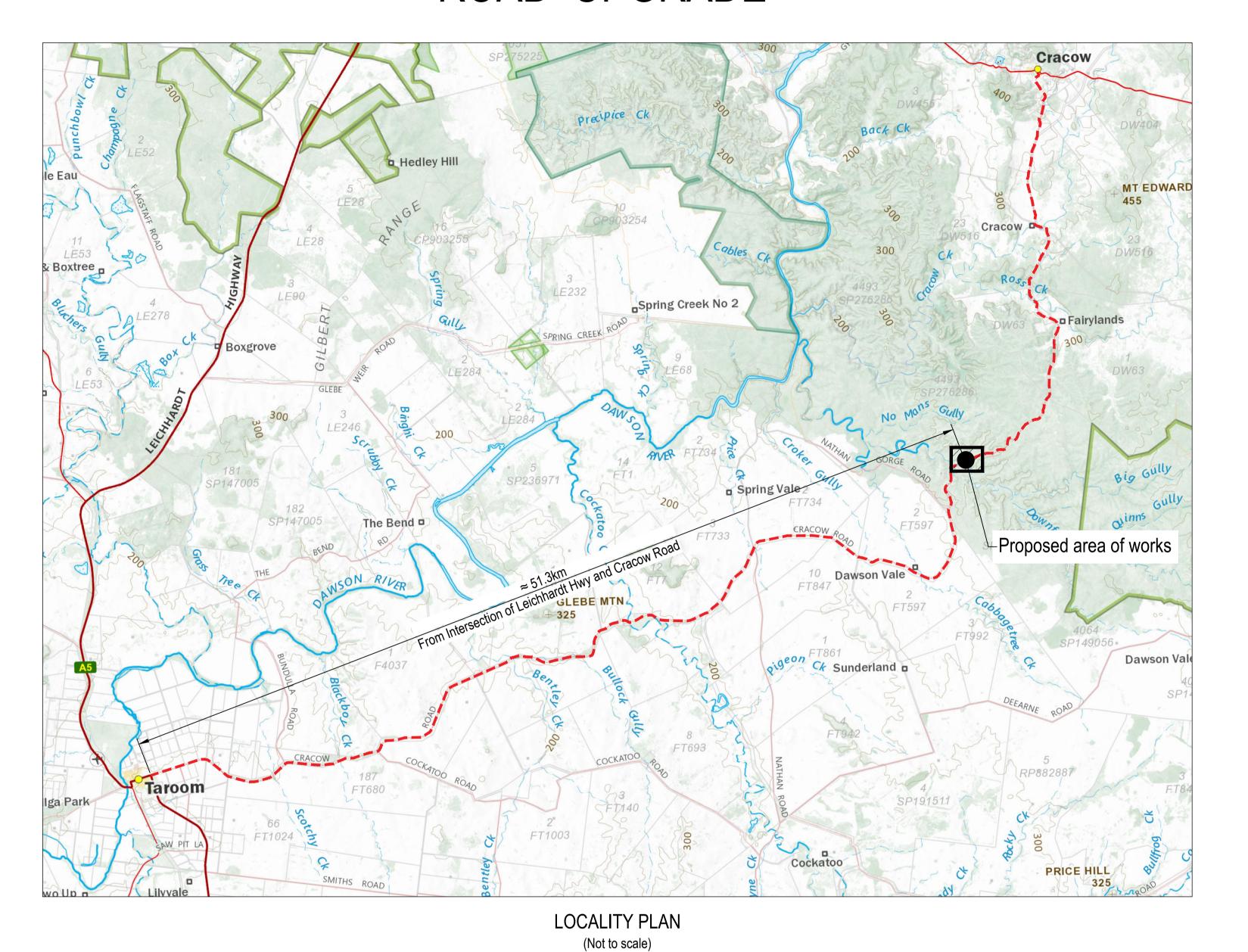
# CRACOW ROAD, SITE 3 - STABILISATION

# PEFORE YOU DIG www.byda.com.au

# ROAD UPGRADE





DRAWING INDEX					
Drawing Number Date	Drawing Description				

Drawing Number	Date	Drawing Description
001	Sep-23	Project Cover Sheet
002	Sep-23	General Notes
300	Sep-23	Survey Control and Services Plan
400	Sep-23	Roadworks and Setout Plan Sheet 1
500	Sep-23	Pavement Plan
600	Sep-23	Longitudinal Section Sheet 1
700	Sep-23	Typical Cross Sections

# DRAWING INDEX

Drawing Number	Date	Drawing Description
800	Sep-23	Annotated Cross Sections
1000	Sep-23	Supplementary Signs Details
1200	Sep-23	Culvert Details
1290	Sep-23	Stormwater Calculation Tables
1600	Sep-23	Limit of Clearing Plan
1700	Sep-23	Temporary Erosion and Sediment Control Sheet 1
1701	Sep-23	Temporary Erosion and Sediment Control Sheet 2

STANDARD DRAWINGS: ROADWORKS

Dwg. Rev. Description

CMDG-R-081 E Sign Location and Installation Details

CMDG-R-094 B Floodway - Bed Level Crossing
DEPARTMENT OF TRANSPORT AND MAIN ROADS - STANDARD DRAWINGS:

