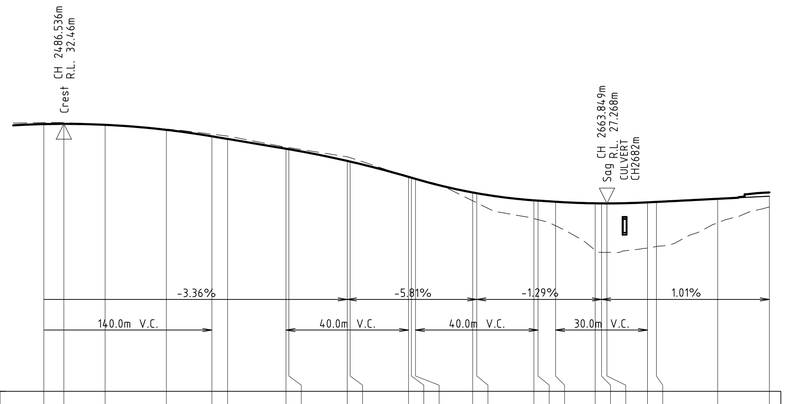
REVISION
A

SCALE 1:1000 @ A1 (0 10 20 30 40 50m)
SCALE 1:200 @ A1 (0 2 4 6 8 10m)

DRAWING SHEET SIZE = A1

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
A	ISSUED FOR INFORMATION	JS		AK	11.12.24





CHAINAGE	FINISHED SURFACE	EXISTING SURFACE
2480	32.446	32.545
2486.536	32.46	32.539
2500	32.397	32.396
2520	32.071	32.116
2534.86	31.649	31.792
2540	31.476	31.663
2559.054	30.836	30.944
2560	30.804	30.914
2579.054	30.042	30.309
2580	29.998	30.251
2599.054	29.002	29.031
2600	28.947	28.977
2601.341	28.869	28.908
2620	27.982	27.44
2621.341	27.933	27.308
2640	27.468	26.272
2641.341	27.45	26.206
2647.071	27.376	25.813
2660	27.274	24.21
2662.071	27.27	24.073
2663.84.9	27.268	24.07
2677.071	27.335	24.347
2680	27.365	24.458
2700	27.568	26.006
2716.863	27.739	27.044

