

PROJECT: AMITY COLLEGE LEPPINGTON CAMPUS

PLANSET: CIVIL WORKS PLAN

CLIENT: AMITY COLLEGE



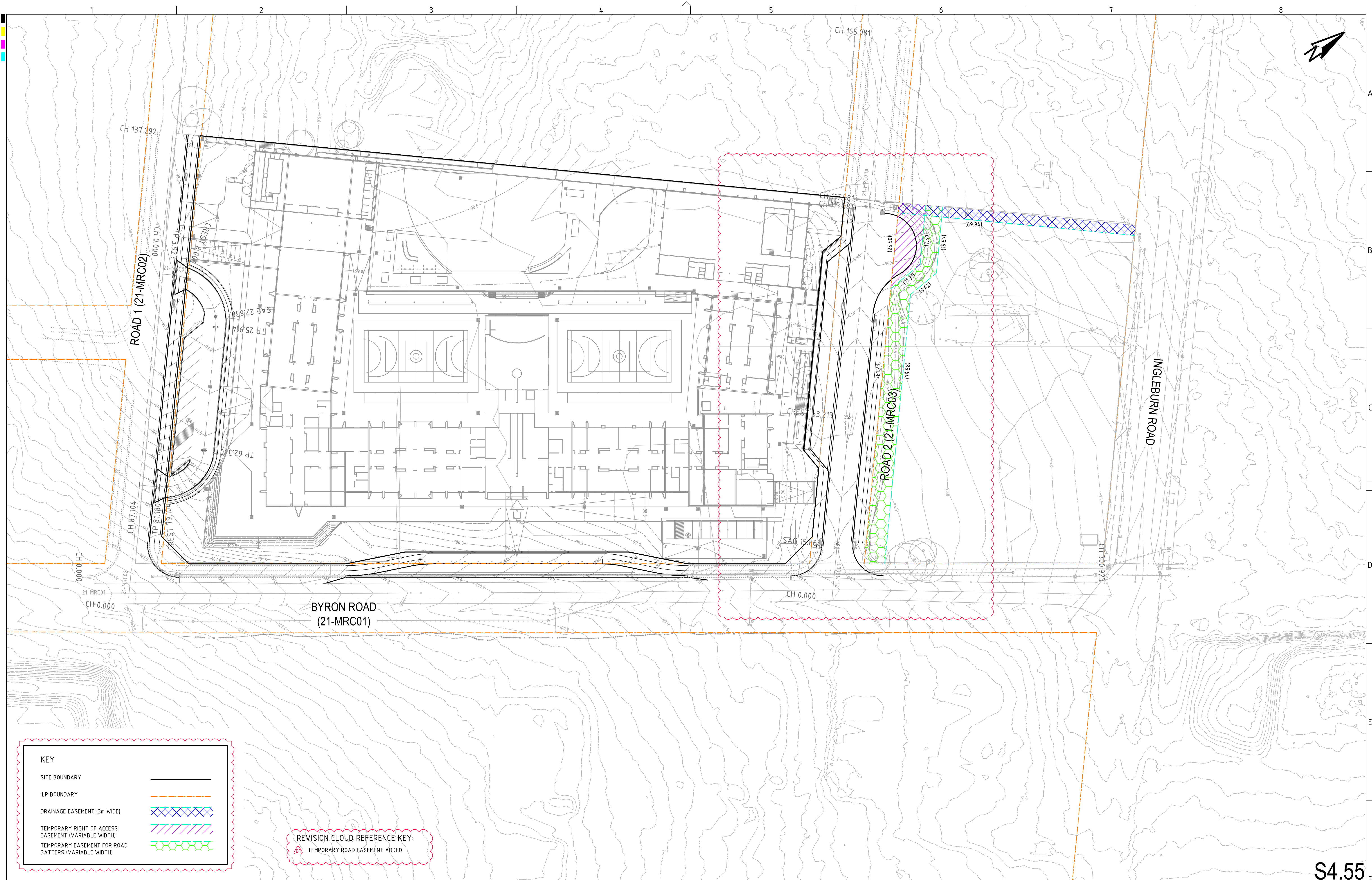
LOCALITY PLAN
NOT TO SCALE

LGA: CAMDEN COUNCIL
85 BYRON RD, LEPPINGTON, NSW 2171
LOT 1 & 2 DP 525996

DRAWING LIST		
DWG NO.	REV	DWG TITLE
GENERAL		
PS08-A000	C	COVER SHEET
PS08-A050	A	DEVELOPMENT OVERVIEW PLAN
CONSTRUCTION MANAGEMENT WORKS		
PS08-B100	B	STAGE 1 OVERVIEW PLAN
PS08-B301	B	SEDIMENT & EROSION CONTROL AND CLEARING PLAN (STAGE 1)
EARTHWORKS		
PS08-C100	A	EARTHWORKS GRADING PLAN (ULTIMATE DEVELOPMENT)
PS08-C101	B	EARTHWORKS GRADING PLAN (STAGE 1)
PS08-C500	A	BULK EARTHWORKS CUT-FILL PLAN (ULTIMATE DEVELOPMENT)
PS08-C501	B	BULK EARTHWORKS CUT-FILL PLAN (STAGE 1)
PS08-C600	A	EARTHWORKS SECTION (SHEET 1)
PS08-C601	A	EARTHWORKS SECTION (SHEET 2)
PS08-C602	A	EARTHWORKS SECTION (SHEET 3)
PS08-C603	A	EARTHWORKS SECTION (SHEET 4)
ROADWORKS		
PS08-D101	A	ROADWORKS PLAN (STAGE 1)
DRAINAGE		
PS08-E100	A	DRAINAGE PLAN (ULTIMATE DEVELOPMENT)
PS08-E101	A	DRAINAGE PLAN (STAGE 1)
PS08-E200	A	OSD AND DRAINAGE DETAILS
PS08-E201	A	TABLE DRAIN & KERB FLOW CALCULATION
PS08-E300	A	DRAINAGE LONGITUDINAL SECTION (SHEET 1)
PS08-E301	A	DRAINAGE LONGITUDINAL SECTION (SHEET 2)
PS08-E302	A	DRAINAGE LONGITUDINAL SECTION (SHEET 3)
PS08-E303	A	DRAINAGE LONGITUDINAL SECTION (SHEET 4)
PS08-E310	A	PIT SCHEDULE



- GENERAL NOTES:
- THIS PLAN IS FOR SECTION 4.55 PURPOSE AND NOT FOR CONSTRUCTION. DESIGN TO BE REVIEWED AND UPDATED FOR CONSTRUCTION CERTIFICATE.
 - ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH, AND THESE NOTES ARE TO BE READ IN CONJUNCTION WITH THE RELEVANT AUSTRALIAN STANDARDS, COUNCIL SPECIFICATIONS, AND ALL PROJECT CONSULTANT'S PLANS AND REPORTS.
 - SURVEY INFORMATION SHOWN BASED ON SURVEY INFORMATION PROVIDED BY TOTAL SURVEYING SOLUTION SURVEYORS.
 - LEVELS ARE TO AUSTRALIAN HEIGHT DATUM (AHD).
 - FINAL SURFACE CONTOURS ARE BASED ON PROPOSED AND EXISTING SURFACE.



KEY

- SITE BOUNDARY
- ILP BOUNDARY
- DRAINAGE EASEMENT (3m WIDE)
- TEMPORARY RIGHT OF ACCESS EASEMENT (VARIABLE WIDTH)
- TEMPORARY EASEMENT FOR ROAD BATTERS (VARIABLE WIDTH)

REVISION CLOUD REFERENCE KEY:

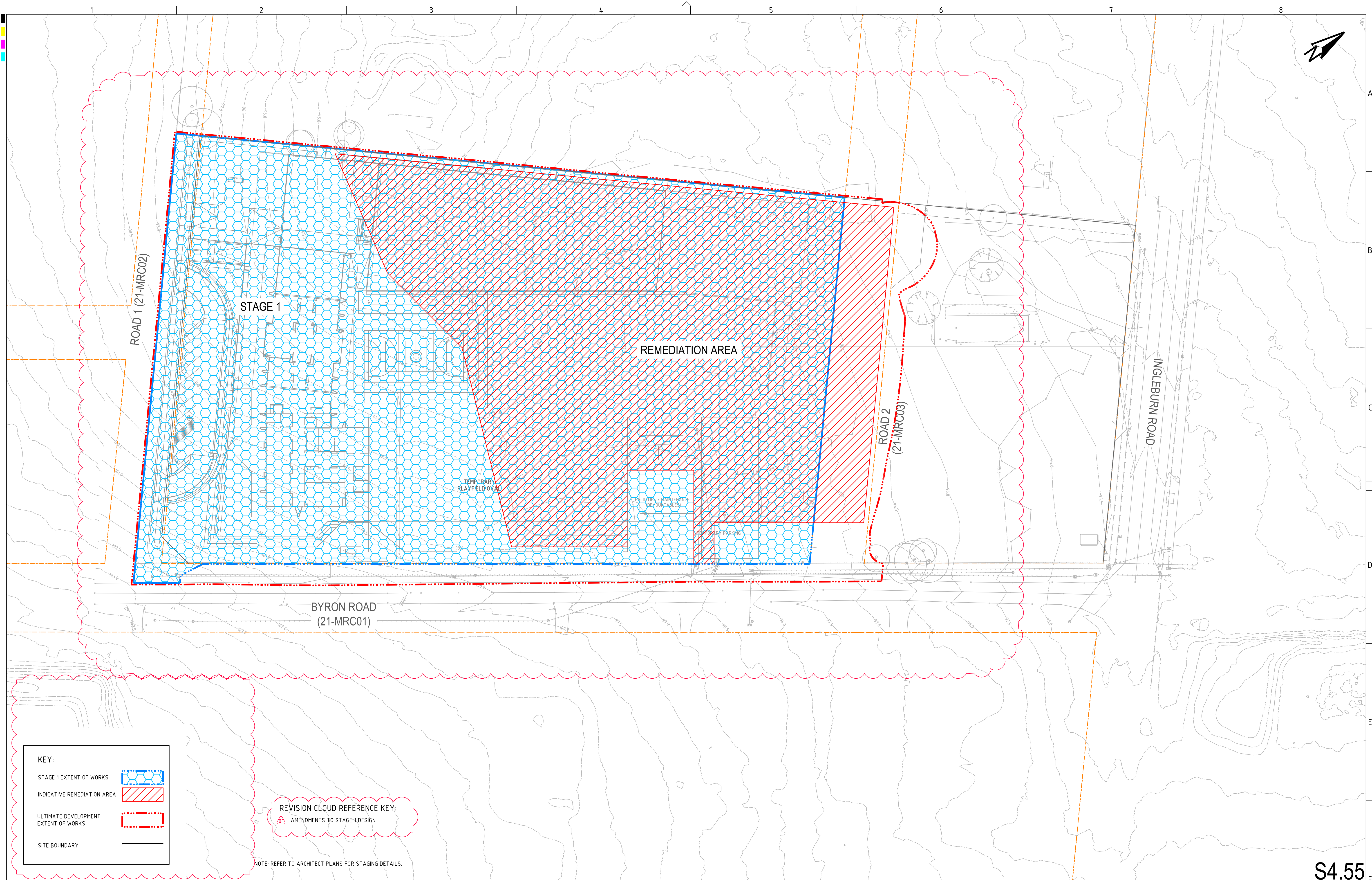
- TEMPORARY ROAD EASEMENT ADDED

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPRVD	SCALE	GRID	DATUM	PROJECT MANAGER	CLIENT	martens & Associates Pty Ltd		Consulting Engineers Environment Water Geotechnical Civil		DRAWING TITLE				
A	INITIAL RELEASE	28/04/2021	RK	AW	SA	TH	A1 (A3) 1:500 (1:1,000)	MGA	mAHD	TH						DEVELOPMENT OVERVIEW PLAN				
												PROJECT NAME/PLANSET TITLE AMITY COLLEGE LEPPINGTON CAMPUS CIVIL WORKS PLAN 85 BYRON RD, LEPPINGTON, NSW 2171 LOT 1 & 2 DP 525996		Suite 201, 20 George St, Hornsby, NSW 2077 Australia Phone: (02) 9476 9999 Fax: (02) 9476 8767 Email: mail@martens.com.au Internet: www.martens.com.au		PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
																P1806493	PS08	R03	PS08-A050	A

PRINTED: 28/04/2021 10:00:00

A1 / A3 LANDSCAPE (A1L_C_02.0.01)

S4.55



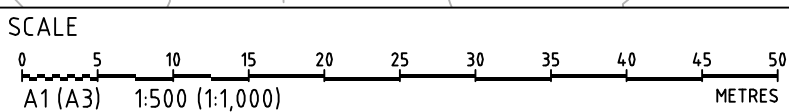
- KEY:
- STAGE 1 EXTENT OF WORKS
 - INDICATIVE REMEDIATION AREA
 - ULTIMATE DEVELOPMENT EXTENT OF WORKS
 - SITE BOUNDARY

REVISION CLOUD REFERENCE KEY:

- AMENDMENTS TO STAGE 1 DESIGN

NOTE: REFER TO ARCHITECT PLANS FOR STAGING DETAILS.

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPRVD
B	MINOR AMENDMENT	29/04/2021	RK	AW	SA	TH
A	INITIAL RELEASE	28/04/2021	RK	AW	SA	TH



GRID	DATUM	PROJECT MANAGER	CLIENT
MGA	mAHD	TH	AMITY COLLEGE
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PROJECT NAME/PLANSET TITLE
AMITY COLLEGE LEPPINGTON CAMPUS
CIVIL WORKS PLAN
85 BYRON RD, LEPPINGTON, NSW 2171
LOT 1 & 2 DP 525996



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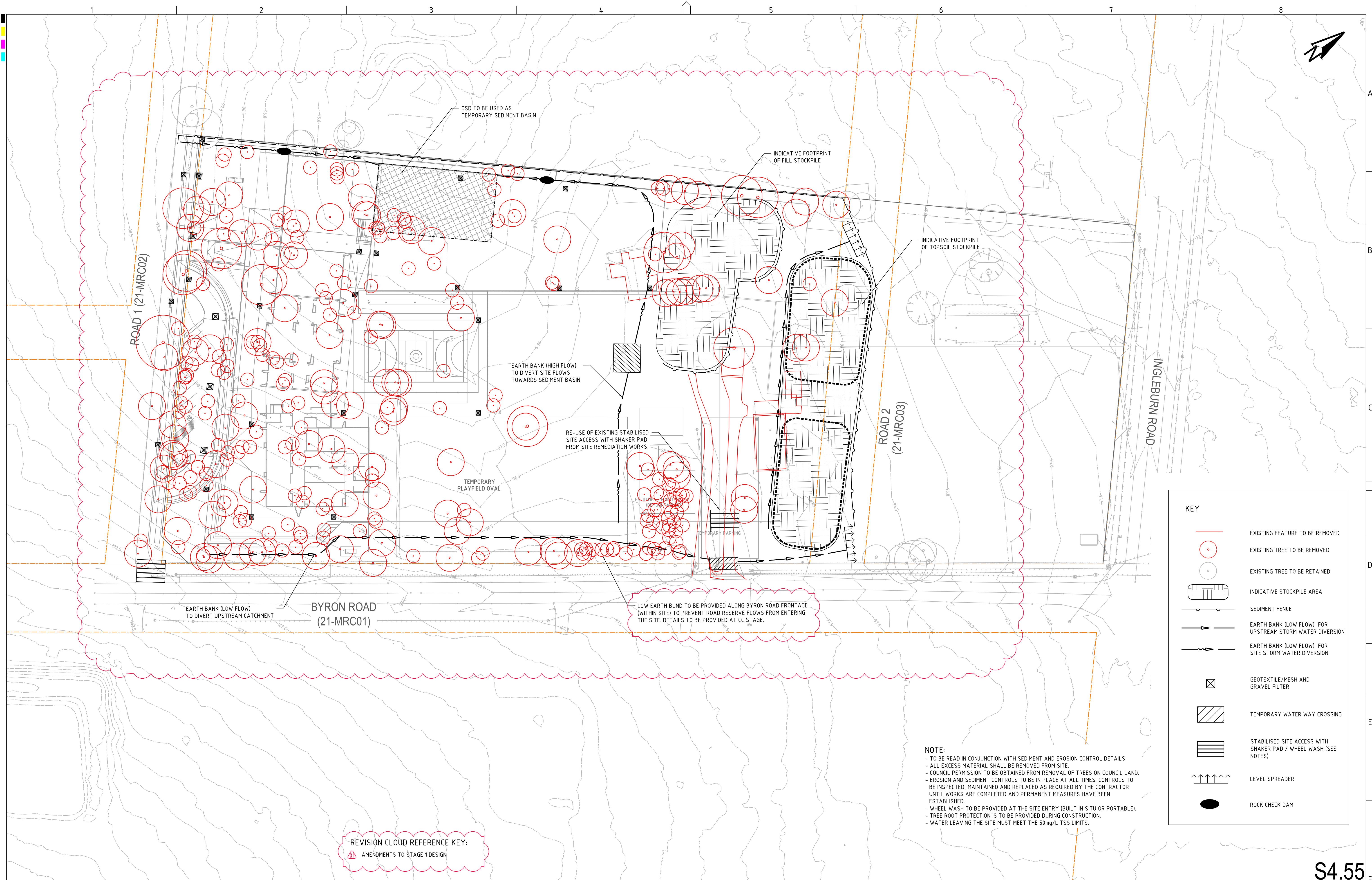
Consulting Engineers

Environment
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DRAWING TITLE				
STAGE 1 OVERVIEW PLAN				
PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
P18064.93	PS08	R03	PS08-B100	B

S4.55



KEY

EXISTING FEATURE TO BE REMOVED

EXISTING TREE TO BE REMOVED

EXISTING TREE TO BE RETAINED

INDICATIVE STOCKPILE AREA

SEDIMENT FENCE

EARTH BANK (LOW FLOW) FOR UPSTREAM STORM WATER DIVERSION

EARTH BANK (LOW FLOW) FOR SITE STORM WATER DIVERSION

GEOTEXTILE/MESH AND GRAVEL FILTER

TEMPORARY WATER WAY CROSSING

STABILISED SITE ACCESS WITH SHAKER PAD / WHEEL WASH (SEE NOTES)

LEVEL SPREADER

ROCK CHECK DAM

NOTE:

- TO BE READ IN CONJUNCTION WITH SEDIMENT AND EROSION CONTROL DETAILS
- ALL EXCESS MATERIAL SHALL BE REMOVED FROM SITE.
- COUNCIL PERMISSION TO BE OBTAINED FROM REMOVAL OF TREES ON COUNCIL LAND.
- EROSION AND SEDIMENT CONTROLS TO BE IN PLACE AT ALL TIMES. CONTROLS TO BE INSPECTED, MAINTAINED AND REPLACED AS REQUIRED BY THE CONTRACTOR UNTIL WORKS ARE COMPLETED AND PERMANENT MEASURES HAVE BEEN ESTABLISHED.
- WHEEL WASH TO BE PROVIDED AT THE SITE ENTRY (BUILT IN SITU OR PORTABLE).
- TREE ROOT PROTECTION IS TO BE PROVIDED DURING CONSTRUCTION.
- WATER LEAVING THE SITE MUST MEET THE 50mg/L TSS LIMITS.