GENERAL EARTHWORKS AND PROPERTY ACCESS

1178 E Diversion of Water from Roadway and Table Drains DRAINAGE, RETAINING STRUCTURES AND PROTECTIVE TREATMENTS

1260 F R C Box Culverts and Slab Link Box Culverts - Culverts Height = 375 TO 600
1359 E Culverts - Installation, bedding and filling/backfilling against/ over culverts

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Title CRA	CRC00287						
		SITE 3 - STAB PROJECT CO\				Drawing No.	001
Drawn		ENGINEERIN	G CERTIFICATION (RPEC	Q)			Δ.
B Doherty	ENG. AREA	NAME	SIGNATURE	NO.	DATE	Revision	Α
Designed	Civil	T Penrose	Theo	24087	26/09/23		
B Doherty						Series No.	1 of 14

- Potential safety hazards identified by the Designer have been assessed for this project in accordance with Safe Design of Structures - Code of Practices by Safe Work Australia, 2012. Refer to the Safety In Design Report for the potential safety hazards.
- Disclaimer: It must be acknowledged that new and/or different risks may become apparent during each project phase. The designer has ensured, so far as reasonably practicable, that the structure/municipal work is designed to minimise risk to the health and safety of persons involved in construction or use related activities. Further, in Appendix A - Safety in Design Risk Register of the **Safety In Design Report**, assumptions may have been made within the different project phases as to how the project and/or project elements will be constructed and maintained. This may differ from the end methods adopted.
- Any person who undertakes alterations, variations or modifications to these design drawings, without consultation and approval from the original or subsequent designer, will assume the duties of a designer and will be held responsible for the safety in design for this project.
- All works must comply with W.H. & S. Act, 2011.

# **GENERAL NOTES:**

- Works shall be undertaken generally in accordance with the relevant CMDG construction specifications except where specific DTMR specification requirements are detailed within these Project specific Drawings. The most current version shall be adopted, unless noted otherwise.
- Works to be measured in accordance with project specific Supplementary Specification for Measurement and Work Operations for Work Items.
- If any archaeological or cultural material is exposed on the work site all works shall cease. The D.E.H.P., Aboriginal Land Council and I.C.C. are to be notified.
- All works are to comply with the requirements of the Environmental Protection Act, 1994.
- Disposal/movement of material in areas of Red Imported Fire Ants are to comply with the D.A.F.F. regulations. Refer the Department's website: www.daff.qld.gov.au/fireants for the current information.
- Prior to commencement of work a Risk Management Plan to minimise the chance of spreading Fire Ants is to be completed.
- The positions shown on drawings for public utilities services are based on the B.Y.D.A. information supplied at time of design and are indicative only. Prior to construction the current Service Authority information is to be obtained from B.Y.D.A. (website: www.byda.com.au). The position and depth of each service is to be verified by the relevant Service Authority on site before the start of any construction.
- Where these drawings make reference to the Administrator or Contract Administrator it shall mean the Superintendent managing the works.
- Prior to commencement of work contact the Superintendent if any PSM's are in the vicinity of the work site.
- Order of Precedence of Documents, Ambiguities or Discrepancies The following order of precedence shall apply where there is any ambiguity, discrepancy or inconsistency between the design documents comprising the Contract, with the higher in the list having a higher priority:
  - These Project Specific Drawings
  - **Technical Specifications**
  - Standard Drawings

The several documents forming the Contract are to be taken as mutually explanatory of one another. If either party discovers any ambiguity or discrepancy in any document prepared for the purpose of executing the Work Under the Contract, that party shall notify the Superintendent in writing of the ambiguity or discrepancy as soon as possible,

- The Scheme Drawings listed on the Project Cover Sheet are to be read as a whole and not in isolation. Any isolated drawing separated from the control set will be considered voided and is not to be used.
- All drawings are to be read in conjunction with the project's specification and all relevant Standard Drawings
- All drawings are to be read in conjunction with the Abbreviation Table shown.
- Materials and workmanship Where materials, material components, workmanship and procedures are not specifically described by the Contract, they shall be in accordance with the relevant Australian Standard. Where no Australian Standard is available, other specifications shall be used in the following order of priority:
  - manufacturer's recommendations, and
  - accepted industry standards.

At a minimum materials and workmanship shall be the best of their respective kinds and fit for the purpose for which they are intended.

Any product trade names have been used to establish a quality requirement. Written approval to be obtained prior to using any substitutions.

- Dimensions / Levels All levels and setout points shall be confirmed on site by a registered surveyor prior to construction. The Contractor shall seek clarification from the Superintendent for any discrepancy prior to proceeding with works. Dimensions shall not be scaled from drawings.
- Set Out of Individual Installations The Contractor shall set out an installation as shown on the Drawings in sufficient detail to identify the location, length and levels of the proposed installation. Once the initial set out is complete the Superintendent will determine the design appropriateness of the set out with regard to the actual site conditions. The Superintendent may direct amendments to the set-out details. Payment for such amendments will be made at appropriate rates in the Schedule of Rates or, where such rates are not deemed by the Superintendent to be appropriate, as determined by the Superintendent. Installations to be set out in accordance with the above requirements include:
  - drainage pipes, culverts, slabs and structures
  - landscaping
  - traffic control

Revisions/Descriptions

Existing Services - Locate service prior to commencing works. Services are shown on these drawings for information only. No responsibility is taken for the accuracy or completeness of the information supplied. Take care to protect services from damage, and report any hits or damage to the service authority immediately.