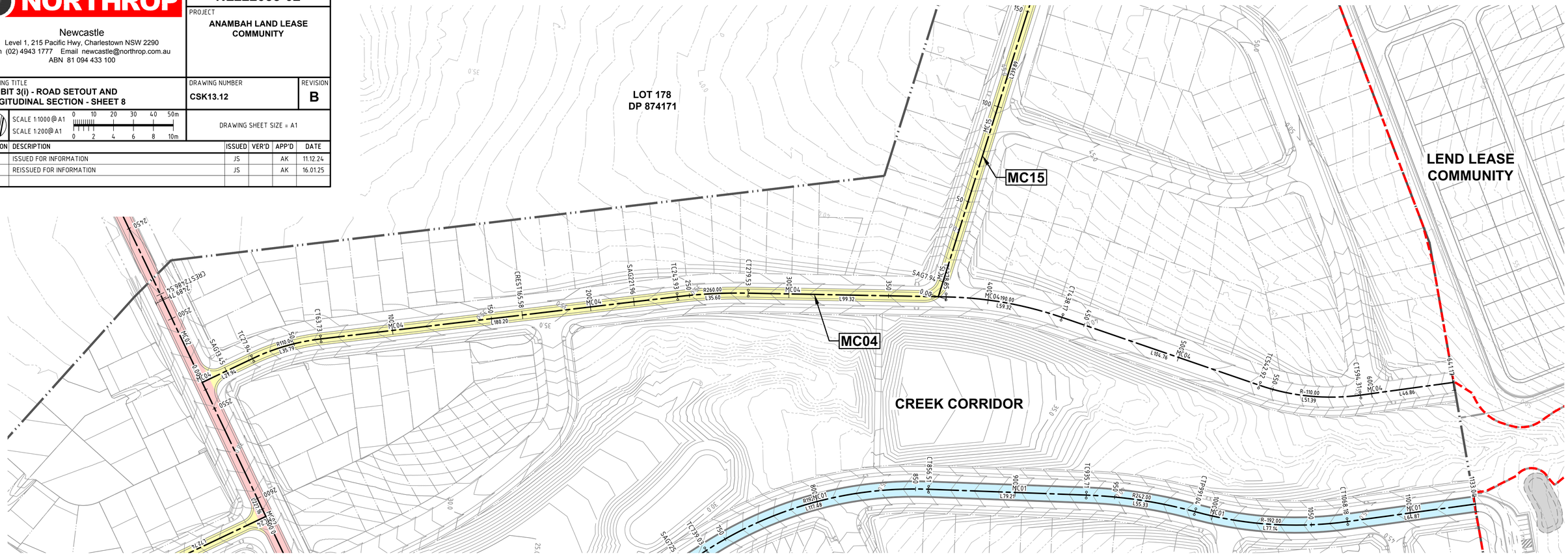
LONGITUDINAL SECTION ALONG MC02

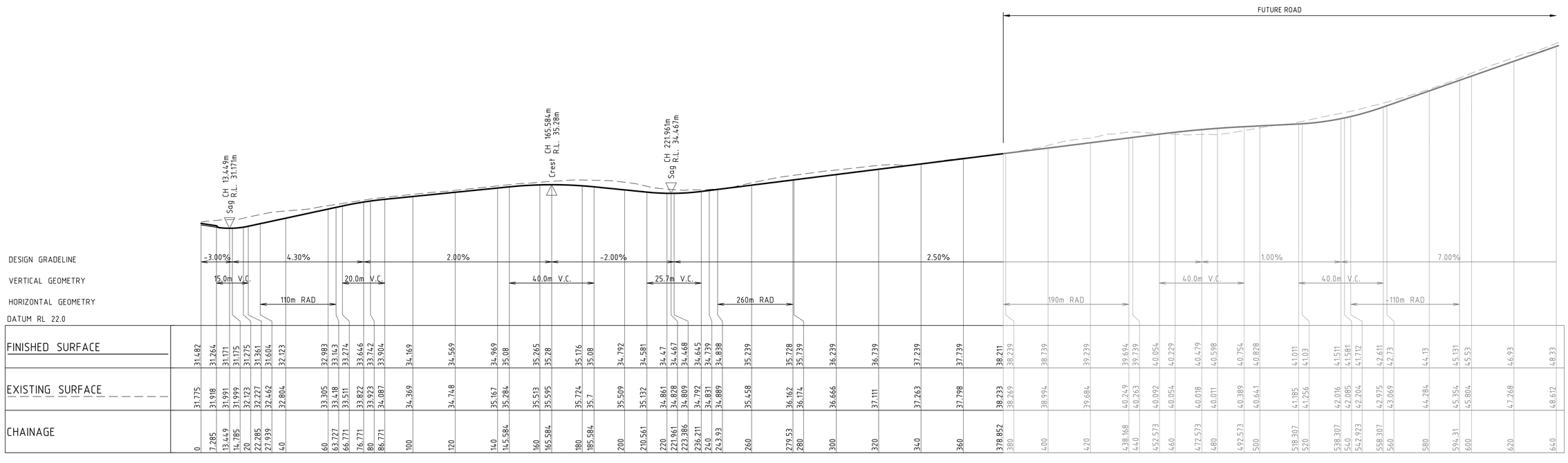
HORIZONTAL SCALE 1:1000@A1
VERTICAL SCALE 1:200@A1

NORTHROP
Newcastle
Level 1, 215 Pacific Hwy, Charlestown NSW 2290
Ph (02) 4943 1777 Email newcastle@northrop.com.au
ABN 81 094 433 100

JOB NUMBER	NL222055-02
PROJECT	ANAMBAH LAND LEASE COMMUNITY
DRAWING TITLE	EXHIBIT 3(i) - ROAD SETOUT AND LONGITUDINAL SECTION - SHEET 8
DRAWING NUMBER	CSK13.12
REVISION	B
SCALE 1:1000 @ A1	0 10 20 30 40 50m
SCALE 1:200 @ A1	0 2 4 6 8 10m
DRAWING SHEET SIZE = A1	

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
A	ISSUED FOR INFORMATION	JS		AK	11.12.24
B	REISSUED FOR INFORMATION	JS		AK	16.01.25





CHAINAGE	FINISHED SURFACE	EXISTING SURFACE
0	31.482	31.775
7.285	31.264	31.918
13.449	31.171	31.991
14.785	31.175	31.999
20	31.275	32.123
22.285	31.361	32.227
27.939	31.604	32.462
40	32.123	32.804
60	32.983	33.305
63.727	33.143	33.418
66.771	33.274	33.511
76.771	33.646	33.822
80	33.742	33.923
86.771	33.904	34.087
100	34.169	34.369
120	34.569	34.748
140	34.969	35.167
145.584	35.08	35.284
160	35.265	35.513
165.584	35.28	35.595
180	35.176	35.724
185.584	35.08	35.7
200	34.792	35.509
210.561	34.581	35.132
220	34.47	34.861
221.961	34.467	34.828
223.386	34.468	34.809
236.211	34.645	34.792
240	34.739	34.831
243.93	34.838	34.889
260	35.239	35.458
279.53	35.728	36.162
280	35.739	36.174
300	36.239	36.666
320	36.739	37.111
340	37.239	37.263
360	37.739	37.798
378.852	38.211	38.233
380	38.239	38.269
400	38.739	38.994
420	39.239	39.684
438.168	39.694	40.249
440	39.739	40.263
452.573	40.054	40.092
460	40.229	40.054
472.573	40.479	40.018
480	40.598	40.011
492.573	40.754	40.389
500	40.828	40.641
518.307	41.011	41.185
520	41.03	41.256
538.307	41.511	42.016
540	41.581	42.085
542.923	41.712	42.204
558.307	42.611	42.975
560	42.73	43.069
580	44.13	44.284
594.31	45.131	45.354
600	45.53	45.804
620	46.93	47.268
640	48.33	48.612