REVISION CLOUD REFERENCE KEY:
A1 AMENDMENTS TO STAGE 1 DESIGN

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPRVD	SCALE	GRID	DATUM	PROJECT MANAGER	CLIENT	DRAWING TITLE
B	MINOR AMENDMENT	29/04/2021	RK	AW	SA	TH	0 5 10 15 20 25 30 35 40 45 50 A1 (A3) 1:500 (1:1,000) METRES	MGA	mAHD	TH	AMITY COLLEGE	SEDIMENT & EROSION CONTROL AND CLEARING PLAN (STAGE 1)
A	INITIAL RELEASE	28/04/2021	RK	AW	SA	TH					AMITY COLLEGE LEPPINGTON CAMPUS CIVIL WORKS PLAN	PROJECT NO. P18064.93
											58 BYRON RD, LEPPINGTON, NSW 2171 LOT 1 & 2 DP 525996	PLANSET NO. PS08
												RELEASE NO. R03
												DRAWING NO. PS08-B301
												REVISION B

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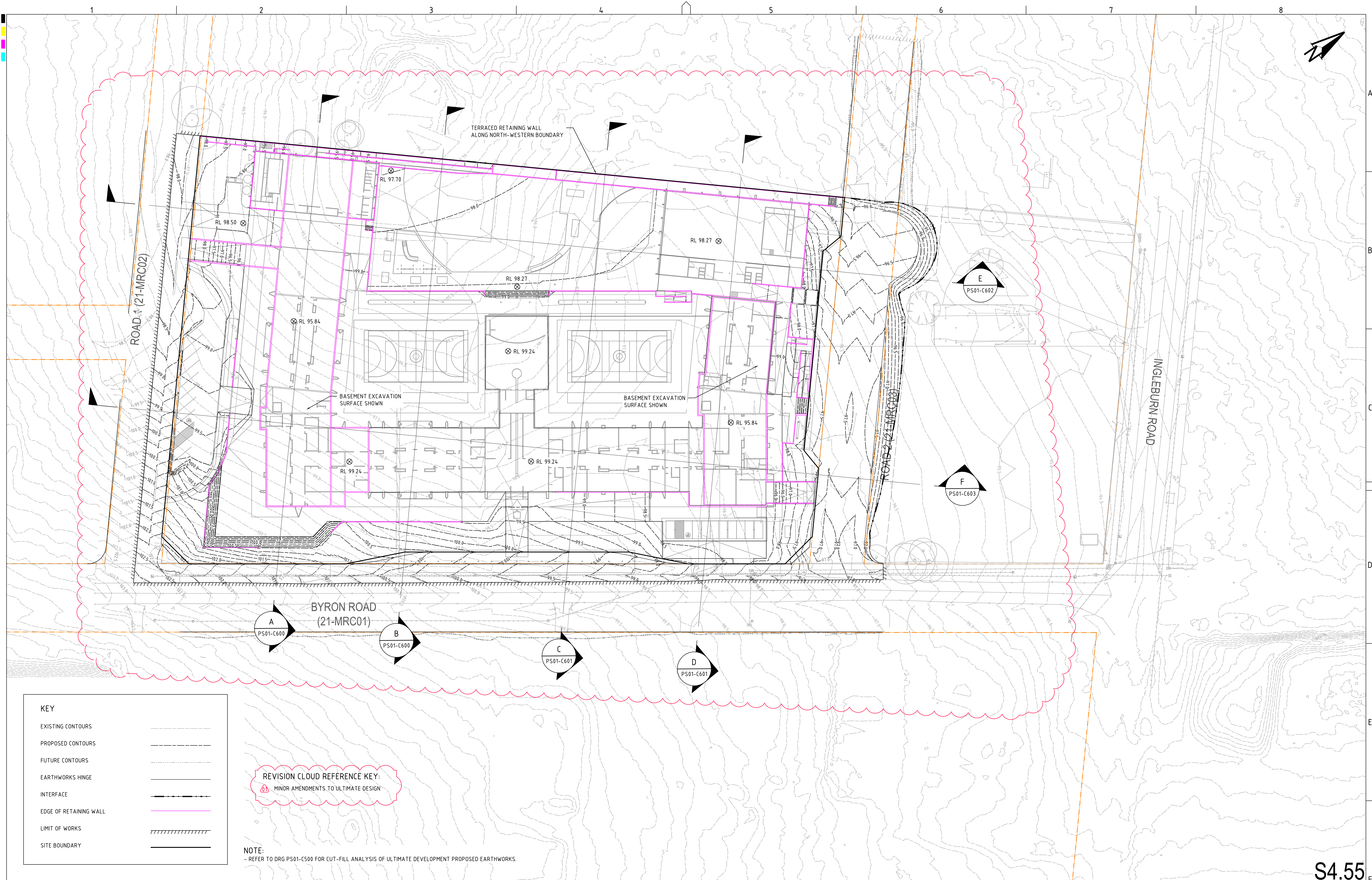
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DRAWING ID: P18064.93-PS08-R03-B301

0 5 10 15 20 25 30 35 40 45 50

S4.55



- KEY**
- EXISTING CONTOURS
 - PROPOSED CONTOURS
 - FUTURE CONTOURS
 - EARTHWORKS HINGE
 - INTERFACE
 - EDGE OF RETAINING WALL
 - LIMIT OF WORKS
 - SITE BOUNDARY

REVISION CLOUD REFERENCE KEY:
01 MINOR AMENDMENTS TO ULTIMATE DESIGN

NOTE:
- REFER TO DRG PS01-C500 FOR CUT-FILL ANALYSIS OF ULTIMATE DEVELOPMENT PROPOSED EARTHWORKS.

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPRVD	SCALE	GRID	DATUM	PROJECT MANAGER	CLIENT	DRAWING TITLE				
A	INITIAL RELEASE	28/04/2021	RK	AW	SA	TH	0 5 10 15 20 25 30 35 40 45 50 A1 (A3) 1:500 (1:1,000) METRES	MGA	mAHD	TH	AMITY COLLEGE					
												 Consulting Engineers Environment Water Geotechnical Civil Suite 201, 20 George St, Hornsby, NSW 2077 Australia Phone: (02) 9476 9999 Fax: (02) 9476 8767 Email: mail@martens.com.au Internet: www.martens.com.au				
											PROJECT NAME/PLANSET TITLE					
											AMITY COLLEGE LEPPINGTON CAMPUS CIVIL WORKS PLAN					
											85 BYRON RD, LEPPINGTON, NSW 2171 LOT 1 & 2 DP 525996					
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PRINTED: 28/04/2021 10:52:00 AM USER: JSM/2021												PROJECT NO. P18064.93	PLANSET NO. PS08	RELEASE NO. R03	DRAWING NO. PS08-C100	REVISION A
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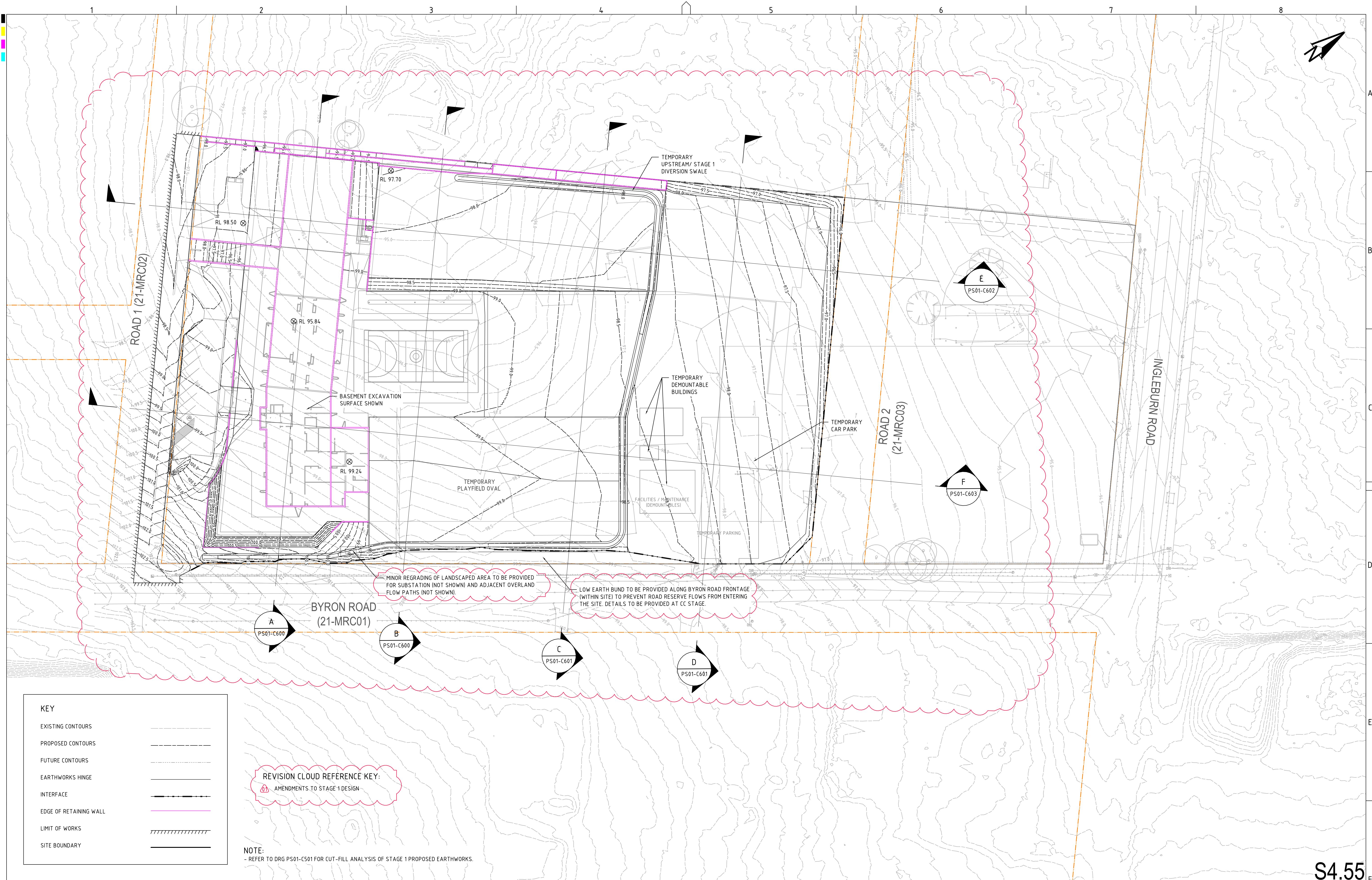
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USER: JAMES7

A1 / A3 LANDSCAPE (A1L_C_02.0.01)

DRAWING ID: P18064.93-PS08-R03-C100

0 5 10 15 20 25 30 35 40 45 50 METRES

S4.55

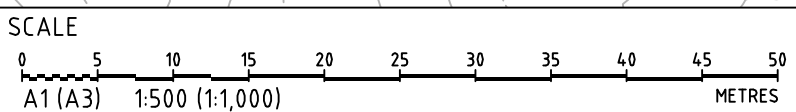


KEY	
EXISTING CONTOURS	---
PROPOSED CONTOURS	---
FUTURE CONTOURS	---
EARTHWORKS HINGE	---
INTERFACE	---
EDGE OF RETAINING WALL	---
LIMIT OF WORKS	---
SITE BOUNDARY	---

REVISION CLOUD REFERENCE KEY:
AMENDMENTS TO STAGE 1 DESIGN

NOTE:
- REFER TO DRG PS01-C501 FOR CUT-FILL ANALYSIS OF STAGE 1 PROPOSED EARTHWORKS.

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPRVD
B	MINOR AMENDMENT	29/04/2021	RK	AW	SA	TH
A	INITIAL RELEASE	28/04/2021	RK	AW	SA	TH



GRID
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DATUM
mAHD
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AMITY COLLEGE
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CIVIL WORKS PLAN
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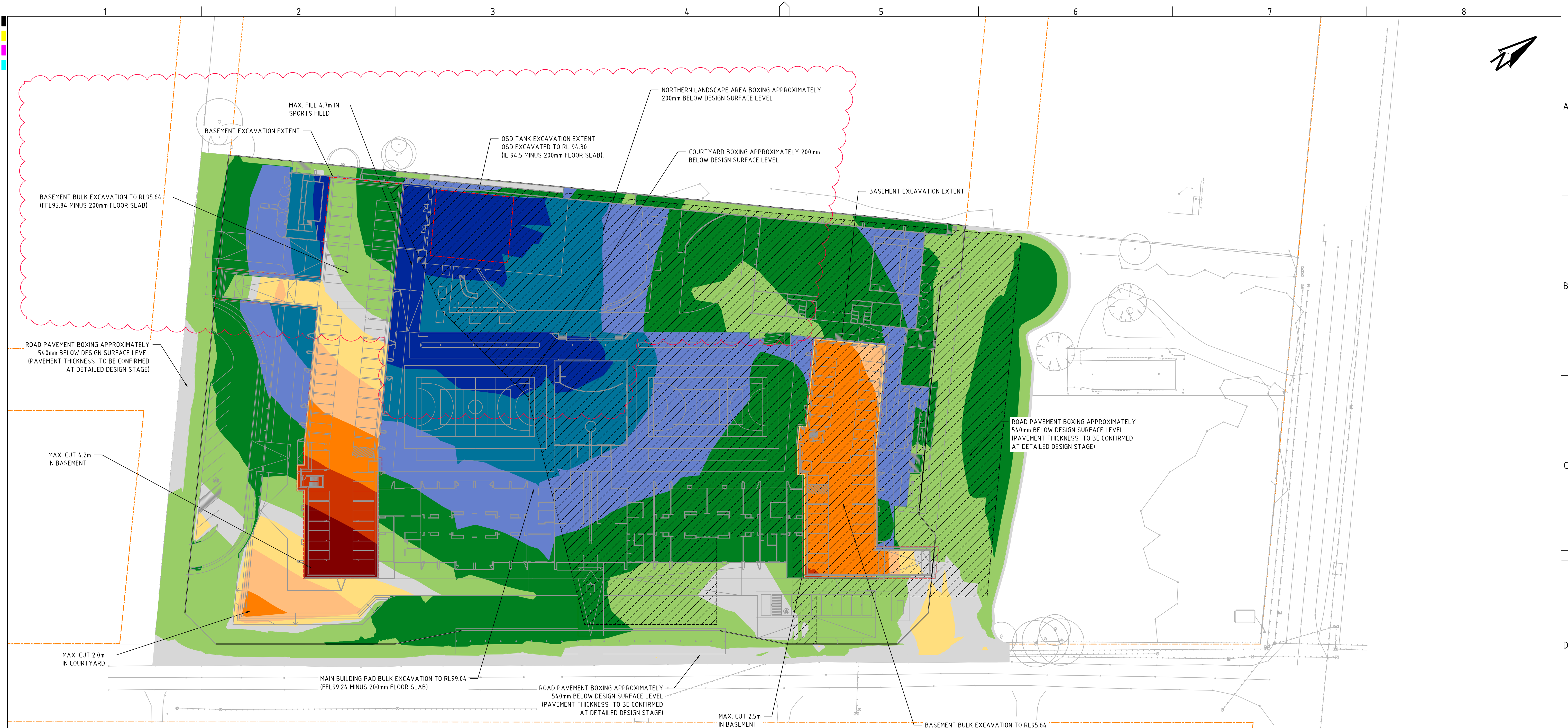
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DRAWING TITLE				
EARTHWORKS GRADING PLAN (STAGE 1)				
PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
P18064.93	PS08	R03	PS08-C101	B

PRINTED: 29/04/2021 10:00:00
USER: JAMES7

A1 / A3 LANDSCAPE (A1L_C_02.0.01)

S4.55



CUT-FILL DEPTH DESIGN TO EXISTING		
LOWER THAN	-3.000 m	
-3.000 to	-2.250 m	
-2.250 to	-1.500 m	
-1.500 to	-0.750 m	
-0.750 to	-0.150 m	
-0.150 to	0.150 m	
0.150 to	0.750 m	
0.750 to	1.500 m	
1.500 to	2.250 m	
2.250 to	3.000 m	
HIGHER THAN	3.000 m	

NOTE:
- EARTHWORK CUTFILL DEPTHS ARE ANALYSED FROM PROPOSED FINISHED SURFACE (REFER TO DRG PS01-C100) TO EXISTING SURFACE.
- BULK EARTHWORK VOLUMES ARE INCLUSIVE OF BOXING, SEE ABOVE PLAN FOR PROPOSED BOXING DEPTHS.
- APPROXIMATELY 2000m³ SOIL TO BE REMOVED FROM REMEDIATION AREA 4, 5 & 6.