Approved

Scales

Dimensions shown in metres

except where shown otherwise

# **EROSION AND SEDIMENT CONTROL NOTES:**

- During construction all necessary precautions shall be taken to control erosion and downstream sedimentation. Monitor the prevailing weather conditions and protect any downstream construction and gully inlets.
- All sediment control devices, sediment fences, check dams, straw bales, stone traps and entry/exit sediment traps are to be in accordance with the E&SC plans within these project drawings or amended as required by the Contractor's suitably qualified professional.

# **EARTHWORK NOTES:**

- All unsuitable material is to be stripped prior to placement of structural fill.
- All unsuitable material is to be removed in accordance with the specification or as directed by the Superintendent.
- All contaminated soil to be removed in accordance with the specification or as directed by the Superintendent.
- Earthwork quantities include existing road pavement excavated where applicable.
- Earthwork quantities include unsuitable and or contaminated material except where noted otherwise.
- Earthwork quantities in cut are bank (nett) volumes and in fill are compacted volumes.
- Class A1 or B material to comply with the requirements of TMR MRTS04, and specific requirements within these project drawings.

## LINEMARKING NOTES:

- All linemarking, signs and traffic devices shall comply with the M.U.T.C.D. current edition.
- Ensure that signage has clear sight distance, otherwise adjust location accordingly.
- Superseded linemarking and signage to be removed.

# **SERVICE ADJUSTMENT NOTES:**

Service Authority infrastructure adjustments are to be performed by contractors approved by the relevant service authority.

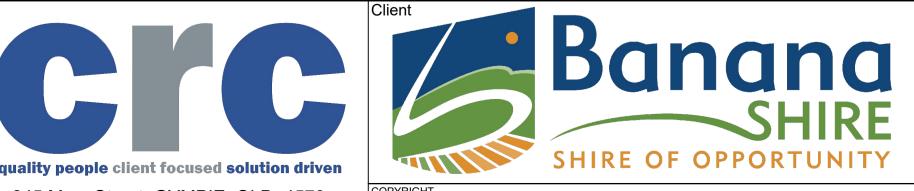


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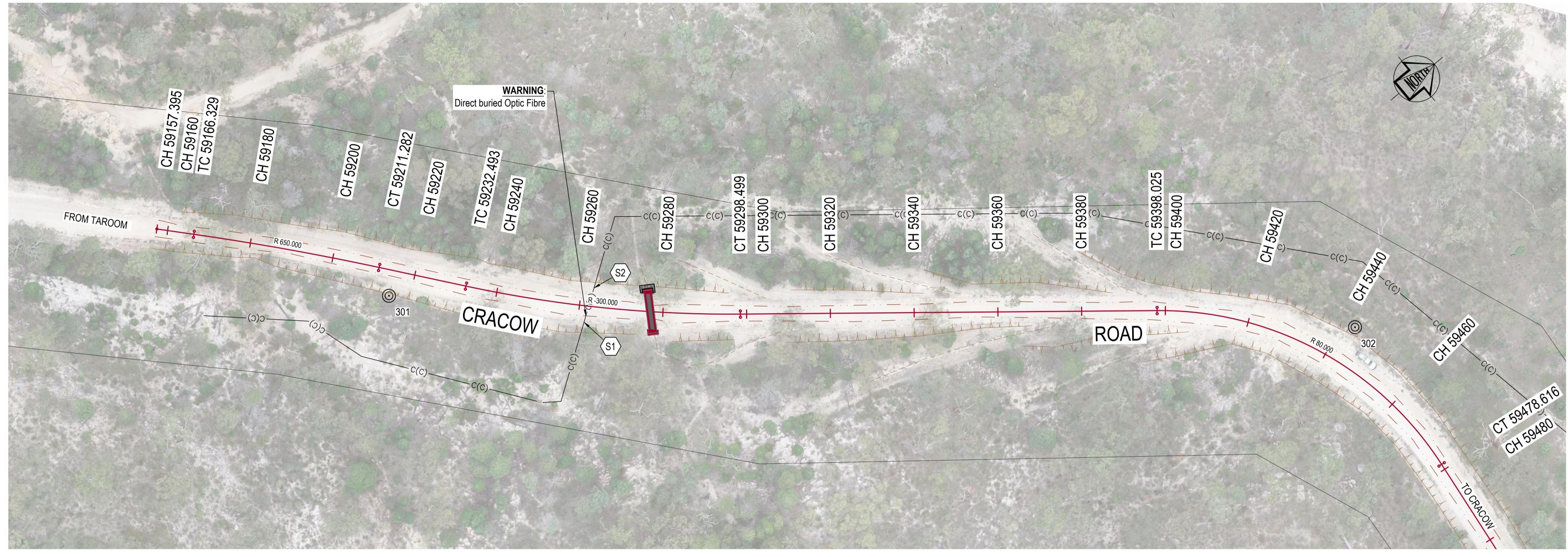
245 Mary Street, GYMPIE, QLD, 4570