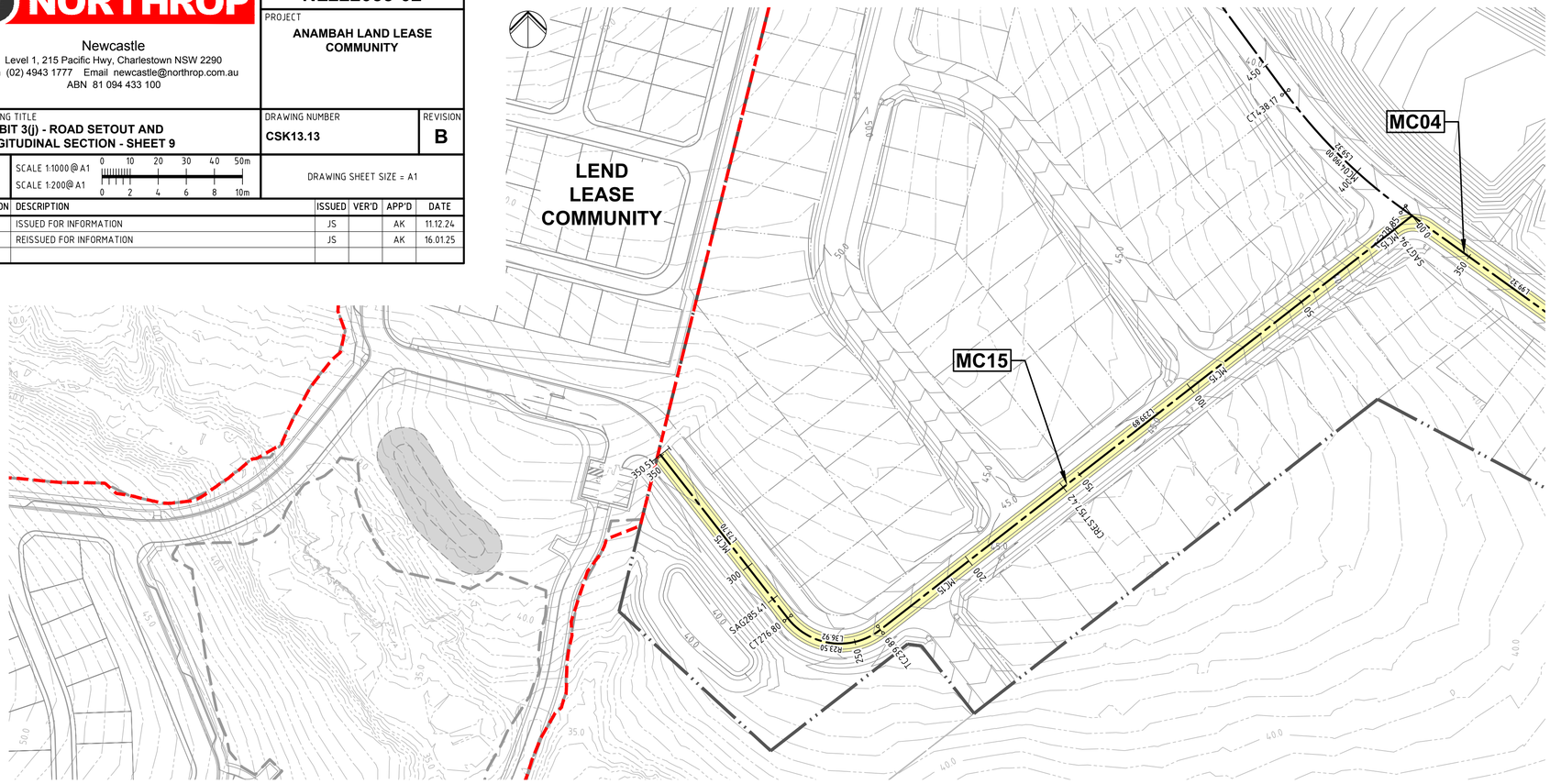
LONGITUDINAL SECTION ALONG MC04

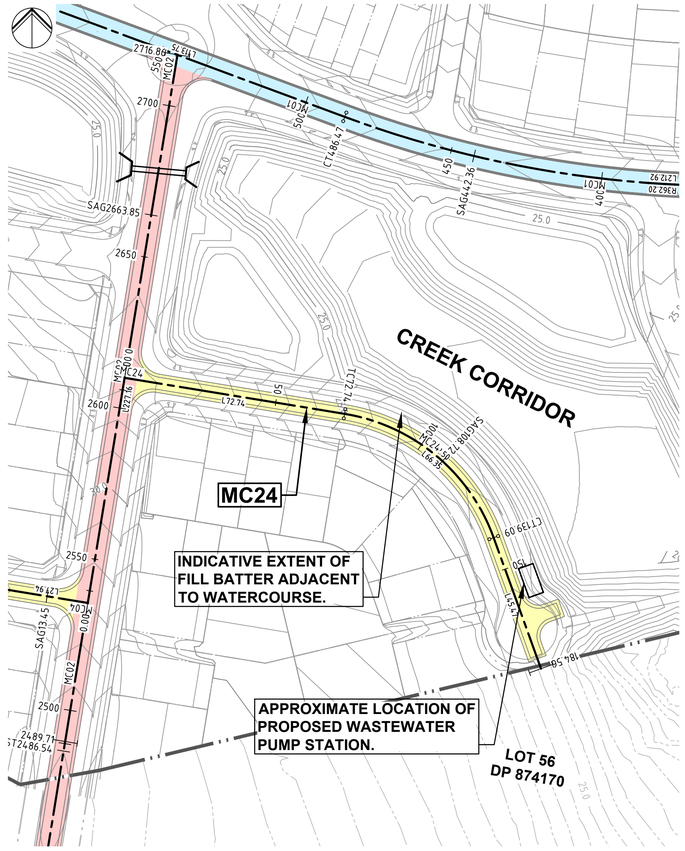
HORIZONTAL SCALE 1:1000@A1
VERTICAL SCALE 1:200@A1