BULK EARTHWORKS SUMMARY		
	CUT	FILL
EARTHWORKS VOLUME (m³)	-6995	23885
EARTHWORKS BALANCE (m³)	-	16890
EARTHWORK BALANCE INCLUDING REMEDIATION AREAS (m³)	-	18890

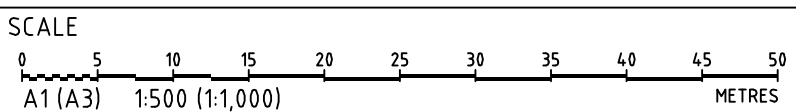
REVISION CLOUD REFERENCE KEY:
MINOR AMENDMENTS TO ULTIMATE DESIGN

KEY:

INDICATIVE REMEDIATION AREA

SITE BOUNDARY

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPRVD
A	INITIAL RELEASE	28/04/2021	RK	AW	SA	TH



GRID
MGA

DATUM
mAHD

PROJECT MANAGER
TH

CLIENT
AMITY COLLEGE

PROJECT NAME/PLANSET TITLE
AMITY COLLEGE LEPPINGTON CAMPUS
CIVIL WORKS PLAN

85 BYRON RD, LEPPINGTON, NSW 2171
LOT 1 & 2 DP 525996

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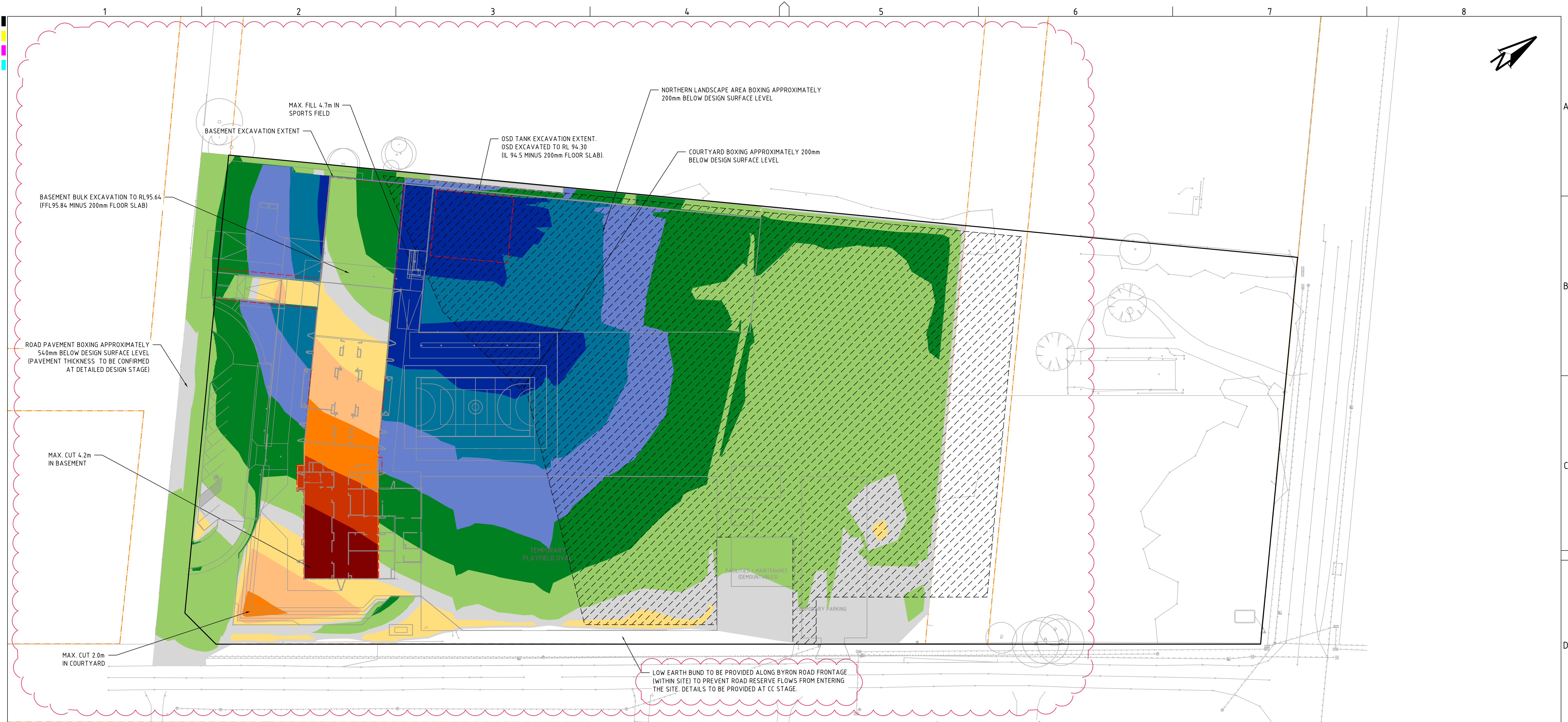
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DRAWING TITLE				
BULK EARTHWORKS CUT-FILL PLAN (ULTIMATE DEVELOPMENT)				
PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
P1806493	PS08	R03	PS08-C500	A

S4.55



CUT-FILL DEPTH DESIGN TO EXISTING		
LOWER THAN	-3.000 m	
-3.000 to	-2.250 m	
-2.250 to	-1.500 m	
-1.500 to	-0.750 m	
-0.750 to	-0.150 m	
-0.150 to	0.150 m	
0.150 to	0.750 m	
0.750 to	1.500 m	
1.500 to	2.250 m	
2.250 to	3.000 m	
HIGHER THAN	3.000 m	

NOTE:
- EARTHWORK CUTFILL DEPTHS ARE ANALYSED FROM PROPOSED FINISHED SURFACE (REFER TO DRG PS01-C100) TO EXISTING SURFACE.
- BULK EARTHWORK VOLUMES ARE INCLUSIVE OF BOXING, SEE ABOVE PLAN FOR PROPOSED BOXING DEPTHS.
- APPROXIMATELY 2000m³ SOIL TO BE REMOVED FROM REMEDIATION AREA 4, 5 & 6.

BULK EARTHWORKS SUMMARY		
	CUT	FILL
EARTHWORKS VOLUME (m³)	-4030	21000
EARTHWORKS BALANCE (m³)	-	16970
EARTHWORK BALANCE INCLUDING REMEDIATION AREAS (m³)	-	18970

REVISION CLOUD REFERENCE KEY:
AMENDMENTS TO STAGE 1 DESIGN

KEY:
INDICATIVE REMEDIATION AREA
SITE BOUNDARY

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPROVD
B	MINOR AMENDMENT	29/04/2021	RK	AW	SA	TH
A	INITIAL RELEASE	28/04/2021	RK	AW	SA	TH

SCALE
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A1 (A3) 1:500 (1:1,000) METRES

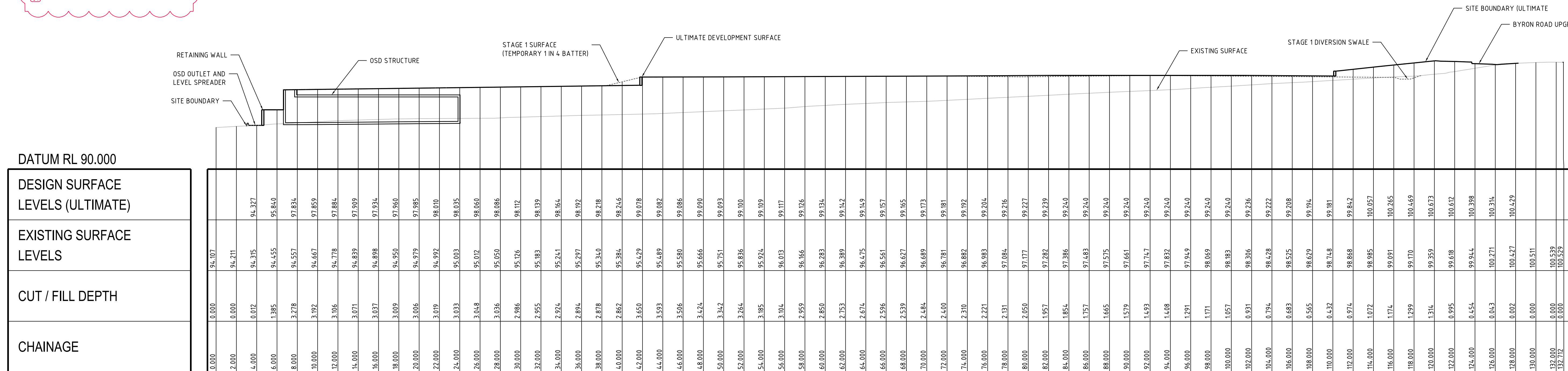
GRID
MGA
DATUM
mAHD
PROJECT MANAGER
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AMITY COLLEGE
PROJECT NAME/PLANSET TITLE
AMITY COLLEGE LEPPINGTON CAMPUS
CIVIL WORKS PLAN
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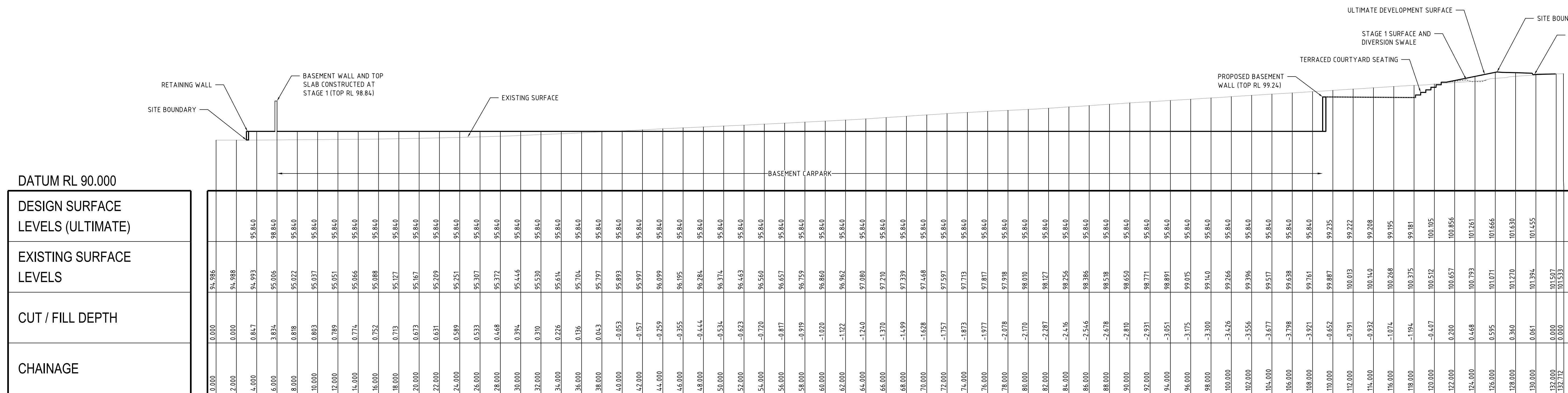
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BULK EARTHWORKS CUT-FILL PLAN (STAGE 1)				
PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
P1806493	PS08	R03	PS08-C501	B

S4.55



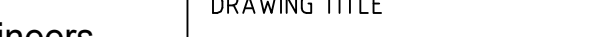
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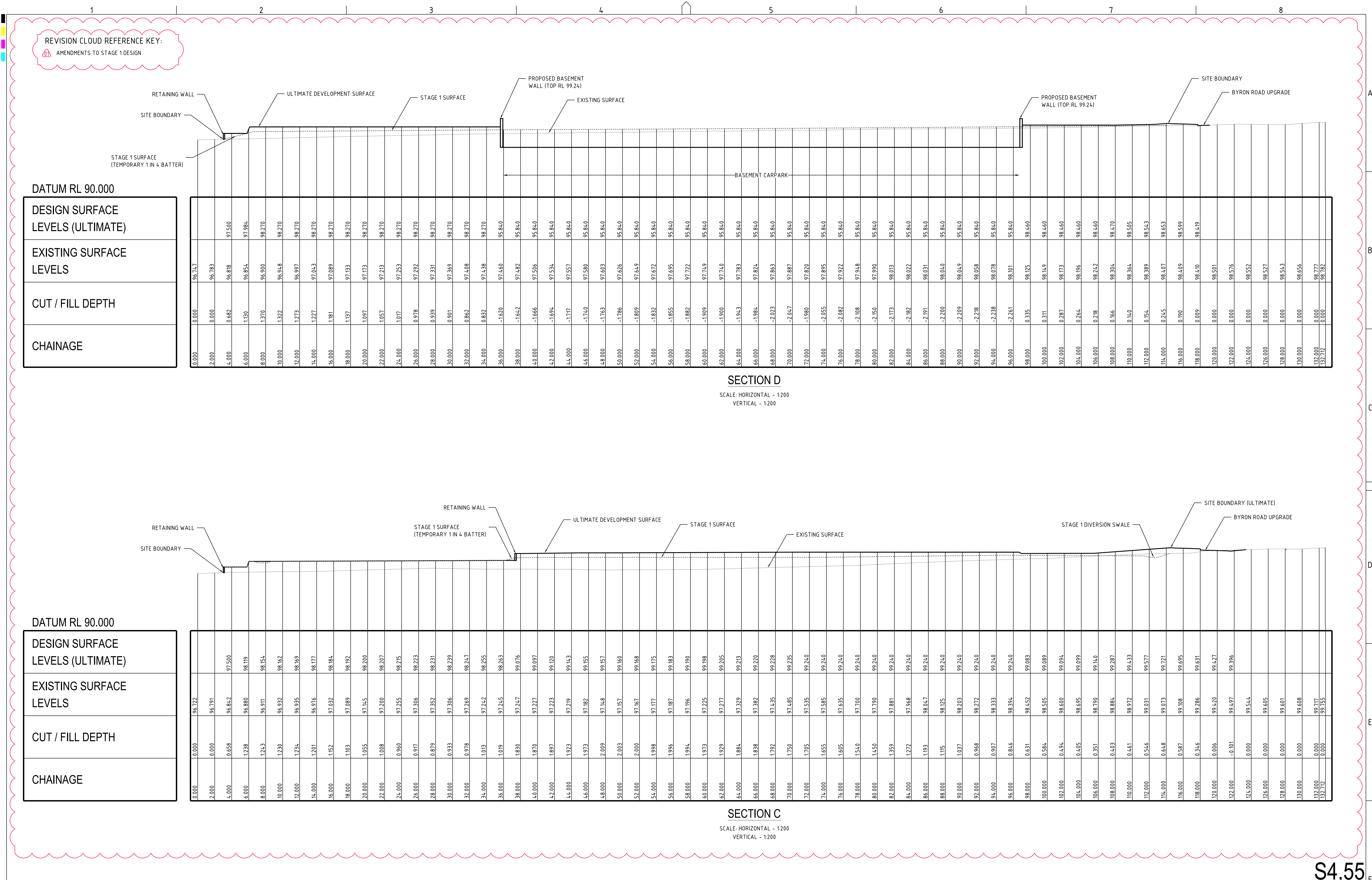
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VERTICAL - 1:200

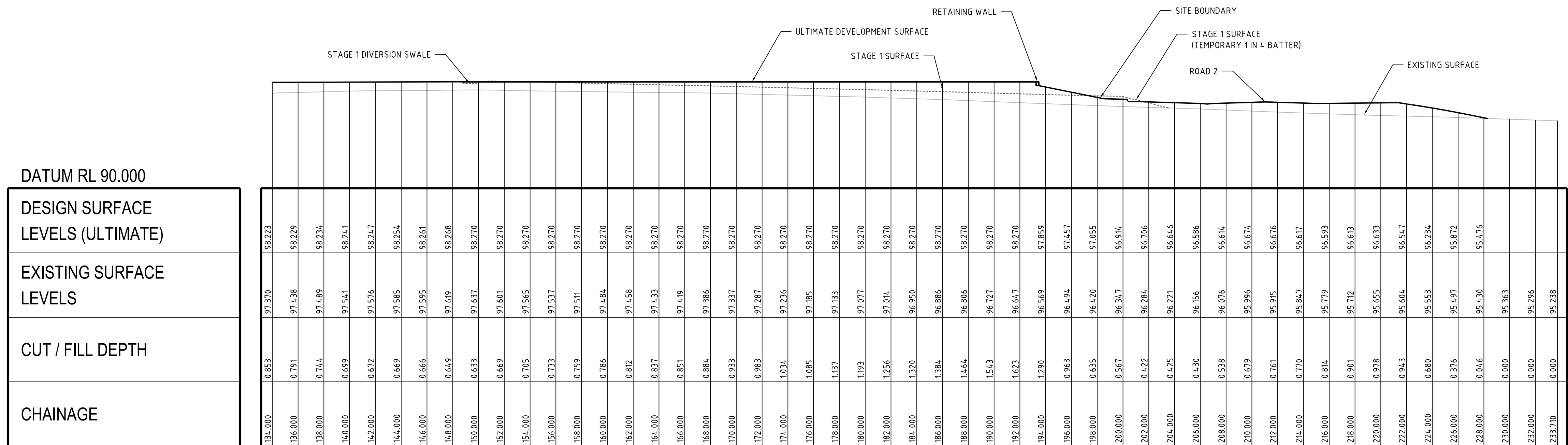


SECTION A

SCALE: HORIZONTAL - 1:200
VERTICAL - 1:200

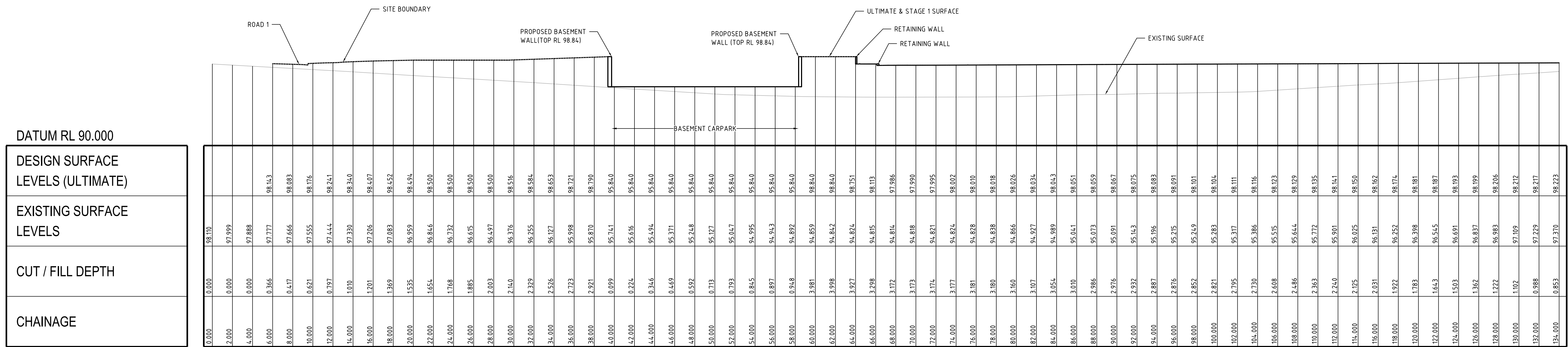
REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPROVD	SCALE	GRID	DATUM	PROJECT MANAGER	CLIENT	 Consulting Engineers Environment Water Geotechnical Civil Suite 201, 20 George St, Hornsby, NSW 2077 Australia Phone: (02) 9476 9999 Fax: (02) 9476 8767 Email: mail@martens.com.au Internet: www.martens.com.au	DRAWING TITLE					
A	INITIAL RELEASE	28/04/2021	RK	AW	SA	TH	 A1 (A3) 1:200 (1:400) MGA mAHD TH	AMITY COLLEGE			EARTHWORKS SECTION (SHEET 1)							
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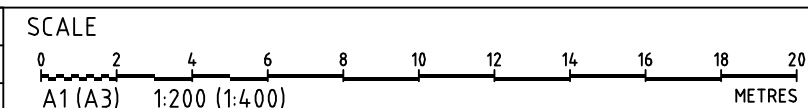
SECTION E