ABN 73 617 924 437 Ph: 0477 322 555



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Title CR/	ACOW R		E (Ch. 59200m -	59400m	۱)	Job No.	CRC00287	
SITE 3 - STABILISATION  GENERAL NOTES  Drawing No. 002								
Drawn		ENGINEERIN	IG CERTIFICATION (RPEC	1)				
B Doherty	ENG. AREA	NAME	SIGNATURE	NO.	DATE	Revision	Α	
Designed	Civil	T Penrose	Theo	24087	26/09/23			
B Doherty				Series No.	2 of 14			



LEGEND

- Survey Mark and Label

# **ENGINEERING SURVEY CONTROL**

211011122111110 001111102									
STATION	EASTING	NORTHING	LEVEL	REMARKS					
301 224263.934		7177818.515	253.569	PBMK					
302	224416.967	7177991.334	264.650	PBMK					

# PERMANENT SURVEY MARKS

<u> </u>					
PSM	EASTING	NORTHING	LEVEL	LOCATION	
PM153059	223551.089	7174809.863	307.496	PPMK	

# SERVICES LOCATION TABLE

POINT No.	EXISTING DEPTH	RL @ TOP OF SERVICE	OF EXCAVATION	COVER FROM BOT. OF EXCAVATION	METHOD USED FOR LOCATION	TYPE OF SERVICE
S1	1.960	251.563	253.437	1.874	Wand with rod trace in conduit	Comms - Optic Fibre
S2	2.070	251.602	253.137	1.535	Wand with rod trace in conduit	Comms - Optic Fibre

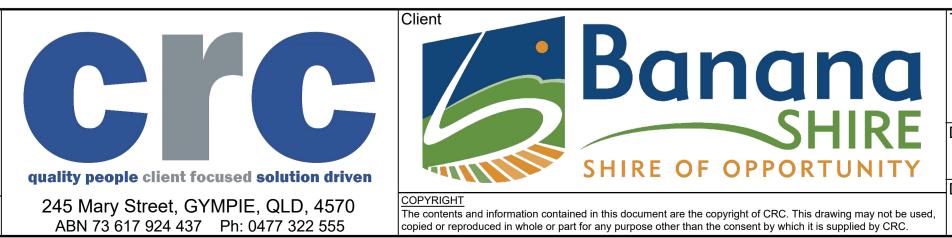
# **¬WARNING!** —

BEWARE OF UNDERGROUND SERVICES

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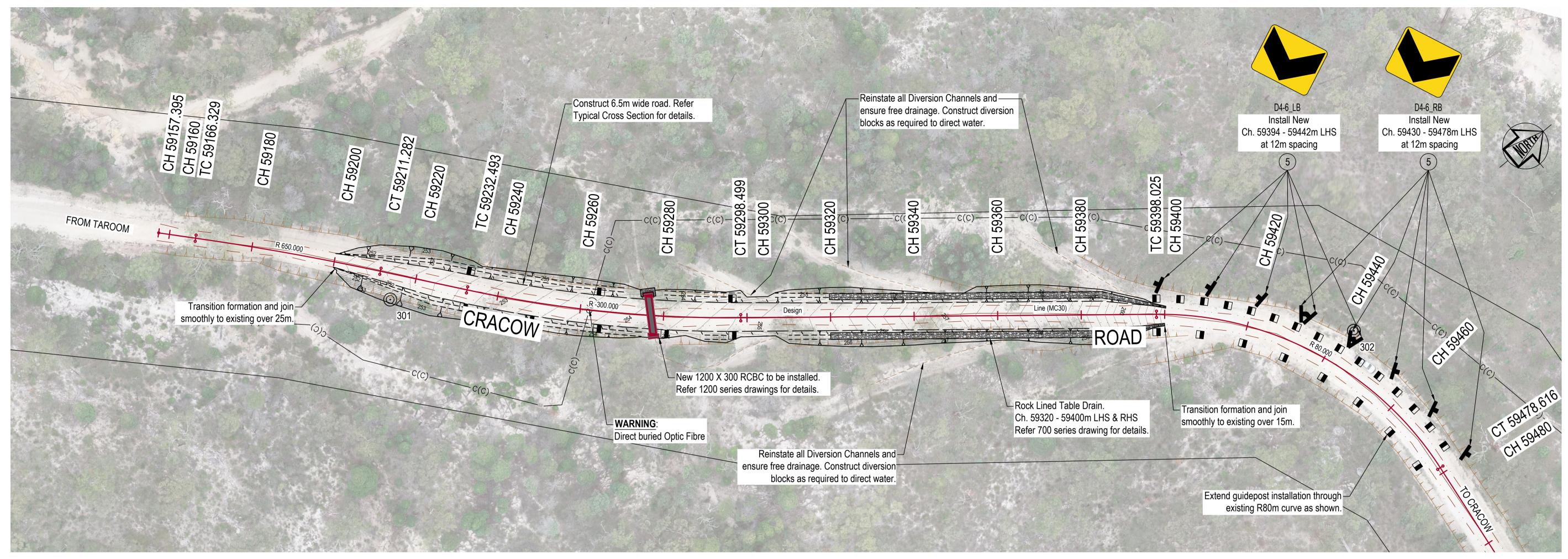
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Title	ACOW R	Job No.	CRC00287				
	SURVE		Drawing No.	300			
Drawn		ENGINEERIN	G CERTIFICATION (RPEQ	)			Α
B Doherty	ENG. AREA	NAME	SIGNATURE	NO.	DATE	Revision	
Designed	Civil						
B Doherty			Series No.	3 of 14			