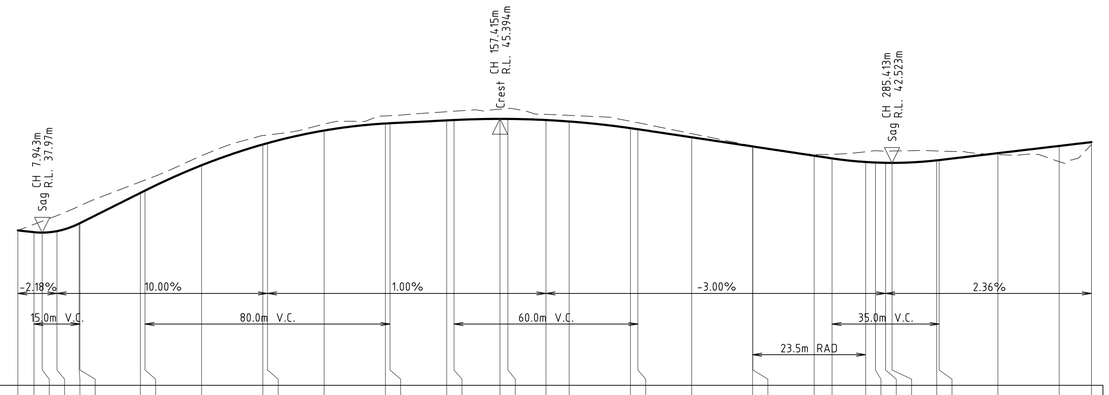
NORTHROP
Newcastle
Level 1, 215 Pacific Hwy, Charlestown NSW 2290
Ph (02) 4943 1777 Email newcastle@northrop.com.au
ABN 81 094 433 100

JOB NUMBER	NL222055-02
PROJECT	ANAMBAH LAND LEASE COMMUNITY
DRAWING TITLE	EXHIBIT 3(j) - ROAD SETOUT AND LONGITUDINAL SECTION - SHEET 9
DRAWING NUMBER	CSK13.13
REVISION	B
SCALE 1:1000@A1	0 10 20 30 40 50m
SCALE 1:200@A1	0 2 4 6 8 10m
DRAWING SHEET SIZE = A1	

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
A	ISSUED FOR INFORMATION	JS		AK	11.12.24
B	REISSUED FOR INFORMATION	JS		AK	16.01.25





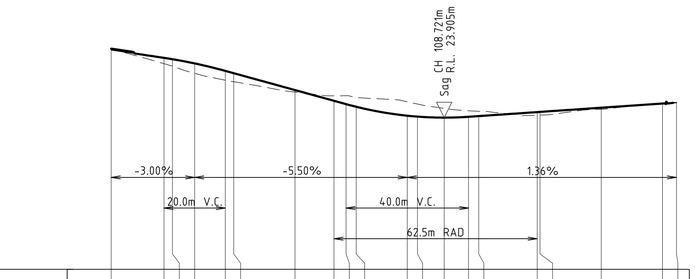


DESIGN GRADELINE	-2.18%	10.00%	1.00%	-3.00%	2.36%
VERTICAL GEOMETRY	15.0m V.C.	80.0m V.C.	60.0m V.C.	35.0m V.C.	
HORIZONTAL GEOMETRY				23.5m RAD	
DATUM RL 28.0					

CHAINAGE	FINISHED SURFACE	EXISTING SURFACE
0	38.113	38.11
5.262	37.999	38.509
7.943	37.97	38.713
12.762	38.064	39.077
20	38.56	39.697
20.262	38.586	39.721
40	40.559	41.285
41.51	40.71	41.4
60	42.367	42.991
80	43.726	44.306
81.51	43.81	44.343
100	44.635	45.055
120	45.094	45.587
121.51	45.11	45.6
140	45.295	45.862
142.415	45.319	45.895
157.415	45.394	46.031
160	45.392	46.072
172.415	45.319	45.687
180	45.224	45.623
200	44.79	45.24
202.415	44.719	45.147
220	44.192	44.431
239.887	43.595	43.644
240	43.592	43.64
260	42.992	43.075
265.815	42.817	43.079
276.804	42.58	43.246
280	42.546	43.318
283.315	42.527	43.288
285.413	42.523	43.295
300	42.686	43.299
300.815	42.705	43.292
320	43.157	43.068
340	43.629	42.602
350.506	43.877	43.719