SCALE: HORIZONTAL - 1:200
VERTICAL - 1:200



SECTION E

SCALE: HORIZONTAL - 1:200
VERTICAL - 1:200

[illegible]

GRID	DATUM	PROJECT MANAGER	CLIENT
MGA	mAHD	TH	AMITY COLLEGE
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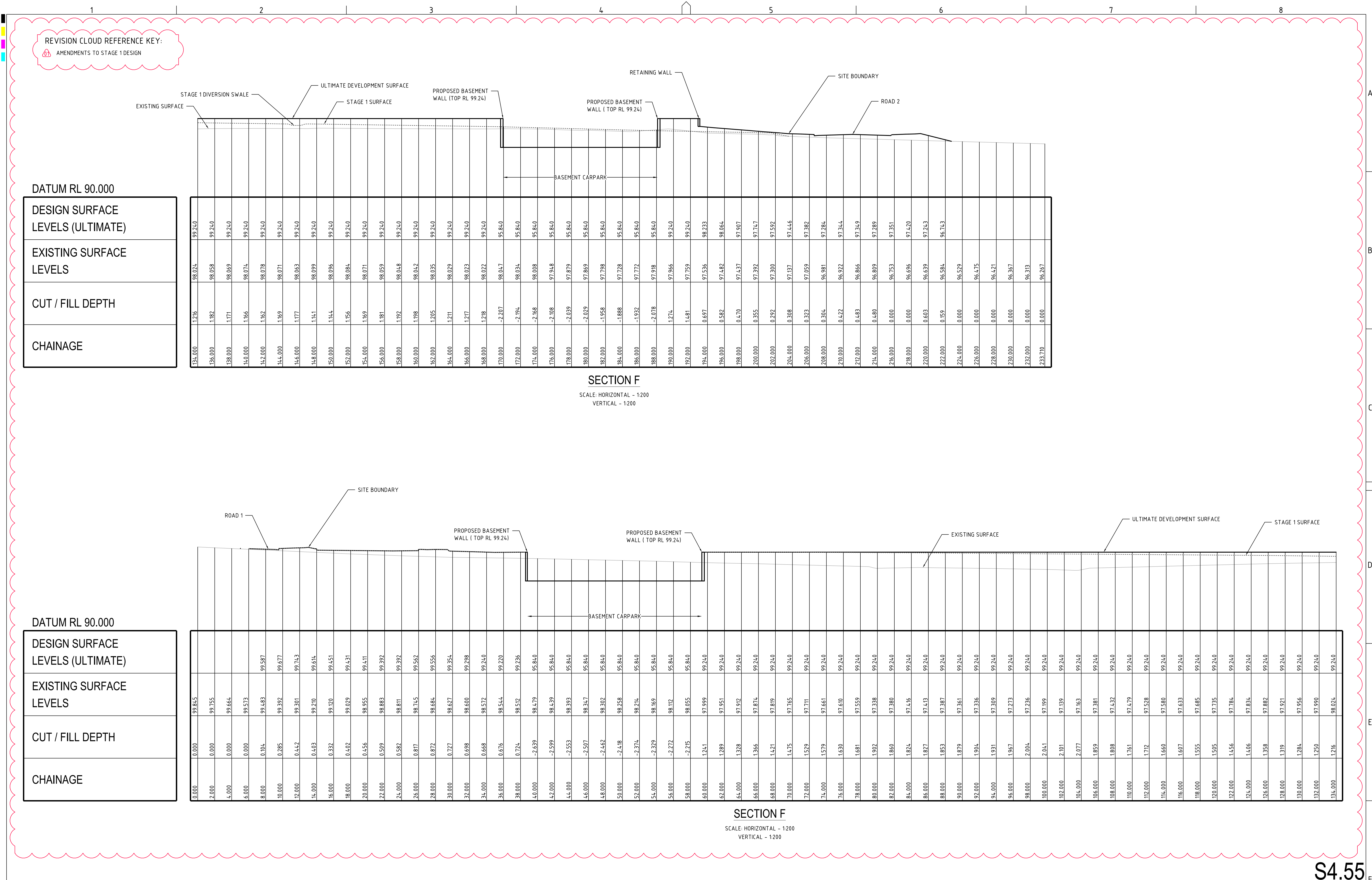
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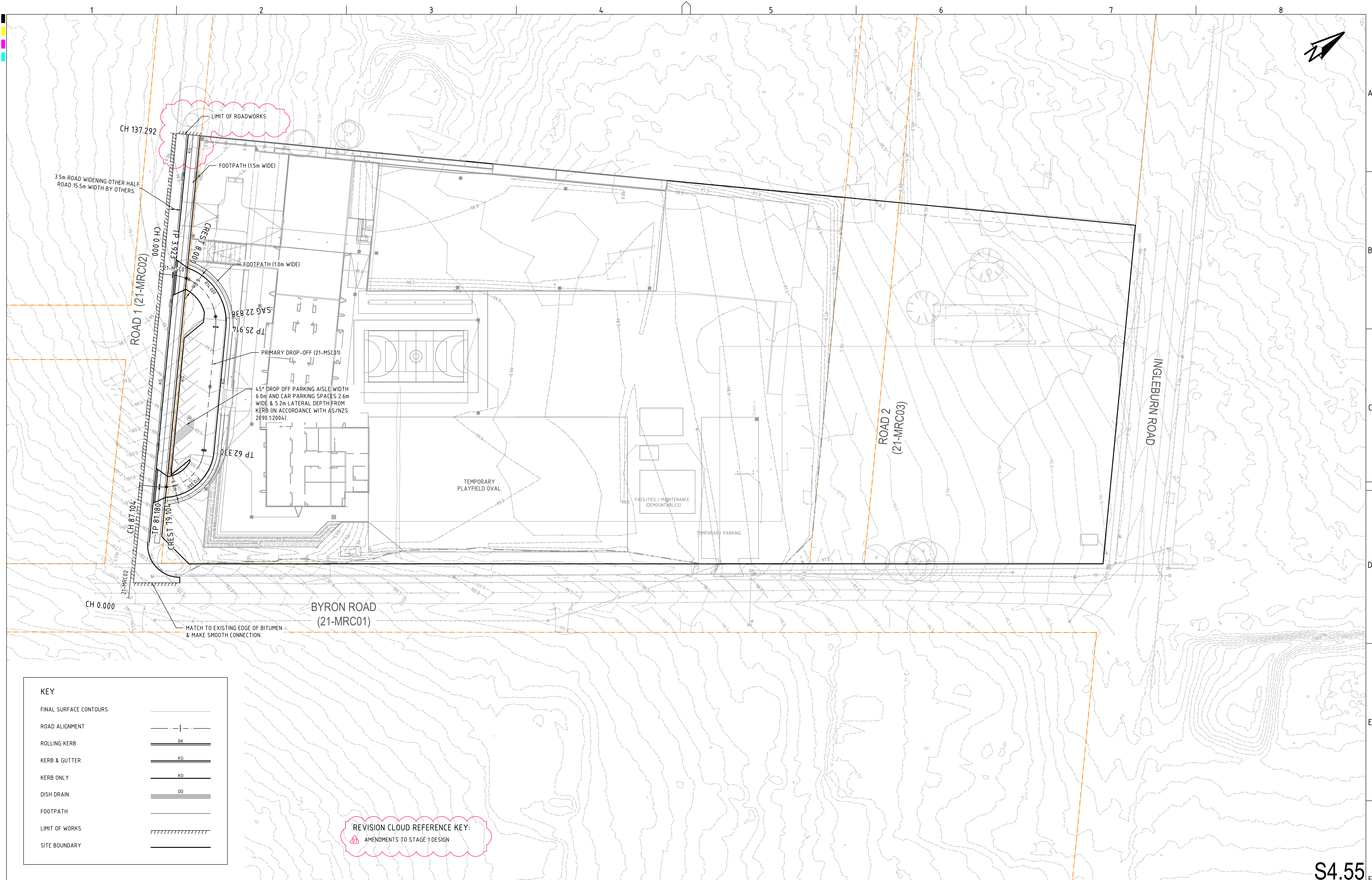
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DRAWING TITLE				
EARTHWORKS SECTION (SHEET 3)				
PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
P1806493	PS08	R03	PS08-C602	A



REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPRVD	SCALE 	GRID	DATUM	PROJECT MANAGER	CLIENT	 Consulting Engineers Environment Water Geotechnical Civil	DRAWING TITLE EARTHWORKS SECTION (SHEET 4)
A	INITIAL RELEASE	28/04/2021	RK	AW	SA	TH		MGA	mAHD	TH	AMITY COLLEGE		



KEY	
FINAL SURFACE CONTOURS	
ROAD ALIGNMENT	
ROLLING KERB	
KERB & GUTTER	
KERB ONLY	
DISH DRAIN	
FOOTPATH	
LIMIT OF WORKS	
SITE BOUNDARY	

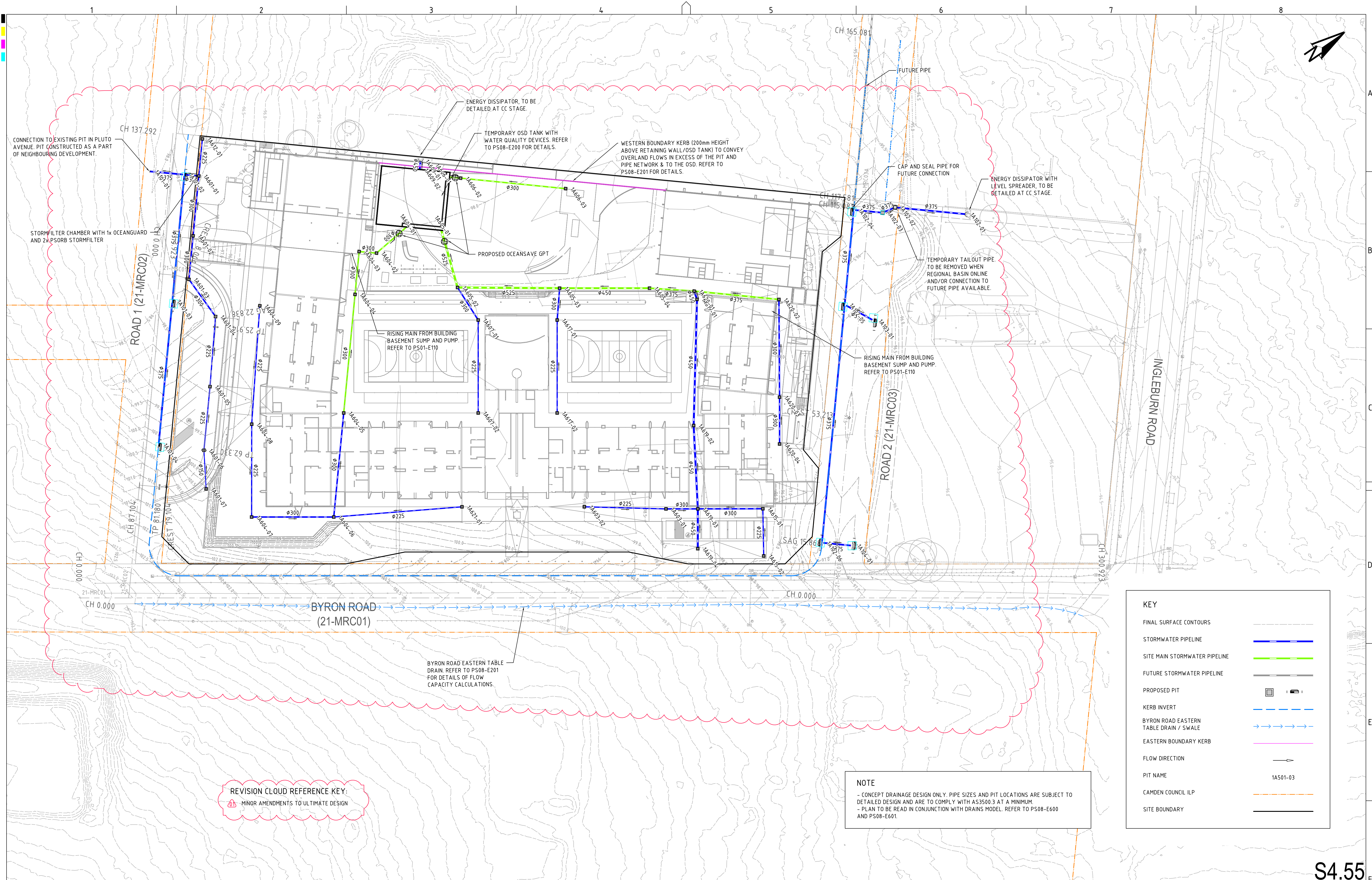
REVISION CLOUD REFERENCE KEY:
 AMENDMENTS TO STAGE 1 DESIGN

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPRVD	SCALE 	GRID	DATUM	PROJECT MANAGER	CLIENT	 Consulting Engineers Environment Water Geotechnical Civil Suite 201, 20 George St, Hornsby, NSW 2077 Australia Phone: (02) 9476 9999 Fax: (02) 9476 8767 Email: mail@martens.com.au Internet: www.martens.com.au				
B	MINOR AMENDMENT	29/04/2021	RK	AW	SA	TH		MGA	mAHD	TH	AMITY COLLEGE					
A	INITIAL RELEASE	28/04/2021	RK	AW	SA	TH		DISCLAIMER & COPYRIGHT This plan must not be used for construction unless signed as approved by principal certifying authority. All measurements in millimetres unless otherwise specified. This drawing must not be reproduced in whole or part without prior written consent of Martens & Associates Pty Ltd. (C) Copyright Martens & Associates Pty Ltd		PROJECT NAME/PLANSET TITLE AMITY COLLEGE LEPPINGTON CAMPUS CIVIL WORKS PLAN 85 BYRON RD, LEPPINGTON, NSW 2171 LOT 1 & 2 DP 525996						
A1 / A3 LANDSCAPE [A1LC_v02.0.0]							DRAWING ID: P18064.93-PS08-R03-D101									

PRINTED: 29/04/2021 10:00:00
USER: JAMES7

A1 / A3 LANDSCAPE (A1L_C_02.0.01)

S4.55



REVISION CLOUD REFERENCE KEY:
A1 MINOR AMENDMENTS TO ULTIMATE DESIGN

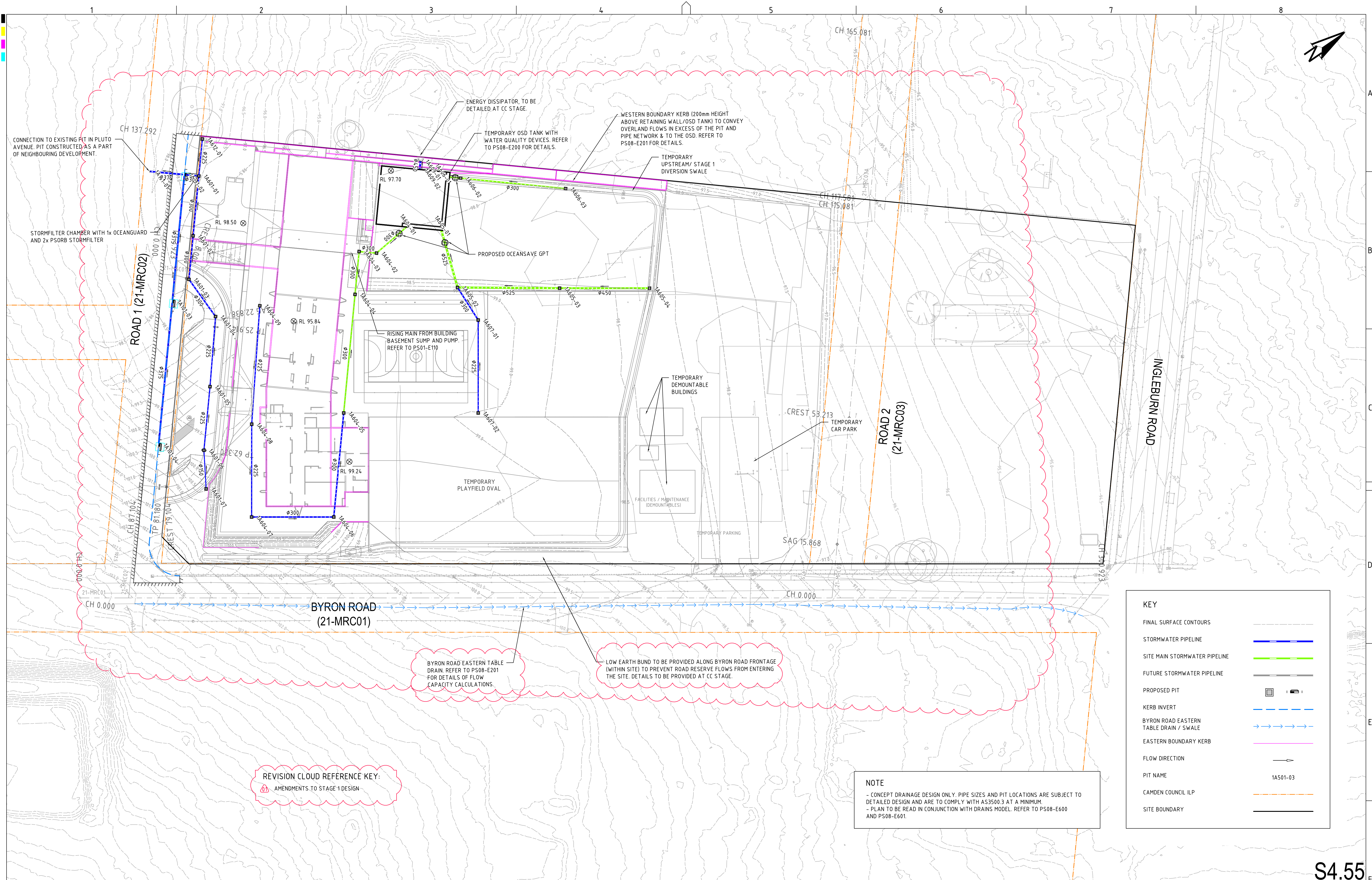
NOTE
- CONCEPT DRAINAGE DESIGN ONLY. PIPE SIZES AND PIT LOCATIONS ARE SUBJECT TO DETAILED DESIGN AND ARE TO COMPLY WITH AS3500.3 AT A MINIMUM.
- PLAN TO BE READ IN CONJUNCTION WITH DRAINS MODEL. REFER TO PS08-E600 AND PS08-E601.