# DESIGN LINE SETOUT (MC30)

POINT	CHAINAGE	EASTING	NORTHING	LEVEL	BEARING	RAD/SPIRAL	A.LENGTH	D.ANGLE
IP 1	59157.395	224216.275	7177786.033	250.536	47°49'31.97"			
TC	59166.329	224222.896	7177792.031	250.106	47°49'31.97"			
IP 2	59188.806	224239.560	7177807.128	250.949		R = 650.000	44.953	3°57'44.91"
СТ	59211.282	224257.228	7177821.036	252.181	51°47'16.88"			
TC	59232.493	224273.894	7177834.157	252.965	51°47'16.88"			
IP 3	59265.496	224299.930	7177854.654	253.645		R = -300.000	66.006	12°36'22.26"
СТ	59298.499	224320.865	7177880.340	254.525	39°10'54.62"			
TC	59398.025	224383.744	7177957.487	261.028	39°10'54.62"			
IP 4	59438.320	224411.599	7177991.662	264.800		R = 80.000	80.591	57°43'09.22"
СТ	59478.616	224455.368	7177986.365	264.442	96°54'03.84"			
TC	59566.521	224542.636	7177975.803	263.729	96°54'03.84"			
IP 5	59646.340	224624.180	7177965.933	264.421		R = -275.000	159.640	33°15'38.29"
СТ	59726.160	224697.779	7178002.403	265.924	63°38'25.55"			
IP 6	59789.593	224754.616	7178030.568	267.129	63°38'25.55"			





- New Sign Location - Existing Sign Location

- Survey Mark and Label

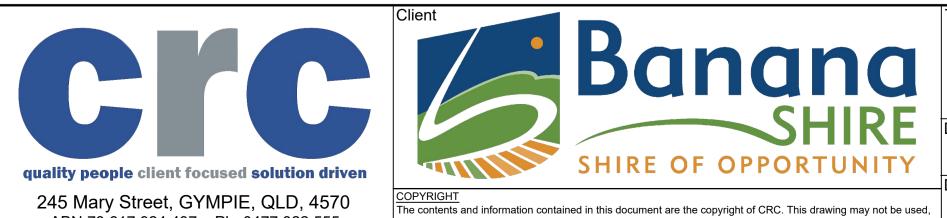
# **WARNING!**

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					0 5 10 15 20 25	
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Title	ACOW R	Job No.	CRC00287					
į į	ROADW	Drawing No.	400					
Drawn		ENGINEERING	G CERTIFICATION (RPEC	1)			_	
B Doherty	ENG. AREA	NAME	SIGNATURE	NO.	DATE	Revision	Α	
Designed	Civil	T Penrose	There	24087	26/09/23			
B Doherty							4 of 14	

New pavement to be constructed. Refer Pavement Type 2 Details.

# PAVEMENT TYPE 1 DETAILS

New pavement to be constructed

150mm Stabilised Base, Full Width,

Imported Unsealed Pavement Material \*\*

Insitu stabilised, GB binder (Cement/Fly Ash) Target UCS value 1 - 2 MPa at 7 Days. Contractor to undertake additive testing to confirm percentage of stablising agent by mass. A nominal 3% by mass used for estimating purposes only.

Design Subgrade CBR 8 (soaked)

150mm Total thickness

All works to be carried out in accordance with the relevant CMDG Construction Specifications. PAVEMENT DESIGN (Lower Order Roads Design Guide)

Design Period: 20 Years Design Traffic: 5.1 x 10<sup>4</sup> DESA Design Subgrade CBR: 8 (Soaked)

UNSEALED PAVEMENT SPECIFICATION (Lower Order Roads Design Guide)

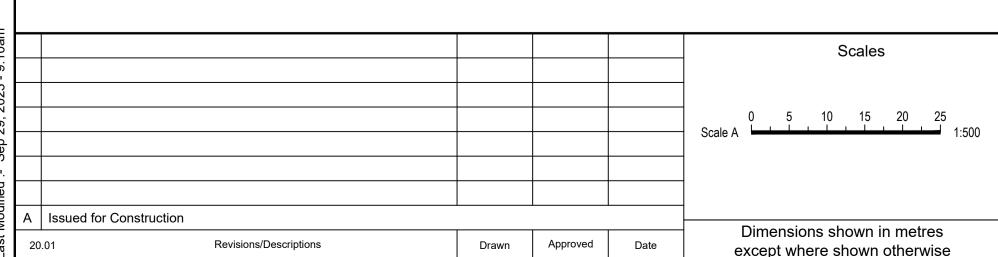
Imported Unsealed Pavement Material to satisfy the following specifications

Grading Coefficient (Gc): 16 - 34 Shrinkage Product (Sp): 100 - 240 < 1200 WPI: ≥ 7% -> 15% Passing 0.075mm Sieve:

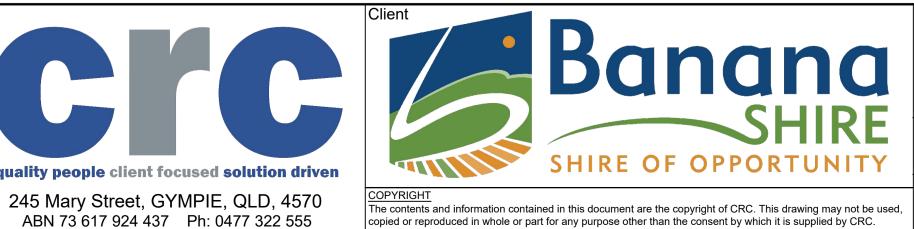
# **-WARNING!** -

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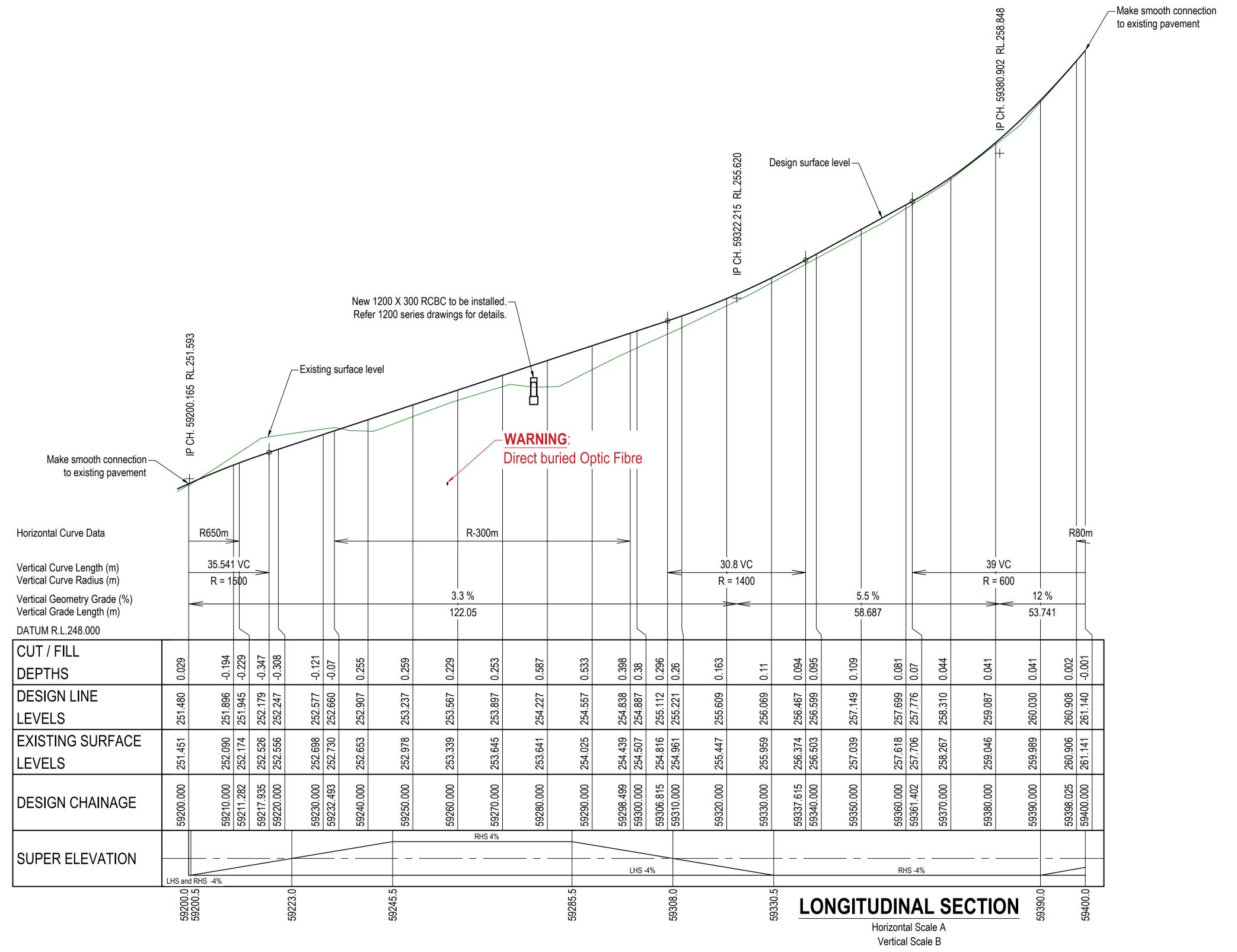
Title	ACOW R	Job No.	CRC00287					
		Drawing No.	500					
Drawn		ENGINEERIN	G CERTIFICATION (RPEC	<b>(</b> )			А	
B Doherty	ENG. AREA	NAME	SIGNATURE	NO.	DATE	Revision		
Designed	Civil	T Penrose	There	24087	26/09/23			
B Doherty							5 of 14	