LONGITUDINAL SECTION ALONG MC15

HORIZONTAL SCALE 1:1000@A1
VERTICAL SCALE 1:200@A1



DESIGN GRADELINE	-3.00%	-5.50%	1.36%
VERTICAL GEOMETRY	20.0m V.C.	40.0m V.C.	
HORIZONTAL GEOMETRY		62.5m RAD	
DATUM RL 14.0			

CHAINAGE	FINISHED SURFACE	EXISTING SURFACE
0	28.322	28.411
17.25	27.804	27.424
20	27.717	27.262
27.25	27.442	26.798
37.25	26.954	26.342
40	26.803	26.245
60	25.703	25.57
72.74	25.002	25.325
76.665	24.787	25.332
80	24.613	25.214
96.665	24.03	24.935
100	23.97	24.788
108.721	23.905	24.5
116.665	23.959	24.345
120	24.005	24.313
139.095	24.265	24.057
140	24.277	24.065
160	24.55	24.448
180	24.822	24.855
184.563	24.885	24.89

LONGITUDINAL SECTION ALONG MC24

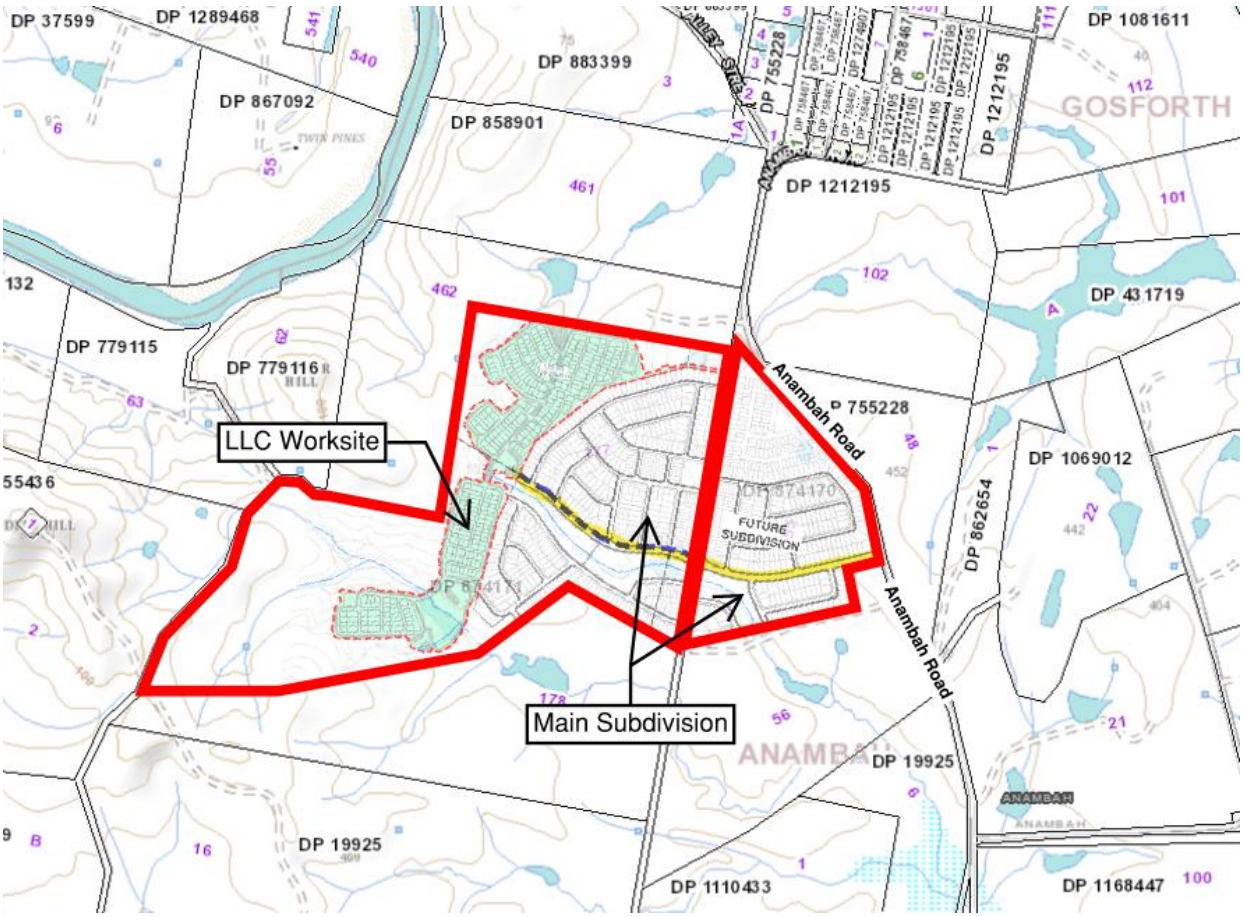
HORIZONTAL SCALE 1:1000@A1
VERTICAL SCALE 1:200@A1

Appendix B – Electrical Supply Advice

Electrical Supply Investigation for "The Vision"

559 Anambah Rd Gosforth

December 2024



C106/215 Pacific Hwy Charlestown NSW
PO BOX 278 Charlestown NSW 2290
& Suite 910, Level 7, 91 Phillip Street Parramatta NSW
t: 1300 732 293 | e: projects@powersol.com.au