KEY

- FINAL SURFACE CONTOURS
- STORMWATER PIPELINE
- SITE MAIN STORMWATER PIPELINE
- FUTURE STORMWATER PIPELINE
- PROPOSED PIT
- KERB INVERT
- BYRON ROAD EASTERN TABLE DRAIN / SWALE
- EASTERN BOUNDARY KERB
- FLOW DIRECTION
- PIT NAME
- CAMDEN COUNCIL ILP
- SITE BOUNDARY

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPRVD	SCALE	GRID	DATUM	PROJECT MANAGER	CLIENT	DRAWING TITLE		PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
A	INITIAL RELEASE	06/05/2021	JS	AVG	SA	TH	A1 (A3) 1:500 (1:1,000)	MGA	mAHD	TH	AMITY COLLEGE	DRAINAGE PLAN (ULTIMATE DEVELOPMENT)		P1806493	PS08	R03	PS08-E100	A
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REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPRVD
A	INITIAL RELEASE	06/05/2021	JS	AVG	SA	TH

SCALE
0 5 10 15 20 25 30 35 40 45 50
A1 (A3) 1:500 (1:1,000) METRES

GRID
MGA

DATUM
mAHD

PROJECT MANAGER
TH

CLIENT
AMITY COLLEGE
PROJECT NAME/PLANSET TITLE
AMITY COLLEGE LEPPINGTON CAMPUS
CIVIL WORKS PLAN
85 BYRON RD, LEPPINGTON, NSW 2171
LOT 1 & 2 DP 525996

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DRAWING TITLE
DRAINAGE PLAN
(STAGE 1)

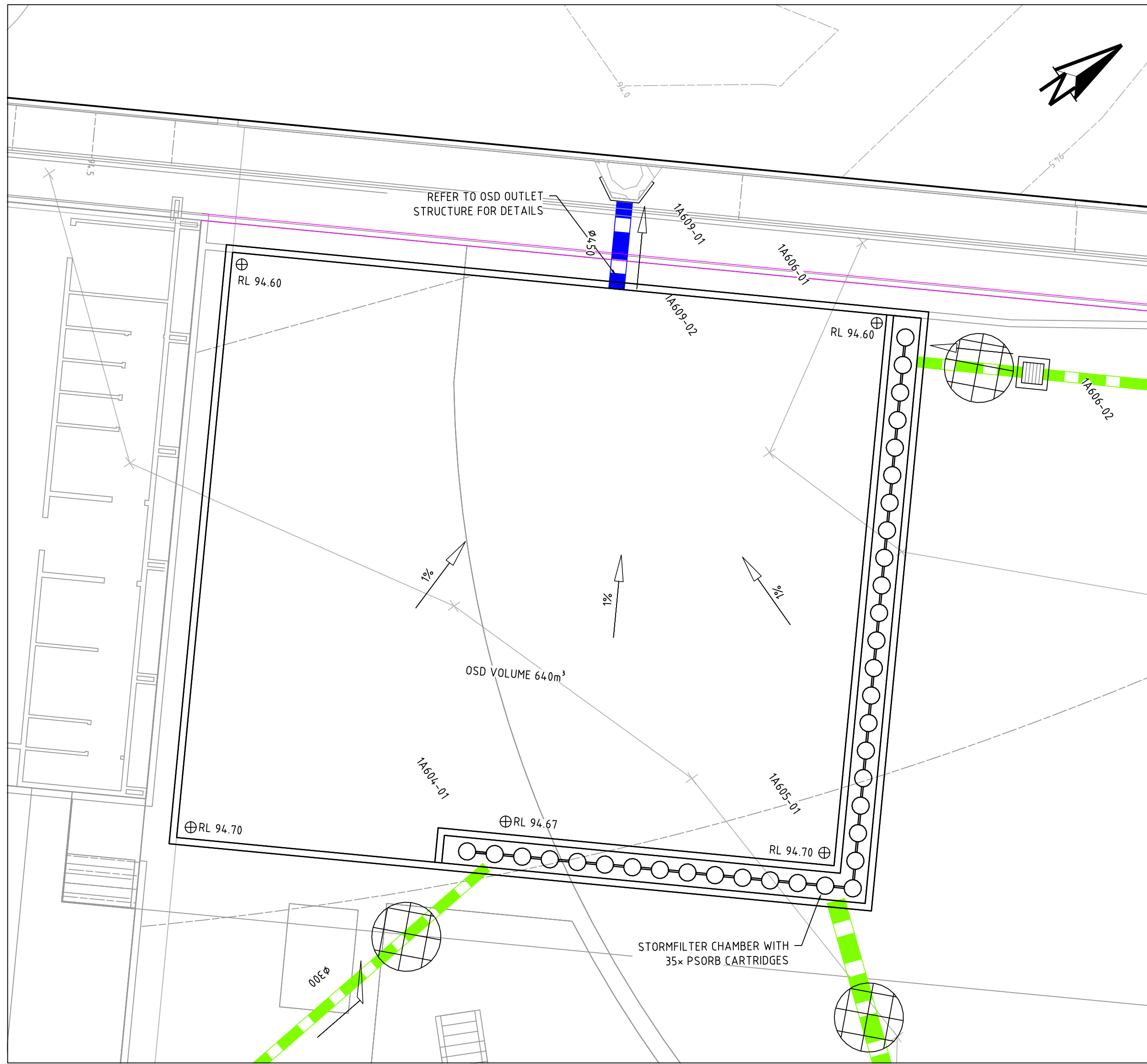
PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
P1806493	PS08	R03	PS08-E101	A

DRAWING ID: P1806493-PS08-R03-E101

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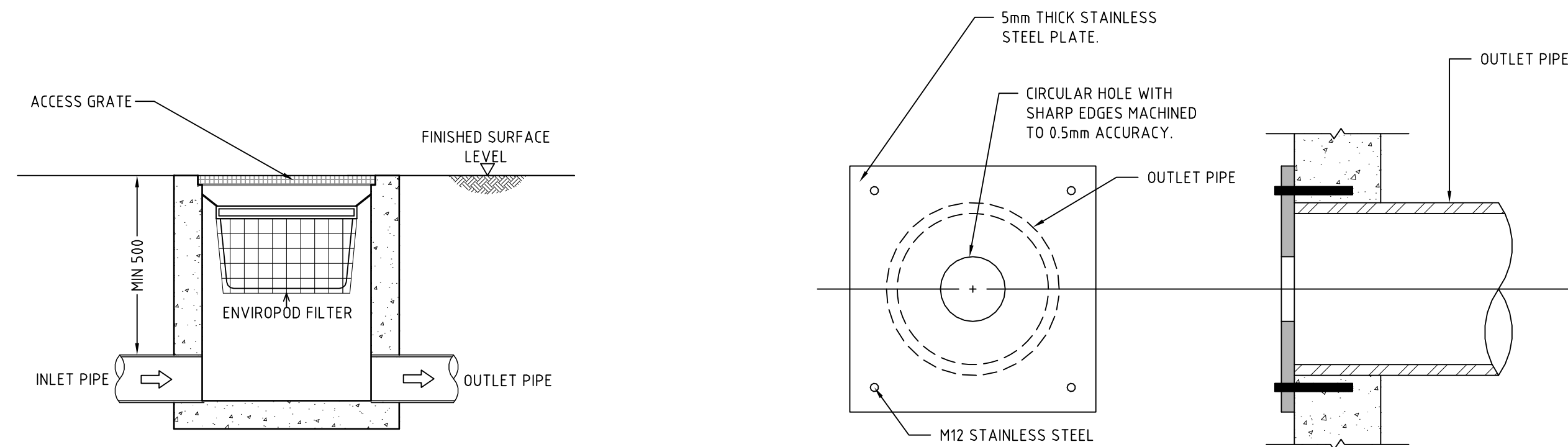
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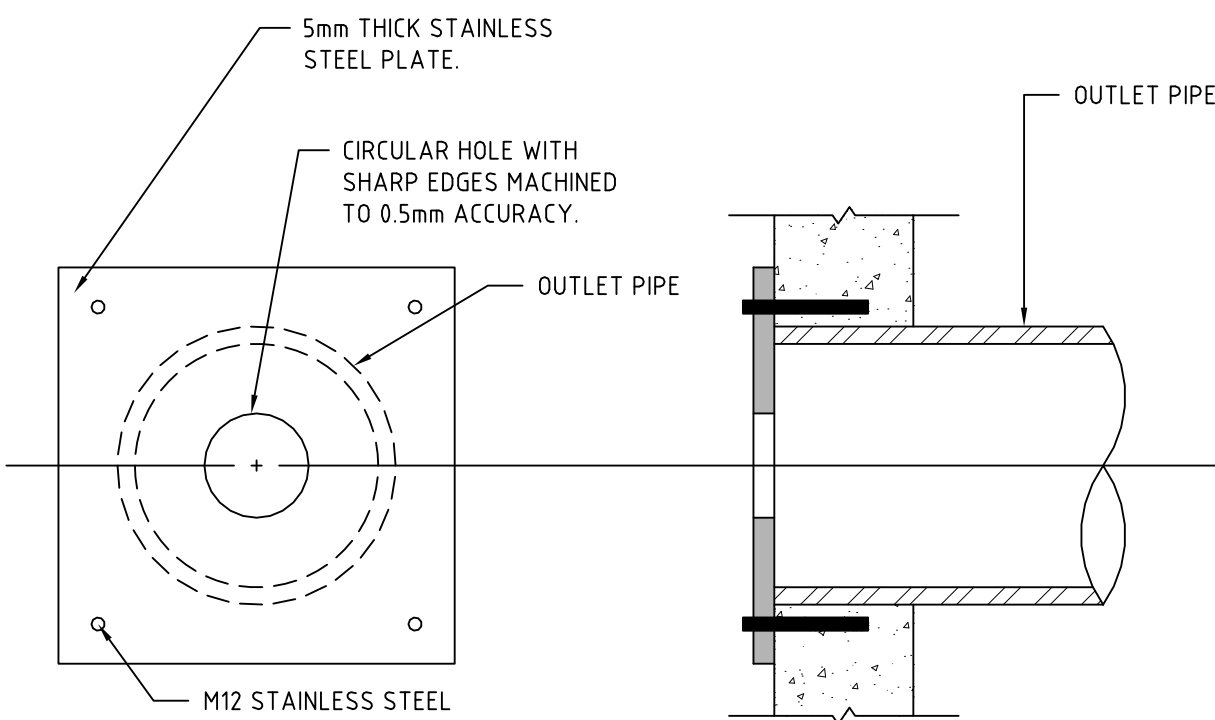
TEMPORARY OSD TANK PLAN

SCALE 1:100



TYPICAL OCEANGUARD PIT INSERT

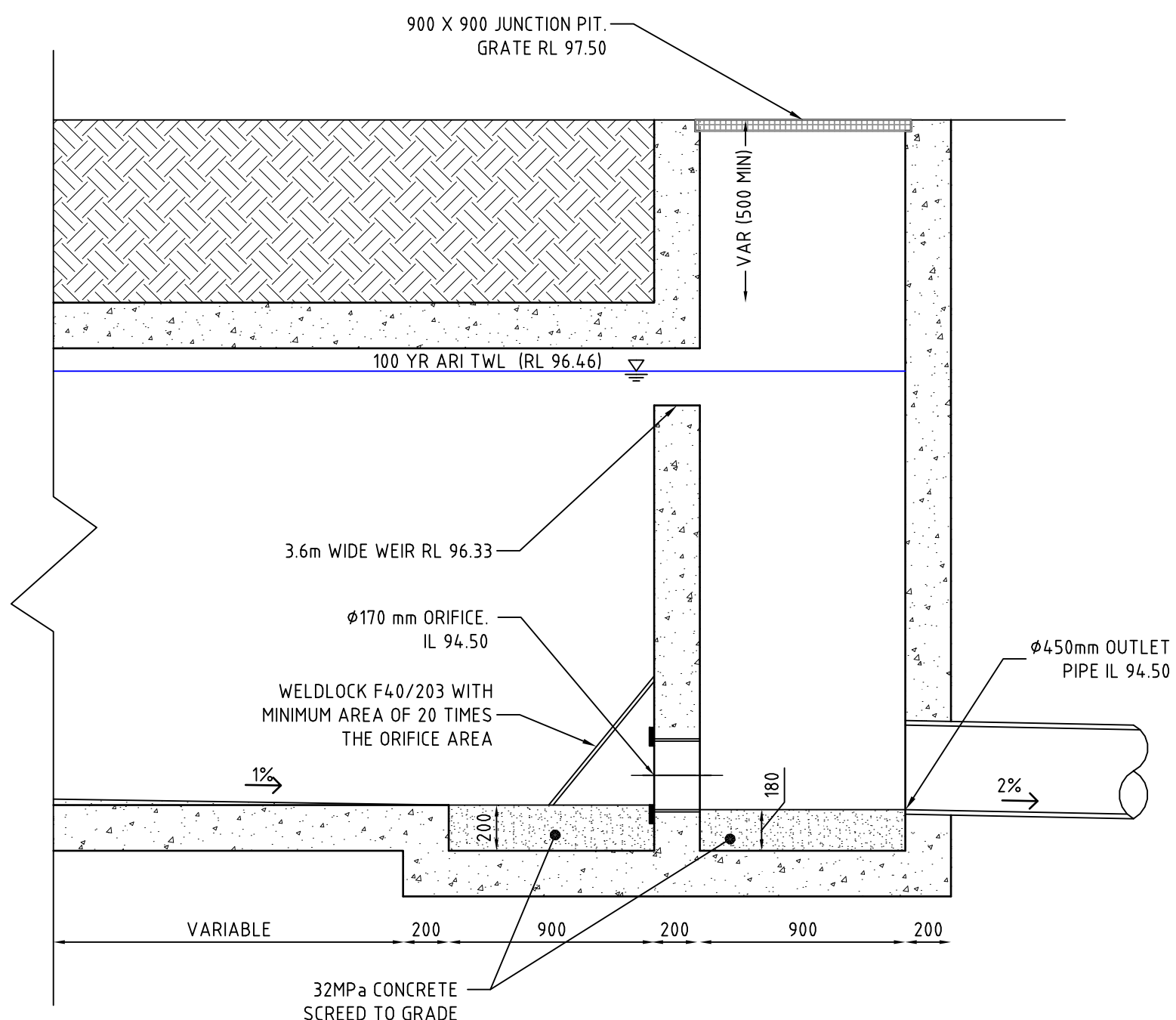
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TYPICAL ORIFICE PLATE DETAIL