# **-WARNING!** -

### BEWARE OF UNDERGROUND SERVICES

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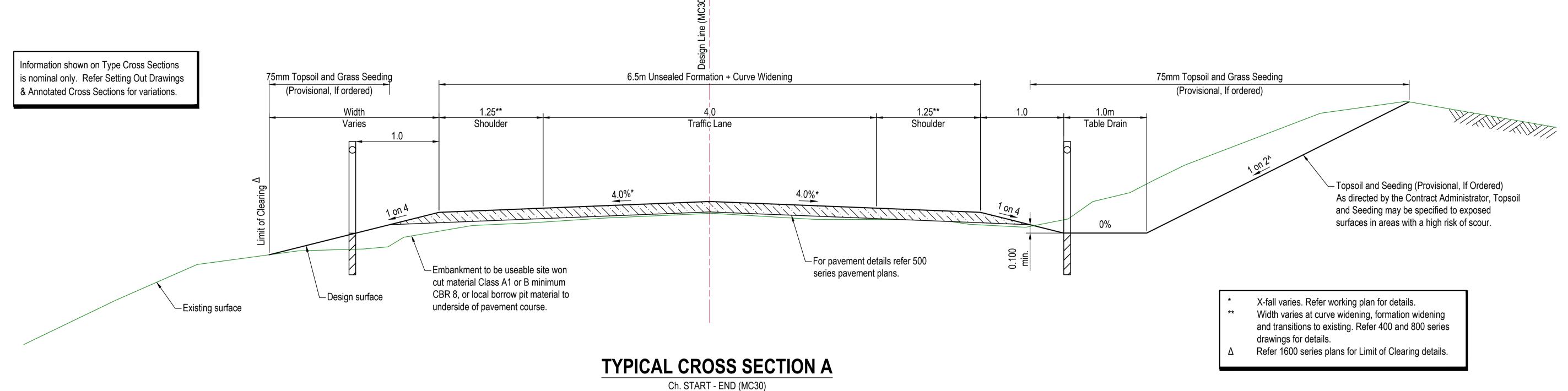
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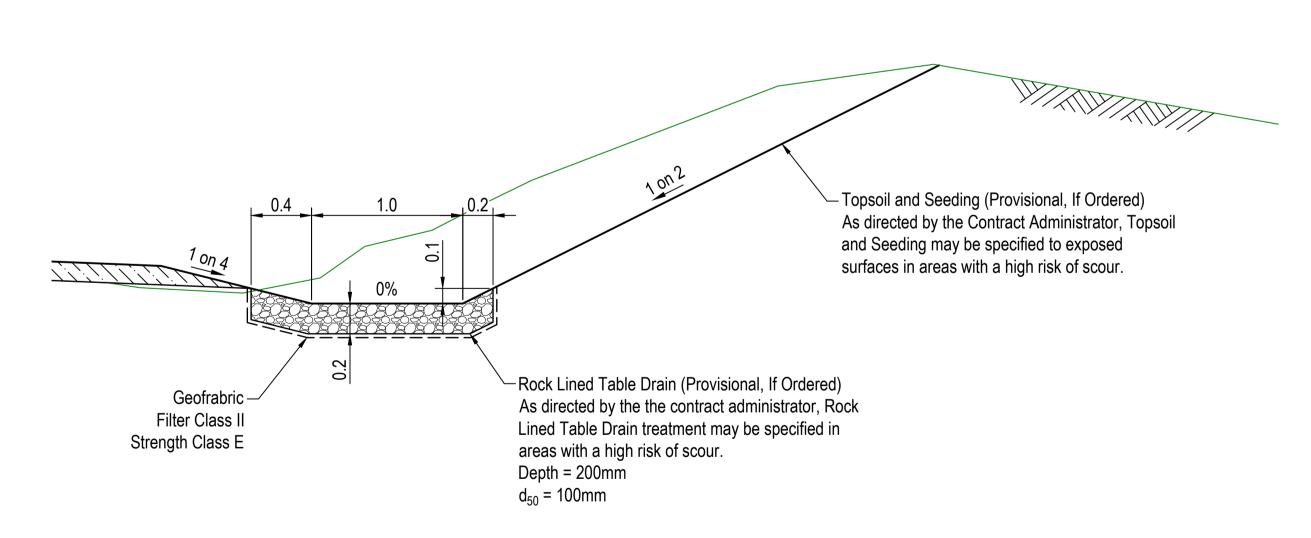
Title CRA	ACOW R	Job No.	CRC00287					
	LON	Drawing No.	600					
Drawn		ENGINEERING	G CERTIFICATION (RPEQ	)			_	
B Doherty	ENG. AREA	NAME	SIGNATURE	NO.	DATE	Revision	Α	
Designed	Civil	T Penrose	Theo	24087	26/09/23			
B Doherty		Series No.	6 of 14					

# WARNING! BEWARE OF UNDERGROUND SERVICES The location of underground services has been compiled from engineering survey and interpolated from Dial Before You Dig as provided by the Service Authorities. No responsibility is taken for the accuracy of the interpolated information supplied. Ensure all services are accurately located prior to commencement of work. Information shown on Type Cross Sections is populated only. Pefor Setting Out Drawings





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# **ROCK LINED TABLE DRAIN**

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Last Modified	20	.01 Revisions/Descriptions	Drawn	Approved	Date	Dimensions shown in metres except where shown otherwise	