DOCUMENT CONTROL

Version	Date	Author	Reviewer	Revision Details
1	25/03/2024	Ben Dennis	Steve Goman	Initial Issue
2	22/08/2024	Ben Dennis	Steve Goman	Updated for Preliminary Enquiry Submission
3	26/08/2024	Ben Dennis	Steve Goman	Updated number of lots as per client comments
4	11/12/2024	Thomas de Jager	Jamie Antonuccio	Inclusion of additional LCC development and Ausgrid prelim enquiry response

CONTENTS

1) EXECUTIVE SUMMARY

Power Solutions were engaged to investigate supply options for the development of 559 Anambah Rd, Gosforth. It is intended that the area be development for a maximum of 900 lots. Following a review of the existing network it was determined there is limited spare capacity on the HV network in the area and there is a strong possibility of requiring significant upgrades if the capacity is not secured soon. Capacity can be secured by negotiating a contract with Ausgrid.

Four supply options were identified, depending on the amount of available capacity and the timeline of the development:

1. Upgrade existing feeders 29876 and 29878 (approx. 1 year and $1.5M)
2. Install a new feeder from Rutherford Zone Substation to the development site (approx. 1.5 years and $5M)
3. Upgrade Rutherford Zone Substation (approx. 5 years and $25M)
4. Wait for Ausgrid's new zone sub and install new feeder (approx. 12 years and $8M). Zone sub timing and location unconfirmed.

Cost and time may differ greatly from the estimates provided.

Power Solutions has lodged a Preliminary Enquiry to Ausgrid to confirm how much capacity is available and which option/s will be realistic. Ausgrid responded and advised that there is limited capacity on feeder 29876 and no spare capacity on 29878. Ausgrid recommends installing a new U/G 11kV feeder from Rutherford zone substation to supply the development.

2) BACKGROUND

The site is to be redeveloped as a residential subdivision of maximum 900 lots. To facilitate this development, it will be necessary to determine if the existing electrical distribution network in the area can be augmented to allow for the additional load or if significant High Voltage upgrades will be required.

From preliminary discussions with regarding many new development projects around the Lochinvar area, Ausgrid are aware of the limited spare capacity of Rutherford Zone Substation.

Ausgrid have advised in the past 6-12 months that Rutherford Zone Substation is approaching full capacity, and they are planning to install a new Zone Substation somewhere between Rutherford and Branxton. The planning, design and construction of a Zone Substation may around 10 years.

A Preliminary Enquiry to Ausgrid will provide an up-to-date confirmation of the capacity available and feeder loading. Lodging a connection application and negotiating a contract with Ausgrid will allow the developer to secure some of the spare capacity to supply at least some of the development.

It needs to be noted here that other developers in the area will be subject to the same limitations and Ausgrid traditionally allocate capacity in a "first come first served" order. Any delays before submitting an application and negotiating a contract with Ausgrid could dramatically impact the capacity available.

3) SCOPE

Power Solutions Pty Ltd have been engaged by Northrop Pty Ltd to complete the following:

- Assess the current site infrastructure and services (electrical)
- Provide a summary of likely connection and infrastructure augmentation requirements to support the development (including spatial allowances that should be made if any)
- Submit a Preliminary Enquiry to Ausgrid to confirm the available capacity and necessary upgrades

This report presents the findings for this scope of works.

4) ASSESSMENT OF EXISTING ELECTRICAL INFRASTRUCTURE

After a review of the existing infrastructure via WebGIS, the following assessment was determined.

Gosforth and Anambah are currently serviced by 11kV feeder 29878 that originates at Rutherford Zone Substation and runs via Lochinvar and Windermere. This feeder crosses the Hunter River twice to come into Gosforth and feed south to Anambah where it terminates. This is a very long feeder that tees off multiple times and services a large area. It reaches as far as Lovedale and Lamb's Valley.

There is a second feeder (29876) that runs from Rutherford Zone Substation and turns up Anambah Road from the New England Highway. There is approximately 1.5-2.0km of Anambah Rd without HV powerlines between the ends of the two feeders. Spare capacity on these two feeders appears to be limited.

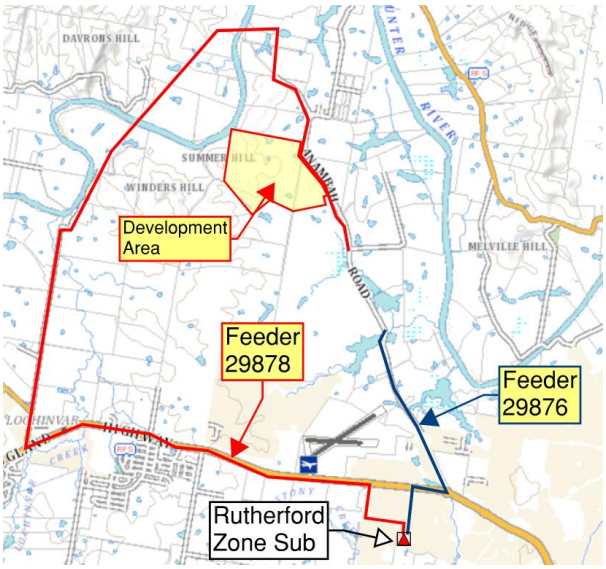
The existing feeder 29876 is bordering the development lot but is only in a 2-phase configuration. Approximately 1km of new 11kV overhead conductor is required to provide a 3-phase supply.