NOT TO SCALE

REVISION CLOUD REFERENCE KEY:
MINOR AMENDMENTS TO OSD DESIGN



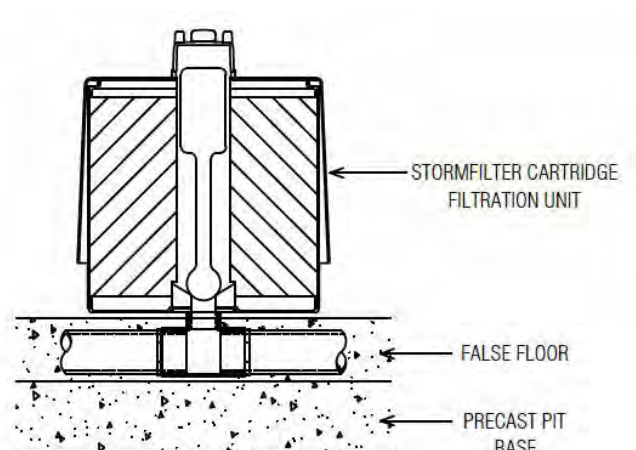
OSD OUTLET STRUCTURE

SCALE 1:25



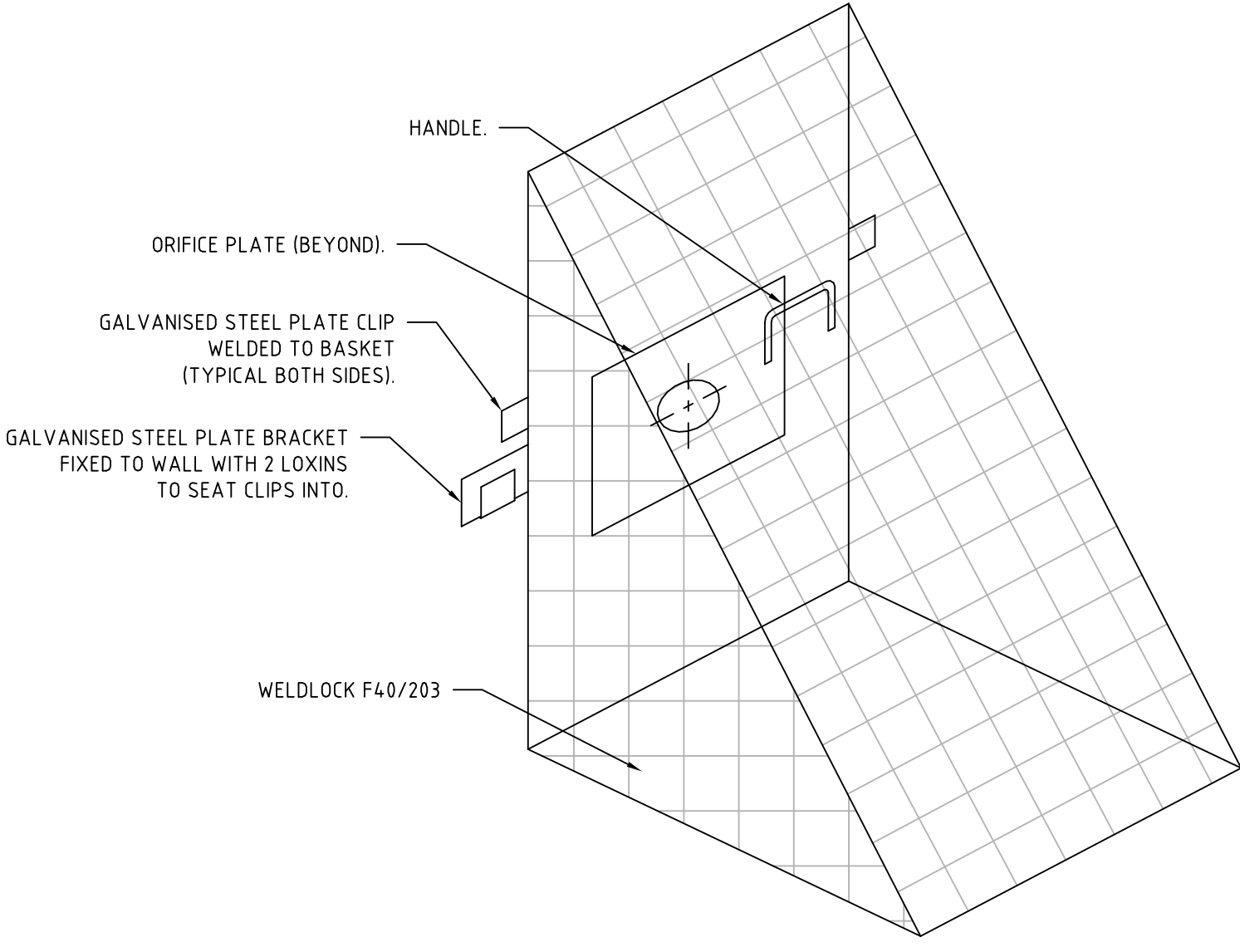
CONFINED SPACE SIGN

NOT TO SCALE



STORMFILTER CARTRIDGE DETAIL

NOT TO SCALE



TRASH SCREEN DETAILS

NOT TO SCALE

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPRVD	SCALE	GRID	DATUM	PROJECT MANAGER	CLIENT	Consulting Engineers				DRAWING TITLE			
A	INITIAL RELEASE	06/05/2021	JS	AVG/EZ	SA	TH	012345678910 A1 (A3) 1:100 (1:200) METRES 00.250.500.751.001.251.501.752.002.252.50 A1 (A3) 1:25 (1:50) METRES	MGA	mAHD	TH	AMITY COLLEGE	 Suite 201, 20 George St, Hornsby, NSW 2077 Australia Phone: (02) 9476 9999 Fax: (02) 9476 8767 Email: mail@martens.com.au Internet: www.martens.com.au	OSD AND DRAINAGE DETAILS						
											PROJECT NAME/PLANSET TITLE		PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION		
											AMITY COLLEGE LEPPINGTON CAMPUS CIVIL WORKS PLAN	P1806493	PS08	R03	PS08-E200	A			
											85 BYRON RD, LEPPINGTON, NSW 2171 LOT 1 & 2 DP 525996								
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DRAWING ID: P1806493-PS08-R03-E200																			

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Open Channel Flow Worksheet - Natural Channel Form

Method based on Manning's equation
Method S1-01 Revised 4.10.2010

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PROJECT DETAILS

Project: Amity College Leppington
Author: AVG
Reviewed: SA
Ref. No.: 6493
Date Created: 20/11/2020

STEP 1: ENTER CHANNEL DATA

FACTOR Enter Data Unit

s - Bed Grade 0.006 m/m

d - Water Depth 0.138 m

n - roughness 0.032 -

Q_d - Design Flow 0.387 m³/s

CROSS-SECTION CO-ORDINATES

X (m)	Y (mAHD)
0.00	100.18
1.00	100.17
2.00	100.16
3.00	100.15
4.00	100.14
5.00	100.13
6.00	100.12
7.00	100.11
8.00	100.10
9.00	100.09
10.00	100.08
11.00	100.07
12.00	100.06
13.00	100.05
14.00	100.04
15.00	100.03
16.00	100.02
17.00	100.01
18.00	100.00
18.05	100.15

Reduced Level (mAHD)

Chainage (m)

WESTERN BOUNDARY 200mm KERB

STEP 2: CALCULATE AND SOLVE DATA

FACTOR Calculated

Channel Invert 100.000 mAHd

Water surface RL 100.138 mAHd

A - Channel Area 0.955 m²

P - wetted perimeter 13.946 m

W - Top Flow Width 13.846 m

R - Hydraulic Radius 0.669 m

V - Velocity 0.405 m/s

Q_d - Calculated Flow 0.387 m³/s

Q Difference 0.000 m³/s

VD Product 0.056 m³/s SAFE

STEP 3: FLOW RATING TABLE

FACTOR Enter Data Unit

Maximum Height 0.150 m

Discharge (m³/s)

Velocity (m/s)

Power (Q)

Stage (m)

WL (mAHD)

A (m²)

W (m)

P (m)

R (m)

V (m/s)

Q (m³/s)

WESTERN BOUNDARY KERB CAPACITY

Open Channel Flow Worksheet - Natural Channel Form

Method based on Manning's equation
Method S1-01 Revised 4.10.2010

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PROJECT DETAILS

Project: Amity College Leppington
Author: AVG
Reviewed: SA
Ref. No.: 6493
Date Created: 20/11/2020

STEP 1: ENTER CHANNEL DATA

FACTOR Enter Data Unit

s - Bed Grade 0.026 m/m

d - Water Depth 0.205 m

n - roughness 0.032 -

Q_d - Design Flow 0.402 m³/s

CROSS-SECTION CO-ORDINATES

X (m)	Y (mAHD)
0.00	97.75
1.25	97.73
3.27	97.65
3.81	97.59
4.10	97.55
4.33	97.59
4.47	97.82
8.85	97.88
9.54	97.93
10.49	97.88
12.34	97.93
12.34	98.00
12.92	98.00
13.02	98.00
13.09	98.00
13.74	98.00
13.91	98.00
14.00	98.00
14.00	98.10

Reduced Level (mAHD)

Chainage (m)

BYRON ROAD CENTRELINE. ANY ADDITIONAL FLOW WILL OVERTOP AND ENTER SITE. REFER TO PS04-E601 DRAIN MODEL RESULTS.

STEP 2: CALCULATE AND SOLVE DATA

FACTOR Calculated

Channel Invert 97.548 mAHd

Water surface RL 97.753 mAHd

A - Channel Area 0.445 m²

P - wetted perimeter 5.875 m

W - Top Flow Width 5.854 m

R - Hydraulic Radius 0.076 m

V - Velocity 0.902 m/s

Q_d - Calculated Flow 0.402 m³/s

Q Difference 0.000 m³/s

VD Product 0.185 m³/s SAFE

STEP 3: FLOW RATING TABLE

FACTOR Enter Data Unit

Maximum Height 0.205 m

Discharge (m³/s)

Velocity (m/s)

Power (Q)

Stage (m)

WL (mAHD)

A (m²)

W (m)

P (m)

R (m)

V (m/s)

Q (m³/s)

BYRON ROAD EASTERN TABLE DRAIN CAPACITY

REVISION CLOUD REFERENCE KEY:
AMENDMENTS TO STAGE 1 DESIGN

S4.55

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A1 / A3 LANDSCAPE (A1L_C_02.0.01)

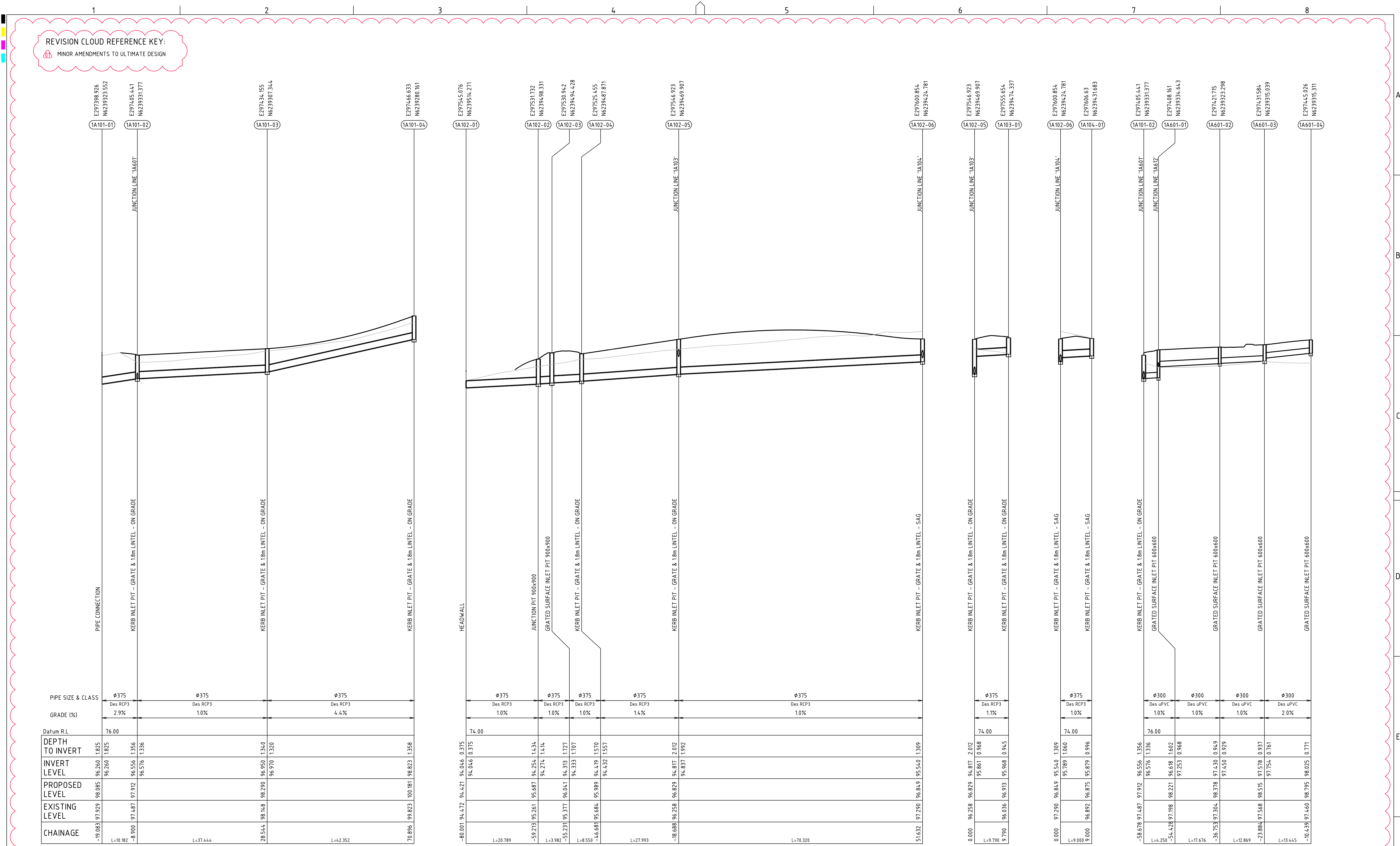
REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPRVD	SCALE
A	INITIAL RELEASE	06/05/2021	JS	AVG	SA	TH	

GRID	DATUM	PROJECT MANAGER	CLIENT
		TH	AMITY COLLEGE
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PROJECT NAME/PLANSET TITLE
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CIVIL WORKS PLAN
85 BYRON RD, LEPPINGTON, NSW 2171
LOT 1 & 2 DP 525996

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DRAWING TITLE				
TABLE DRAIN & KERB FLOW CALCULATION				
PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
P18064.93	PS08	R03	PS08-E201	A



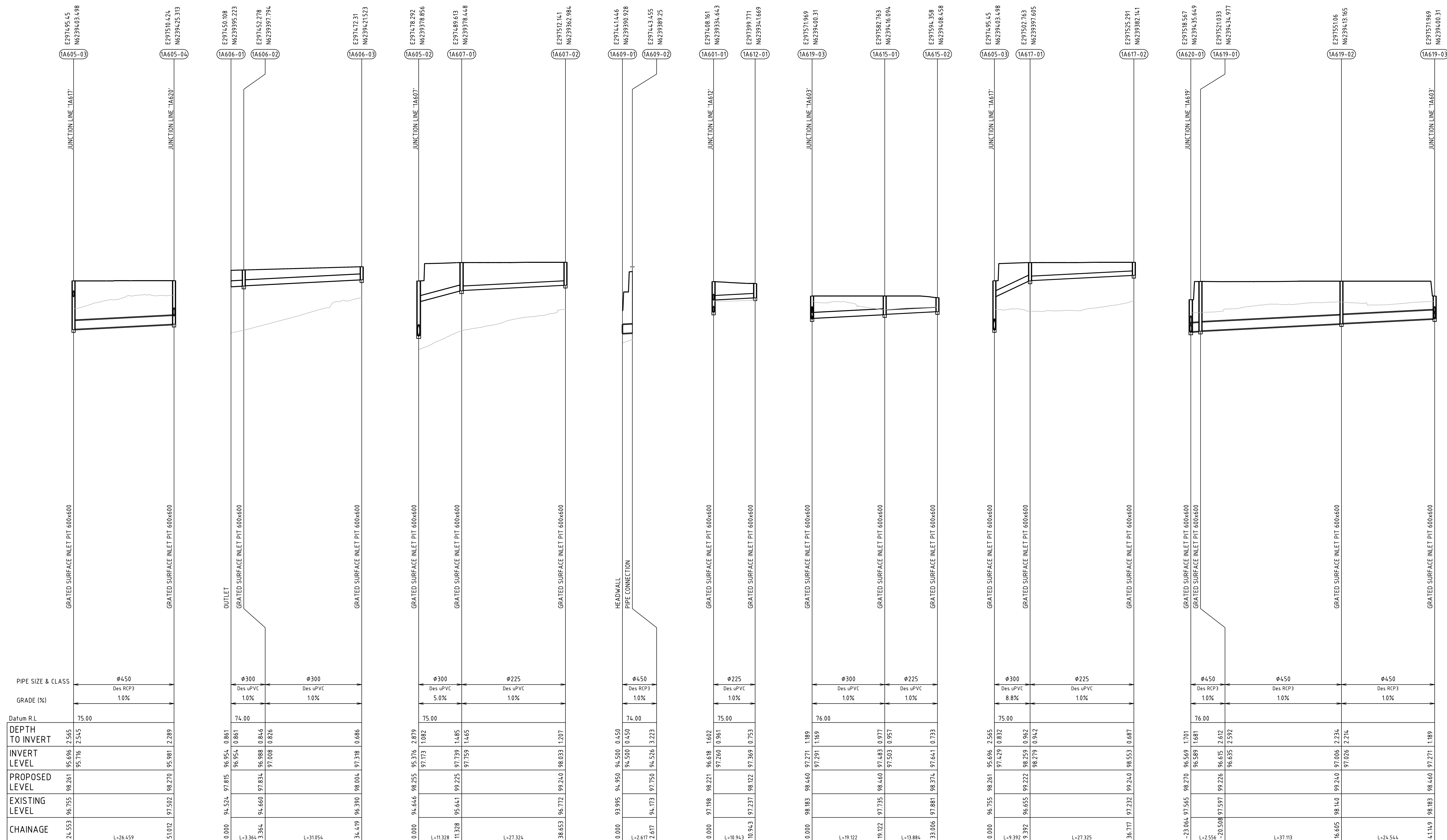
LINE 1A601

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GRID	DATUM	PROJECT MANAGER	CLIENT
	TH		AMITY COLLEGE
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DRAWING TITLE				
DRAINAGE LONGITUDINAL SECTION (SHEET 1)				
PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
P1806493	PS08	R03	PS08-E300	A

F



NOTE: LINE 1A605

LINE 1A606

LINE 1A607

LINE 1A609

LINE 1A612

LINE 1A615

LINE 1A617

LINE 1A619

CONCEPT DRAINAGE DESIGN ONLY. PIPE SIZES AND PIT LOCATIONS ARE SUBJECT TO DETAILED DESIGN AND ARE TO COMPLY WITH AS3500.3 AT A MINIMUM. THE DESIGN LEVEL SHOWN IS THE ULTIMATE STAGE UNLESS SPECIFIED OTHERWISE.

[illegible]

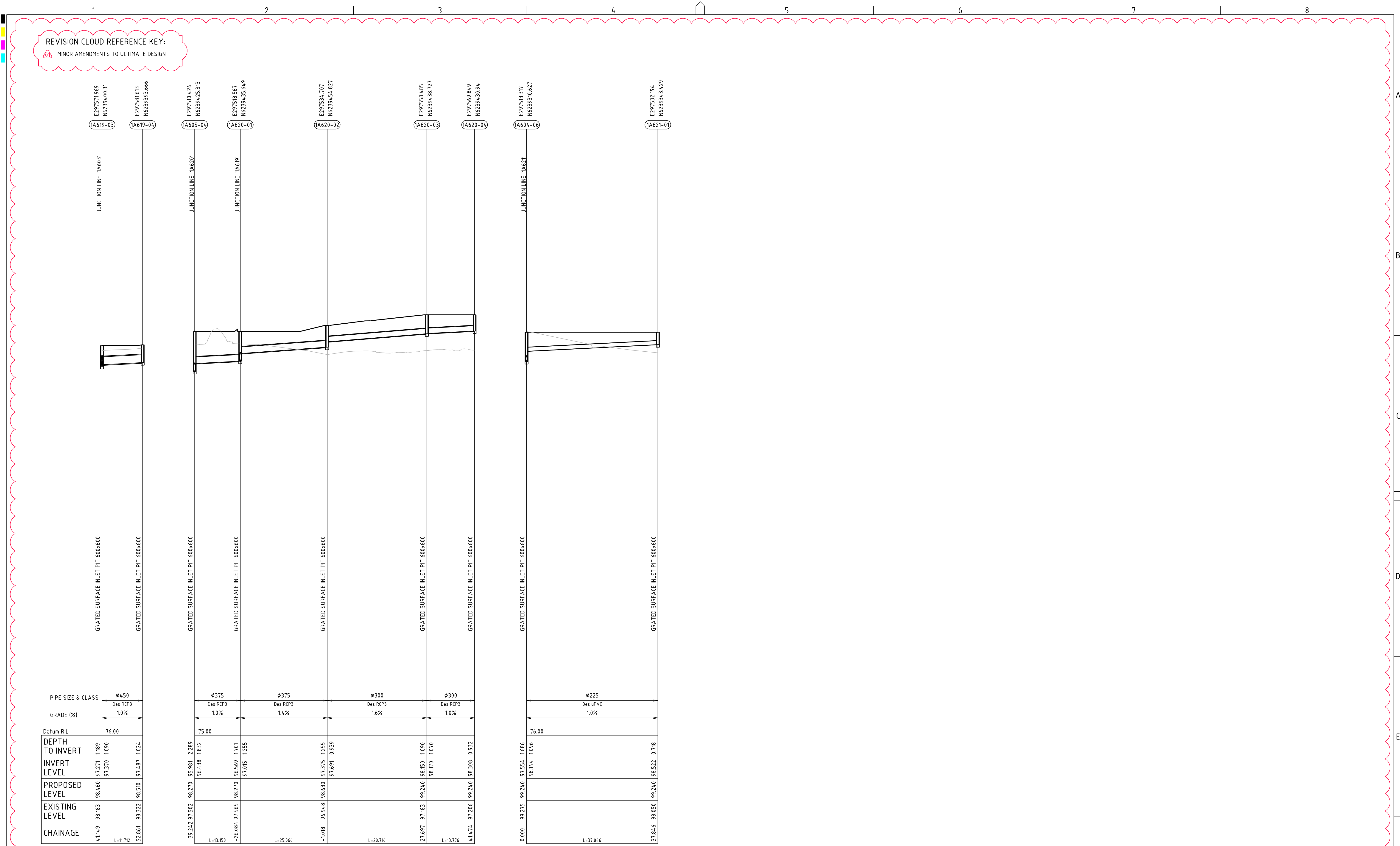
GRID	DATUM	PROJECT MANAGER TH	CLIENT AMITY COLLEGE
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DRAWING TITLE				
DRAINAGE LONGITUDINAL SECTION (SHEET 3)				
PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
P1806493	PS08	R03	PS08-E302	A



NOTE: **LINE 1A619**

LINE 1A620

LINE 1A621

GRID

DATUM

PROJECT MANAGER

CLIENT

AMITY COLLEGE

PROJECT NAME/PLANSET TITLE

AMITY COLLEGE LEPPINGTON CAMPUS

CIVIL WORKS PLAN

85 BYRON RD, LEPPINGTON, NSW 2171

LOT 1 & 2 DP 525996

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DRAWING TITLE

DRAINAGE LONGITUDINAL SECTION (SHEET 4)

PROJECT NO.

P1806493

PLANSET NO.

PS08

RELEASE NO.

R03

DRAWING NO.

PS08-E303

REVISION

A

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A1 / A3 LANDSCAPE (A1LC_v02.0.01)

DRAWING ID: P1806493-PS08-R03-E303

			INTERNAL			INLET		OUTLET		PIT	
Name	TYPE	EASTING	NORTHING	WD	LEN	DIA	INV LEV	DIA	INV LEV	SETOUT RL	DEPTH
1A101-04	KERB INLET PIT - GRATE & 1.8m LINTEL - ON GRADE	297466.633	6239280.161	0.90	0.90	-	-	375	88.823	100.181	1.358
1A101-03	KERB INLET PIT - GRATE & 1.8m LINTEL - ON GRADE	297434.155	6239307.344	0.90	0.90	375	96.970	375	96.950	98.290	1.340
1A101-02	KERB INLET PIT - GRATE & 1.8m LINTEL - ON GRADE	297405.441	6239331.377	0.90	0.90	375	96.576	375	96.556	97.912	1.356
1A101-01	PIPE CONNECTION	297398.926	6239323.552	0.00	0.00	375	96.260	-	-	98.085	1.825
Pit			INTERNAL			INLET		OUTLET		PIT	
Name	TYPE	EASTING	NORTHING	WD	LEN	DIA	INV LEV	DIA	INV LEV	SETOUT RL	DEPTH
1A102-06	KERB INLET PIT - GRATE & 1.8m LINTEL - SAG	297600.854	6239424.781	0.90	0.90	-	-	375	95.540	96.849	1.309
1A102-05	KERB INLET PIT - GRATE & 1.8m LINTEL - ON GRADE	297546.923	6239469.907	0.90	0.90	375	94.837	375	94.817	96.829	2.012
1A102-04	KERB INLET PIT - GRATE & 1.8m LINTEL - ON GRADE	297525.455	6239487.871	0.90	0.90	375	94.432	375	94.419	95.989	1.570
1A102-03	GRATED SURFACE INLET PIT 900x900	297530.942	6239494.428	0.90	0.90	375	94.333	375	94.313	96.041	1.727
1A102-02	JUNCTION PIT 900x900	297531.732	6239498.331	0.90	0.90	375	94.274	375	94.254	95.687	1.434
1A102-01	HEADWALL	297545.076	6239514.271	0.00	0.00	375	94.046	-	-	94.421	0.375
Pit			INTERNAL			INLET		OUTLET		PIT	
Name	TYPE	EASTING	NORTHING	WD	LEN	DIA	INV LEV	DIA	INV LEV	SETOUT RL	DEPTH
1A103-01	KERB INLET PIT - GRATE & 1.8m LINTEL - ON GRADE	297555.654	6239474.337	0.90	0.90	-	-	375	95.968	96.913	0.945
1A102-05	KERB INLET PIT - GRATE & 1.8m LINTEL - ON GRADE	297546.923	6239469.907	0.90	0.90	375	95.861	-	-	96.829	2.012
Pit			INTERNAL			INLET		OUTLET		PIT	
Name	TYPE	EASTING	NORTHING	WD	LEN	DIA	INV LEV	DIA	INV LEV	SETOUT RL	DEPTH
1A104-01	KERB INLET PIT - GRATE & 1.8m LINTEL - SAG	297606.630	6239431.683	0.90	0.90	-	-	375	95.879	96.875	0.996
1A102-06	KERB INLET PIT - GRATE & 1.8m LINTEL - SAG	297600.854	6239424.781	0.90	0.90	375	95.789	-	-	96.849	1.309
Pit			INTERNAL			INLET		OUTLET		PIT	
Name	TYPE	EASTING	NORTHING	WD	LEN	DIA	INV LEV	DIA	INV LEV	SETOUT RL	DEPTH
1A601-07	GRATED SURFACE INLET PIT 600x600	297485.258	6239284.342	0.60	0.60	-	-	150	99.863	101.090	1.228
1A601-06	GRATED SURFACE INLET PIT 600x600	297475.508	6239290.238	0.60	0.60	150	98.723	225	98.703	100.351	1.648
1A601-05	GRATED SURFACE INLET PIT 600x600	297461.094	6239302.302	0.60	0.60	225	98.515	225	98.495	99.209	0.714
1A601-04	GRATED SURFACE INLET PIT 600x600	297445.026	6239315.311	0.60	0.60	225	98.114	300	98.025	98.795	0.771
1A601-03	GRATED SURFACE INLET PIT 600x600	297431.584	6239315.039	0.60	0.60	300	97.754	300	97.578	98.515	0.937
1A601-02	GRATED SURFACE INLET PIT 600x600	297421.715	6239323.298	0.60	0.60	300	97.450	300	97.430	98.378	0.949
1A601-01	GRATED SURFACE INLET PIT 600x600	297408.161	6239334.643	0.60	0.60	300	97.253	300	96.618	98.221	1.602
1A101-02	KERB INLET PIT - GRATE & 1.8m LINTEL - ON GRADE	297405.441	6239331.377	0.90	0.90	300	96.576	-	-	97.912	1.356
Pit			INTERNAL			INLET		OUTLET		PIT	
Name	TYPE	EASTING	NORTHING	WD	LEN	DIA	INV LEV	DIA	INV LEV	SETOUT RL	DEPTH
1A603-02	GRATED SURFACE INLET PIT 600x600	297552.571	6239373.113	0.60	0.						

Pit		INTERNAL				INLET		OUTLET		PIT	
Name	TYPE	EASTING	NORTHING	WD	LEN	DIA	INV LEV	DIA	INV LEV	SETOUT RL	DEPTH
1A620-04	GRADED SURFACE INLET PIT 600x600	297569.849	6239430.940	0.60	0.60	-	-	300	98.308	99.240	0.932
1A620-03	GRADED SURFACE INLET PIT 600x600	297558.485	6239438.727	0.60	0.60	300	98.170	300	98.150	99.240	1.090
1A620-02	GRADED SURFACE INLET PIT 600x600	297534.707	6239454.827	0.60	0.60	300	97.691	375	97.375	98.630	1.255
1A620-01	GRADED SURFACE INLET PIT 600x600	297518.567	6239435.649	0.60	0.60	375	97.015	375	96.569	98.270	1.701
1A605-04	GRADED SURFACE INLET PIT 600x600	297510.424	6239425.313	0.60	0.60	375	96.438	-	-	98.270	2.289
Pit		INTERNAL				INLET		OUTLET		PIT	
Name	TYPE	EASTING	NORTHING	WD	LEN	DIA	INV LEV	DIA	INV LEV	SETOUT RL	DEPTH
1A621-01	GRADED SURFACE INLET PIT 600x600	297532.194	6239343.429	0.60	0.60	-	-	225	98.522	99.240	0.718
1A604-06	GRADED SURFACE INLET PIT 600x600	297513.317	6239310.627	0.60	0.60	225	98.144	-	-	99.240	1.686

REVISION CLOUD REFERENCE KEY:
 MINOR AMENDMENTS TO ULTIMATE DESIGN

Amity College



Integrated Water Management Plan:

Lots 1 and 2 DP 525996,
85 Byron Road and 63 Ingleburn Road,
Leppington, NSW

ENVIRONMENTAL



WATER



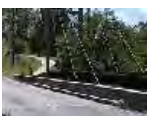
WASTEWATER



GEOTECHNICAL



CIVIL



PROJECT
MANAGEMENT



P1806493JR01V06
May 2021

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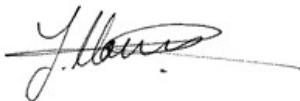
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All enquiries regarding this project are to be directed to the Project Manager.

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1 Introduction

1.1 Overview

This stormwater management report has been prepared by Martens & Associates Pty Ltd (MA) to support a S4.55 application for a state significant development (SSD 9227) regarding a proposed school at 85 Byron Road and 63 Ingleburn Road, Leppington, NSW (the 'site').

The school is proposed to be developed in a series of stages. The stormwater management report is designed to be compatible with this staged approach and should be read in conjunction with MA planset P1806493PS08.

1.2 Project Scope and Aims

This report provides the following:

- Evidence of compliance with Secretary's Environmental Assessment Requirements (SEARs) SSD 9227 as they relate to stormwater management;
- Water quality assessment modelling and results using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) in accordance with Camden Council Engineering Design Specification (2009).
- Drainage system concept design to cater for the minor system by way of pit and pipe and major system by way of pit and pipe and overflow paths.
- Documentation of water quantity requirements for the development in accordance with SEARs.
- Flooding assessment.
- Sediment and erosion control.
- Water assessment.
- Wastewater assessment.
- Groundwater assessment.

1.3 Relevant Planning Controls and Design Principles

The following planning and engineering controls and design principles have been considered:

- Camden Council (2009) – *Engineering Design Specification*.
- Camden Council (2010) – *Local Environmental Plan*.
- Camden Council (2016) – *Camden Growth Centre Precincts Development Control Plan*.
- Greater Sydney Local Land Services (GSLLS) (2015)– *NSW MUSIC Modelling Guidelines*.
- NSW Office of Environment & Heritage (NSW OEH) (2013) – *Guidelines for Development Adjoining Land and Water Managed by DECCW*.
- Parsons Brinckerhoff (2014) – *Leppington Precinct Water Cycle Management Strategy*.

2 Site Description

2.1 Location and existing land use

The site is approximately 2.3 ha per the Total Survey Solutions Plan no 191149-1 and located on Lots 1 and 2 DP 525996, 85 Byron Road and 63 Ingleburn Road, Leppington, NSW within the Camden Council Local Government Area (LGA). The rural site is predominantly open grasslands. The site is zoned SP2 -Infrastructure and R3 – Medium Density Residential.

The surrounding land uses are primarily rural and rural residential. Camden Valley Way is located approximately 550 m to the south-east.

2.2 Topography and Hydrology

Site elevation is approximately 93.75 m AHD to the site's north western boundary at the existing drainage depression, sloping up to 102.5 m AHD near the southern. There is a ridge running from the southeast to the northwest through the centre of the site. Existing site drainage is generally via overland flow paths to a natural drainage depression at the north eastern boundary for land west of the ridge, and to the northern corner of the lot for land east of the ridge.

3 Stormwater Quality Assessment

3.1 Water Quality Objective

Camden Council has provided the treatment objectives for pollutants in Council's Engineering Design Specification (2009). The following water quality objectives are to be achieved by the development when comparing the developed site with and without integration of water quality treatment measures:

- 85% reduction in total suspended solids (TSS).
- 65% reduction in total phosphorus (TP).
- 45% reduction in total nitrogen (TN).
- 90% reduction in gross pollutants (GP).
- The post development duration of stream forming flows shall be no greater than 5 times the pre developed duration of stream forming flows.

3.2 Modelling Methodology

3.2.1 Overview

Model for Urban Stormwater Improvement Conceptualisation (*MUSIC*, Version 6.3) was used to evaluate treatment train effectiveness (TTE) and the Stream Erosion Index (SEI).

Modelling has been undertaken in accordance with Camden Council requirements (*MUSIC-link*) and GSLLS (2015) guidelines with the developed site based on the proposed design for both stage 1 and the ultimate stage, including water quality treatment devices required to achieve adopted water quality objectives.

The *MUSIC* model layouts are provided in MA planset P1806493PS08-E710 and E711.

3.2.2 Approach

An iterative approach was used to determine appropriate types, sizes and locations of stormwater treatment devices required to satisfy the adopted water quality objectives.

The MUSIC model includes all areas that are disturbed by the proposed development or which drain to a treatment device. All other areas (i.e. where no development is proposed) have been excluded from the model.

3.2.3 Climate Data

MUSIC was run on a 6-minute timestep using the MUSIC-link function for Camden Council data obtained from eWater.

3.2.4 Input Parameters

Input parameters for source and treatment nodes have been obtained via the MUSIC-link function for Camden Council and are provided in MUSIC models P1806493MUS04V03 (stage 1) and P1806493MUS03V02 (ultimate stage).

3.2.5 Catchment Areas

Catchment delineation and impervious fractions are based on the proposed development and concept grading works. Refer to MA planset P1806493PS08-E710 and E711 for catchment boundaries.

3.3 Water Sensitive Urban Design Measures

Water sensitive urban design (WSUD) measures are required to satisfy the water quality objectives in Section 3.1 in accordance with Council's Engineering Design Specification (2009) and Leppington Precinct Water Cycle Management Strategy (2014).

The stormwater treatment strategy for the site uses a combination of 'at source' and 'end of line' controls to ensure treatment objectives are satisfied. Individual WSUD measures are outlined in the following sections.

3.3.1 Stage 1

3.3.1.1 Buffer Strip

Vegetated buffer strips are proposed to treat sheet flow runoff. The buffer strips are proposed immediately downslope of impervious areas to filter coarse matter and reduce pollutant loads to downstream treatment devices.

Final sizing and extents of buffer strips shall be confirmed at detailed design stage.

3.3.1.2 Gross Pollutant Traps (GPTs)

GPTs in the form of Ocean Protect's Oceanguard pit inserts or Oceansave end of line device are proposed. These devices have been modelled to treat gross pollutants from small and large scale areas respectively. The modelled treatment efficiency of these devices is based on the manufacturer's specifications.

The location of the Oceanguard and Oceansave devices are shown on MA planset P1806493PS08-E101.

3.3.1.3 Ocean Protect Stormfilters

Stormfilter devices provide a reduction in nutrient pollutant loads through propriety media filtration. Two independent Stormfilter chambers are proposed with the following cumulative properties:

- Tank surface area: 27 m² (inclusive of cartridges)
- No. of cartridges: 37 x Stormfilter PSorb cartridges

The location of the stormfilter chambers and cartridges are shown on MA planset P1806493PS08-E101.

3.3.2 Ultimate Stage

3.3.2.1 Buffer Strip

Vegetated buffer strips are proposed to treat sheet flow runoff. The buffer strips are proposed immediately downslope of impervious areas to filter coarse matter and reduce pollutant loads to downstream treatment devices.

Final sizing and extents of buffer strips shall be confirmed at detailed design stage.

3.3.2.2 Rainwater Tank

Runoff from designated roof areas will be connected to one of seven rainwater tanks for reuse. The collected water will be reused for landscape irrigation. The following was modelled:

- 7 x 10 kL rainwater tank; four located next to the primary hall and three next to the secondary hall.
- An average internal daily reuse rate of 1 kL/day was applied.

- An annual external reuse rate of 450 kL/year (0.4 kL/m²/year) was applied and scaled by potential evapotranspiration variations.

3.3.2.3 Gross Pollutant Traps (GPTs)

GPTs in the form of Ocean Protect's Oceanguard pit inserts or Oceansave end of line device are proposed. These devices have been modelled to treat gross pollutants from small and large scale areas respectively. The modelled treatment efficiency of these devices is based on the manufacturer's specifications.

The location of the Oceanguard and Oceansave devices are shown on MA planset P1806493PS08-E100.

3.3.2.4 Ocean Protect Stormfilters

Stormfilter devices provide a reduction in nutrient pollutant loads through propriety media filtration. Two independent Stormfilter chambers are proposed with the following cumulative properties:

- Tank surface area: 27 m² (inclusive of cartridges)
- No. of cartridges: 37 x Stormfilter PSorb cartridges

The location of the stormfilter chambers and cartridges are shown on MA planset P1806493PS08-E100.

3.4 MUSIC Results

MUSIC modelling results for stage 1 (P1806493MUS04V03) and the ultimate stage (P1806493MUS03V02) are provided in Table 1 and Table 2.

Table 1: MUSIC results: stage 1.

Parameter	Sources	Residual Load	Achieved Reduction	Required Reduction	Complies (Y/N)
TSS (kg/year)	1280	188	85.3%	85%	Y
TP (kg/year)	2.93	0.85	71.2%	65%	Y
TN (kg/year)	23.8	13.0	45.3%	45%	Y
Gross Pollutants (kg/year)	243	0	100%	90%	Y

Table 2: MUSIC results: ultimate stage.