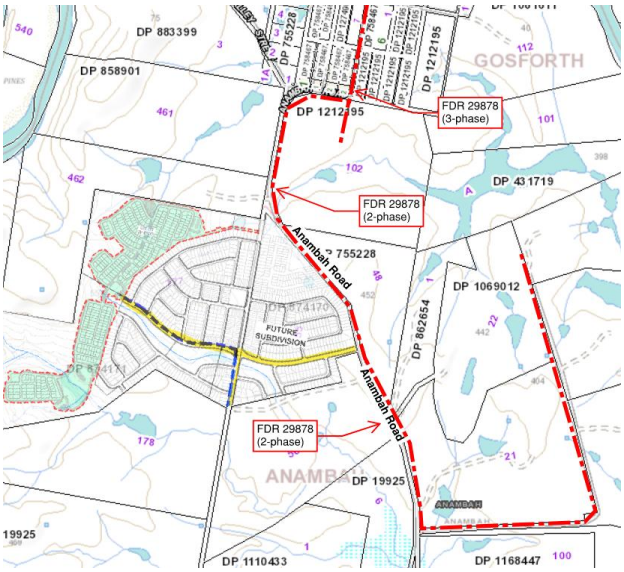
Note that a development of 900 residential lots will need approximately 3.5 MVA of power, which equates to approximately 184 amps at 11kV. Adding commercial lots will increase this load.

For a new development like this, Ausgrid will require two alternative supplies in the area so that customer supply can be maintained during feeder maintenance and unplanned outages.

Rutherford Zone Substation is a 33/11kV substation with two 30MVA transformers and 11kV switchgear with spaces for 12 feeders, of which only one is spare (feeder 29881). The substation yard appears to have space to allow a third transformer and additional 33kV bus if required. The two existing 33kV feeders supplying Rutherford Zone Substation are overhead lines from Kurri Kurri Sub-Transmission Substation.

Simplified feeder routes sketch is shown in the figure below. This sketch shows indictive routes from Rutherford Zone Sub to the investigation area only and does not include tee-offs servicing other areas.





5) LLC SUPPLY OPTION (EXCLUDING MAIN SUBDIVISION SUPPLY)

Based on review of the existing Ausgrid 11kV network in the area around the development, it is unlikely that the existing network can facilitate any new connections without significant network augmentation.

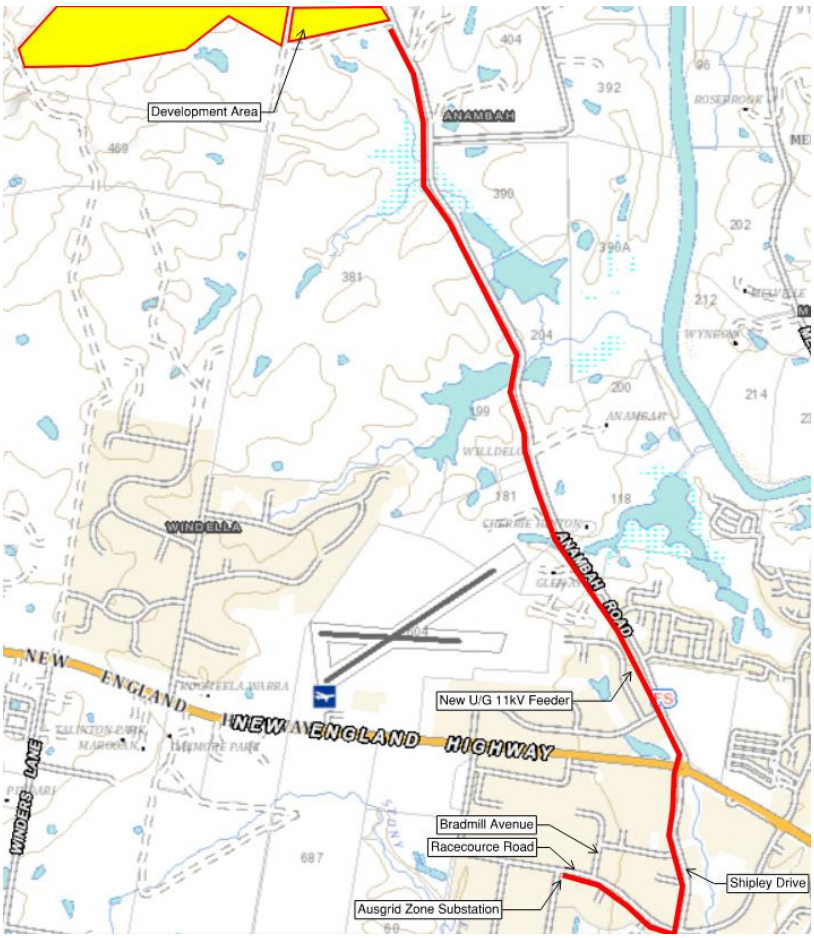
As mentioned in the Ausgrid preliminary enquiry response, 11kV feeder 29878 has no spare capacity and is unable to facilitate new connections.