Parameter	Sources	Residual Load	Achieved Reduction	Required Reduction	Complies (Y/N)
TSS (kg/year)	1750	248	85.8%	85%	Y
TP (kg/year)	4.24	1.48	65.1%	65%	Y
TN (kg/year)	35.7	19.5	45.3%	45%	Y
Gross Pollutants (kg/year)	417	0	100%	90%	Y

3.5 SEI calculations and results

DRAINS software package (version 2020.061 – 22 December 2020) was used with the ILSAX hydrological engine to calculate the 2 year ARI pre development flow.

The critical flow which is 50% of the 2 year ARI flow, was found to be 0.099 m³/s for stage 1 and 0.102 m³/s for the ultimate stage. This flow was applied to a generic treatment node to transform flows less than the critical flow to zero and evaluate stream forming flows. Table 3 shows stream forming flows for the pre development and post development scenarios. Camden Council requires SEI values less than 5.0.

Table 3: MUSIC stream erosion index results.

Parameter	Pre Sources	Post Sources	SEI	Complies (Y/N)
SEI (ML/yr) Stage 1	0.34	0.52	1.53	Y
SEI (ML/yr) Ultimate Stage	0.39	1.10	2.81	Y

3.6 Conclusion

The modelling results indicate that the water quality objectives will be met by the proposed WSUD measures for both stage 1 and the ultimate stage. The proposed management system is consistent with the principles of Water Sensitive Urban Design as the proposed treatment strategy uses 'at source' controls rather than relying solely on end of line structures. This approach is considered appropriate for the site and will provide a satisfactory outcome for receiving environments.

4 Stormwater Quantity Assessment

4.1 Objectives

Water quantity objectives are to comply with Camden Council Engineering Design Specification (2009). Site stormwater management has been designed to comply with the objectives of Camden Council Engineering Design Specification (2009) as follows:

- Attenuating flows from the post development site so that pre development flows are not exceeded for storms up to the 1% annual exceedance probability (AEP) event.
- Drainage system to carry all flows during minor storm events, up to the 20% AEP event, by way of pit and pipe.
- Drainage system to carry all flows during major storm events, up to the 1% AEP event, by way of pit and pipe and overland flow.
- Providing stormwater quantity devices outlets outside of preliminary 1% AEP flood extent so as to not be drowned outlets.

4.2 Overview

The DRAINS software package (version 2020.061 – 22 December 2020) was used with the ILSAX hydrological engine to satisfy the OSD objectives listed above. A conceptual pit and pipe network is provided in MA planset P1806493PS08 drawings E100, E101 & E110 with hydraulic analysis to be completed at detailed design stage.

4.3 Modelling Methodology

Parameters used in the model are consistent with *Australian Rainfall and Runoff (AR&R)* 2019 procedure. Modelling assumptions are derived from the following sources:

- Rainfall data and storm events were modelled in accordance with AR&R (2019) principles.
- ILSAX parameters for all catchments were based on Council's Engineering Design Specifications (2009) as shown in Table 4.
- Catchment delineation was developed using site survey data, LIDAR data and the proposed drainage system. Catchment

information has been provided in MA planset P1806493PS08 drawings E600.

- Post-development catchment impervious areas were determined based on the proposed development layout.

Table 4: ILSAX hydrology details used in DRAINS modelling.

Parameter	Element	Value
ILSAX parameters	Impervious area depression storage (mm)	1.0
	Supplementary area depression storage (mm)	1.0
	Grassed area depression storage (mm)	5.0
	Soil type	3

4.4 Site Drainage

The proposed concept pit and pipe network for the ultimate stage and stage 1 is provided in MA planset P1806493PS08-E100 and P1806493PS08-E101, and uses the following system to manage runoff:

- Development run-off shall be captured by the proposed pit and pipe network and conveyed to a water quality treatment or OSD system prior to discharging offsite.
- Hydraulic modelling shall be completed at detailed design stage to comply with Camden Council Engineering Design Specifications (2009) and AS 3500.3.

4.5 Onsite Detention (OSD)

OSD storage has been designed for the proposed development to satisfy the objectives in Section 4.1. Further details for OSD are provided in MA planset P1806493PS08-E200 with a summary of key components provided in Table 5.

Table 5: Summary of OSD tank for ultimate stage.

Volume (m ³)	Primary orifice (mm)	Primary Orifice Centre Elevation (mAHD)	Primary Weir (mAHD)	Primary Weir Crest Length (m)
640	170	94.59	96.33	3.6

4.6 DRAINS Results

A summary of the critical storm discharge results for the ultimate stage is provided in Table 6 and MA planset P1806493PS08 drawing E601.

Table 6: Summary of OSD results for the ultimate stage (P1806493DRN04V03).

Storm Event	Pre Development Peak flow (L/s)	Post Development Peak Flow (L/s)	Post < Pre
0.5 EY	0.334	0.317	Yes
20% AEP	0.585	0.467	Yes
10% AEP	0.793	0.629	Yes
5% AEP	0.997	0.748	Yes
2% AEP	1.300	0.953	Yes
1% AEP	1.530	1.170	Yes

Modelling was conducted for the ultimate stage of development. The ultimate onsite detention tank is proposed to be constructed at stage 1, thus making it oversized for all intermediary stages. This is because all stages prior to the final stage have lower levels of impervious area (and thus produce lower flow rates) than the final stage for which the tank is designed.

4.7 Conclusion

The proposed drainage system has been designed to capture and convey site stormwater. Hydraulic modelling shall be completed at detailed design stage to comply with Camden Council Engineering Design Specification (2009) and AS 3500.3. The OSD and water quality (WSUD) elements have been designed to comply with the SEAR's requirements, with further details provided at the detailed design stage.

5 Flooding

The current site is partially affected by Overland Flow - the 1% Annual Exceedance Probability (AEP) event as shown in Council's mapping in the Upper South Creek Floodplain Risk Management Study and Plan (March, 2019). Refer to Attachment A: Flood Map.

The proposed flood characteristics are expected to be consistent with the existing conditions, with a very minor loss of flood storage as a result of filling at the site. As the site is to be raised above the flood planning level and the PMF level, the developed site is not considered flood affected. Council's flood mapping suggests that the flood affectation is due to local overland flows and the downstream dam (likely to be filled as part of future development). The loss of flood storage is considered to be of immaterial significance as the development occurs on the outer extent of the flood fringe.

6 Erosion and Sediment Control Plan

6.1 Overview

This section details the erosion and sediment controls proposed for the construction phase of the works at the site. To eliminate the discharge of sediment from the site, temporary sediment and erosion controls are to be constructed prior to commencement of any work. The controls are to be installed in accordance with the Sediment and Erosion Control Plans prepared by MA and the requirements of Landcom (2004).

6.2 Sedimentation Basin

Based on the methods provided in the Blue Book, a 180 m³ sedimentation basin is required for the construction phase of the development. The OSD is proposed to be used as the temporary sedimentation basin.

6.3 Erosion and Sediment Control Measures

The following sediment and erosion control measures are proposed to prevent the pollutants generated from construction activities from adversely affecting the water quality of the receiving environment.

- Sediment fencing shall be used at the downslope end of the site for the duration of all earthworks.
- Proposed site clearance and bulk earthworks shall be undertaken following the implementation of site sediment control fences.
- Stormwater inlets shall be protected by geotextile sediment barriers at all times during work on site.
- All site stockpile areas shall have sediment fencing downslope of them.
- Stabilised site access is to be used at all times during the construction phase.
- Rock check dams are to be used within concentrated flow channels.

7 Water Management

The site's water supply comes from two sources: roofwater reuse and town water. Despite roofwater being captured and reused on site, town water is the main water supply for the site.

The site water management and reuse system is summarised as follows:

- Rainwater from the building roofs is to be collected and stored in rainwater tanks and used for outdoor irrigation.
- Town water will be used for amenities, potable uses and to supplement other supplies as required.

For more information on water supply to the site refer to Section 2 of the Infrastructure & Services Report prepared by Erbas.

We recommend that the following water conservation strategies to be investigated at detailed design stage to further reduce the site's town water demands:

- Use of smart water meters;
- Use of flow limited taps and showers;
- Use of drip irrigation; and
- Use of water efficient applications such as dual flushing toilet and waterless urinals.

8 Wastewater Management

The site will be connected to Sydney Water sewer main in Ingleburn Road for sewage disposal. No onsite treatment, reuse or disposal is proposed. The connection will require extension of the sewer main in accordance with the Infrastructure & Services Report prepared by Erbas.

We recommend that the following wastewater load reduction strategies to be investigated at detailed design stage:

- Graywater reuse;
- Use of water efficient applications which contribute to wastewater loads.

9 Groundwater Assessment

The Geotechnical and Salinity Investigation Report prepared by GeoEnviro Consultancy indicates that all boreholes were dry during and shortly after completion of drilling. Therefore, regular encounters with groundwater during construction are not expected.

10 Water Cycle Management Strategy Compliance

Checklist

Water cycle management strategy to be used for the development are provided in Table 7.

Table 7: Water Cycle Management Strategy Compliance Checklist (Parson Brinckerhoff, 2014)

Water Cycle Management Objectives	Section of Report	Compliance (Y/N)
1. Stormwater Quantity		
1) Harvest rainwater from roof areas for non-potable internal and external demands.	Section 3.3.2.2	Y
2) Harvest stormwater to reduce the demand for potable water for nonpotable demands as much as possible.	-	N
3) Minimise changes in hydraulic regime to protect stability of waterways and ecosystems within waterways in accordance with requirements for erosion control ratio in the Camden Growth Centres DCP.	Section 4	Y
4) Adopt best practice erosion and sediment control techniques during construction.	Section 6	Y
2. Stormwater Quality		
1) Reduce load of urban stormwater pollutants from site to best practice criteria.	Section 3	Y
2) Adopt WSUD elements in the stormwater management system to protect and enhance natural water systems, to reduce stormwater runoff and peak flows, to meet water quality objectives through quality improvement measures.	Section 3	Y
3. Water Supply		
1) Provide a safe and reliable supply of water.	Section 7	Y
2) Minimise potable water consumption by limiting potable water supply to demands that require potable water.	Sections 3.3.2.2 & 7	Y
3) Maximise re-use of stormwater in urban areas	Section 7	Y
4) Encourage the use of recycled water for non-contact uses.	Section 8	Y
4. Wastewater		
1) Provide appropriate wastewater collection and conveyance system in accordance with Sydney Water Corporation strategy and receiving environment.	Section 8	Y
2) Minimise the generation of wastewater.	Section 8	Y
5. Groundwater		
1) Minimise the impacts of development to groundwater quality and quantity.	Section 9	Y

Water Cycle Management Objectives	Section of Report	Compliance (Y/N)
2) Maintain or restore hydrological regimes to specific groundwater dependant ecosystems.	Section 9	Y
3) To manage and mitigate the impacts of salinity on existing and proposed infrastructure and vegetation.	Section 9	Y
4) Reduce any increase in salt loads to existing watercourses, to prevent degradation of the existing soil and groundwater environment.	Section 9	Y
6. Flooding		
Attenuate stormwater runoff up to the 1% AEP event.	Section 5	Y
Maintain safe flood conveyance through the site for events greater than the 1% AEP.	Section 5	Y
7. Riparian Corridors	-	-
1) Maintain riparian buffer between development and waterways.		
2) Rehabilitate degraded waterways.		
3) Minimise any changes to flow frequency and magnitude.		

11 References

Camden Council (2009) – *Engineering Design Specification*.

Camden Council (2010) – *Local Environmental Plan*.

Camden Council (2016) – *Camden Growth Centre Precincts Development Control Plan*.

DRAINS (2019) – *DRAINS content menu*.

Erbas (2019) – *Infrastructure & Services Report*.

Greater Sydney Local Land Services (GSLLS) (2015) – *NSW MUSIC Modelling Guidelines*.

GeoEnviro Consultancy (2019) – *Geotechnical and Salinity Investigation*. Institution of Engineers, Australia (2006) – *Australian Rainfall and Runoff*.

Land and Property Information NSW (2016) – *SIX Maps Viewer*.

NSW Office of Environment & Heritage (NSW OEH) (2013) – *Guidelines for Development Adjoining Land and Water Managed by DECCW*.

Parsons Brinckerhoff (2014) – *Leppington Precinct Water Cycle Management Strategy*.

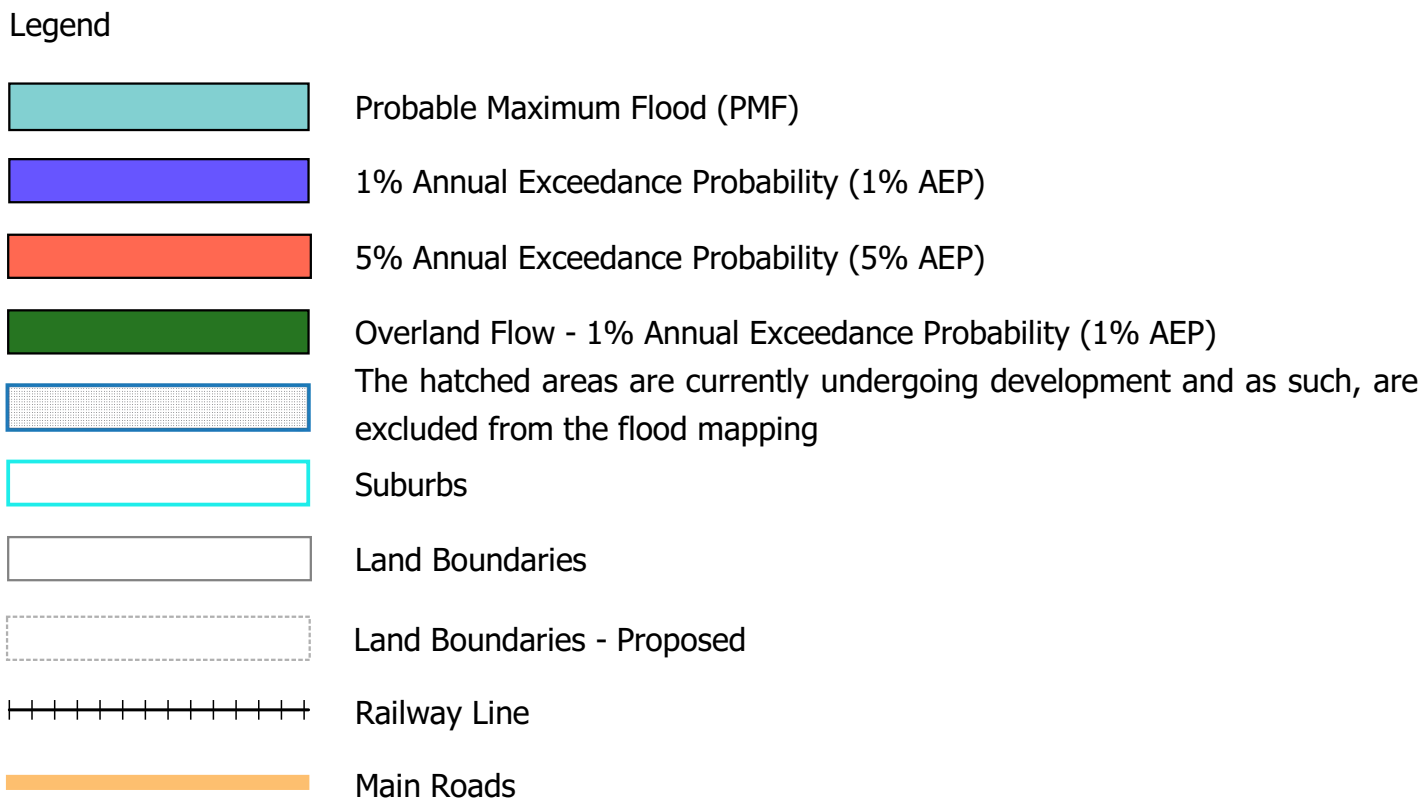
12 Attachment A – Flood Map



Mainstream Flood Extents:
1% AEP, 5% AEP and PMF Flood Events

Overland Flow: 1% AEP Flood Event

Upper South Creek Floodplain Risk
Management Study and Plan, March 2019



Flood Information

This map has been prepared by Council's Land Information Section based on the results provided in Upper South Creek Floodplain Risk Management Study and Plan, March 2019, Aerial Laser Survey 2008 and other survey data collected after Upper South Creek Flood Study, 2012.

The extent of flood inundation is approximate only.

For greater accuracy, you should obtain a Flood Certificate from Camden Council which will provide flood levels to Australian Height Datum (AHD) and these can be compared to actual site levels.

The Aerial Laser survey, 2008 has an accuracy of $\pm 150\text{mm}$ vertical and $\pm 270\text{mm}$ horizontal.

The flood extents shown in this map are for the South Creek Catchment only and areas that may be subject to flooding but are not part of the South Creek Catchment are not shown.

Any areas with flood depths less than 150mm are excluded from the flood extent mapping.

The flooding shown on these plans is for main stream flooding and overland flooding.

Mainstream flooding means inundation resulting from overbank flow from a waterway rather than by local runoff.

Overland Flow is local runoff on its way to a waterway, rather than overbank discharge from a waterway.

Overland flow flood extents are located outside the mainstream watercourses. The 1% AEP overland flow flood depth is generally greater than 0.15m and no more than 0.5m.

Climate Change has not been considered in flood mapping. It is expected that existing flood behaviour and levels will change due to the impacts of Climate Change.

The hatched areas are currently undergoing development and as such, are excluded from the study. These areas are Oran Park, Turner Road, part of Leppington and Catherine Field (Part) Precincts, and Gledswood Hills, Emerald Hills.

The information contained on these maps is to the best of Council's belief, correct. However, no warranty or guarantee is provided by Council and no liability is accepted for any loss or damage resulting from any person relying upon or using the information contained in the map. Flood information and levels are subject to change (without notice) based upon matters such as new or improved flood study data, climate change and changes to the build and / or natural environments.

In accordance with section 733 of the Local Government Act 1993, Council is not liable in respect of any advice furnished in good faith by the Council relating to the likelihood of any land being flooded or the nature or extent of any such flooding, or anything done or omitted to be done in good faith by the Council in so far as it relates to the likelihood of land being flooded or the nature or extent of any such flooding.

Map 3