The alternative 11kV feeder 29876 is approximately 2km South of the LLC site. This feeder has approximately 3MVA of spare capacity available. It may be possible to supply up to 850 residential lots with this supply. An N-1 connection will still be required to “loop in” the new connection to the existing 11kV network.

For a new development with underground reticulation Ausgrid will require an 11kV interconnection. This interconnection is generally made so that in the event of a fault, the secondary feeder can provide supply. This is known as N-1 contingency.

For this development, if an 11kV supply is sought from feeder 29876, Ausgrid may not approve 11kV feeder 29878 as a suitable N-1 interconnection. Ausgrid may request that a new feeder be installed from Rutherford zone substation.

A new 11kV U/G feeder could be installed from the zone substation on Racecource Rd, East along Racecource Rd to Shipley Drive. North along Shiple Drive to the roundabout with New England HWY and Anambah Road. Then along Anambah Road to the development. This will be approx. 7km.



6) AUSGRID PRELIMINARY ENQUIRY RESPONSE

Ausgrid has provided a response to the preliminary enquiry on 22/10/2024.

In summary:

- The existing 11kV feeder 29876 has approximately 3MVA of available capacity.
- The existing 11kV feeder 29878 has no spare capacity.
- Ausgrid recommends installing a new 11kV U/G feeder from Rutherford Zone Substation to supply the development.
- Rutherford only has 1 spare 11kV feeder circuit breaker available.
- Ausgrid is planning to construct another zone substation in the Rutherford/Telarah area sometime between 2030 and 2040.

7) ELECTRICAL SUPPLY OPTIONS

7.1 OPTION 1 – Upgrade existing 11kV Feeders

If there is sufficient capacity available on the existing 11kV feeders 29878 and 29876, these can be utilised to service the development. This will likely mean upgrading overhead conductors along sections of both feeders as well as extending feeder 29876 along Anambah Rd to connect to 29878. This will provide the alternative supply for maintenance.

Note that Ausgrid need to confirm capacity on both feeders before this option can be confirmed.

7.2 OPTION 2 – Install New 11kV Feeder

If there is insufficient capacity on the existing feeders, Ausgrid may determine the development needs a new feeder to be installed from Rutherford Zone Substation. This will likely involve installing approximately 5.5km of underground cable to the site, following a similar route to feeder 29876. There will likely be some smaller upgrades required to one or both existing feeders in the area to allow interconnection.

Note that Ausgrid need to confirm capacity on existing feeders and Rutherford Zone Substation before this option can be confirmed.

7.3 OPTION 3 – Zone Substation Upgrades

If Ausgrid determine there is insufficient spare capacity on the feeders and the zone sub, the next option will be to upgrade the Rutherford Zone Substation. This will involve installing a new 33kV feeder from Kurri Kurri Sub-Transmission Substation to Rutherford Zone Substation, adding a transformer and associated switchgear. This will add capacity to allow connection of a new 11kV feeder per Option 2 above.

This option will come at significant cost to the developer and will have a long lead time for design and construction. The implications for this option should be closely considered before progressing. If some capacity can be secured using either of the first two options above, it may be beneficial to wait for Ausgrid to complete construction of their new Zone Substation. This will depend on things like development staging timeline, amount of existing capacity available etc.

7.4 OPTION 4 – Wait for New Zone Substation

This option will best suit a development timeline that is in the infancy of planning that can wait 10 years for Stage 1 to be energised, or when the cost implications of the other options make the development unfeasible.

This option will still come with some 11kV network installation/augmentation work, but at a significantly reduced scope from Option 3.

Some risks of this is option are:

- New Zone Substation timeline is currently unconfirmed. Expecting approximately 2035
- New Zone Substation location unconfirmed. There may still be large costs in running a new feeder from Lochinvar, Harpers Hill, or Greta if required.

8) OPTIONS COST AND TIME ESTIMATES

Note that the costs below are based on market data and are only estimates. The fees listed below are combined estimates of design fess, Ausgrid fees, construction fees. For budgeting purposes, it is advisable to add 50% to these figures.

COST AND LEAD TIME ESTIMATES		
Description	**Years**	**Cost**
Option 1 – Upgrade existing feeders	1	$1,500,000
Option 2 – Install new feeder	1.5	$5,000,000
Option 3 – Zone Substation upgrades	5	$25,000,000
Option 4 – Wait for new zone substation (incl new 11kV feeder)	12	$8,000,000

9) CONCLUSIONS

There is limited spare capacity on the 11kV feeders coming from Rutherford Zone Sub. The two existing feeders in the area (29876 & 29878) can be upgraded to use all remaining capacity, which is unlikely to supply the whole development.

If more power is required, Rutherford Zone Substation has one spare circuit breaker for connection of a new 11kV feeder. This would involve installing approximately 5.5km of 11kV cable from Rutherford to the development site. This new 11kV connection will be dependent on the maximum capacity of the substation.

A preliminary enquiry has been submitted to Ausgrid to determine the capacity of the network and the upgrades required. Ausgrid responded and advised that there is limited capacity on feeder 29876 and no spare capacity on 29878. Ausgrid recommends installing a new U/G 11kV feeder from Rutherford zone substation to supply the development.