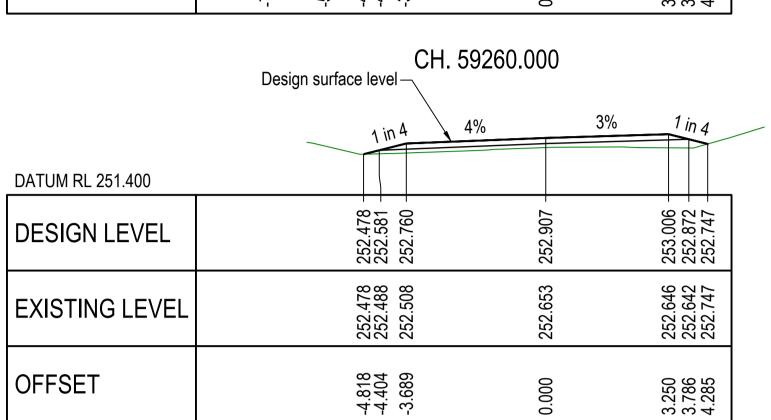


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Title	ACOW R	Job No.	CRC00287					
	7	Drawing No.	700					
Drawn		ENGINEERIN	G CERTIFICATION (RPEQ	)			_	
B Doherty	ENG. AREA	NAME	SIGNATURE	NO.	DATE	Revision	Α	
Designed	Civil T Penrose 24087 26/09/23							
B Doherty		Series No.	7 of 14					



CH. 59240.000

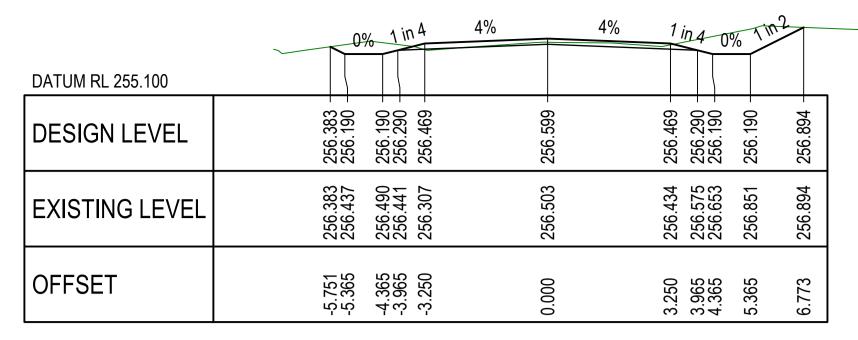
DATUM RL 250.800	7,	in 2 0% tin 4 4	<del>% 0.5</del>	% 0% 1 in	2
DESIGN LEVEL	253.067	251.896 <del> </del> 251.896 <del> </del> 251.976 <del> </del> 252.119 <del> </del>	252.247 +	252.232 <del> </del> 252.114 <del> </del> 252.034 <del> </del> 252.034 <del> </del>	253.700
	253	251 251 251 252 252	252	252 252 252 252 252	253
EXISTING LEVEL	253.067	252.827 252.503 252.374 252.297	252.556	252.509 252.652 252.769 253.061	253.700
OFFSET	-7.252	-4.910 -4.110 -3.790 -3.218	0.000	2.868 3.341 3.661 4.461	7.794

CH. 59220.000

		4%	4	%
DATUM RL 250.300	_			
DESIGN LEVEL		251.387 - 251.400 -	251.480 -	251.428 - 251.425 -
EXISTING LEVEL		251.387 251.390	251.451	251.425 251.425
OFFSET		-2.051 -2.000	0.000	1.308 1.319

OFFSET

CH. 59200.000



CH. 59340.000

DATUM RL 254.100	1 in 2	0% 1 in 4	4% 2.1%	1 in 4 0% +in 2
DESIGN LEVEL	255.952	255.196 255.296 255.475	255.609 -	255.540 255.376 255.276 255.276
EXISTING LEVEL	255.952	255.701 255.581 255.366	255.447	255.337 255.339 255.463 255.770 256.114
OFFSET	-6.993	-4.482 -4.082 -3.367	0.000	3.250 3.906 4.306 5.306

CH. 59320.000

	1 in 4	4%	1.4% 1 in 4
DATUM RL 253.200			
DESIGN LEVEL	254.403 - 254.565 -	254.744 -	254.934 - 254.792 - 254.553 -
EXISTING LEVEL	254.403 254.442	254.266	254.432 254.474 254.553
OFFSET	-4.954	-3.589	3.250 3.818 4.774

CH. 59300.000

	0% 1 in 4	4% 4%	1 in 4
DATUM RL 252.400			
DESIGN LEVEL	253.969 - 253.799 - 253.799 - 253.899 - 254.077 -	254.227 -	254.357 - 254.228 - 253.795 -
EXISTING LEVEL	253.969 253.975 253.884 253.778 253.590	253.641	253.698 253.689 253.795
OFFSET	-6.207 -5.865 -4.865 -4.465	0.000	3.250 3.768 5.501

CH. 59280.000

		4%	2.2%	
DATUM RL 259.800				
DESIGN LEVEL		261.022 - 261.070 -	261.140 -	261.087 -
EXISTING LEVEL	000 700	261.022 261.051	261.141	261.087
OFFSET		-1.94 <i>2</i> -1.750	0.000	2.450

CH. 59400.000

DATUM RL 257.600	1 in 20% 1 in 4	4% 4%	1 in 4 0%
DESIGN LEVEL	259.172 - 258.678 - 258.678 - 258.778 - 258.778 -	259.087 -	258.957 258.778 258.678 258.678
EXISTING LEVEL	259.172 259.257 258.983 258.983	259.046	258.893 259.020 259.106 259.301 259.941
OFFSET	-6.352 -5.365 -4.365 -3.965	0.000	3.250 3.965 4.365 5.365 7.890

CH. 59380.000

	1 in 2 0% 1 in 4	4% 4%	1 in 4 0% in 2
DATUM RL 256.200			
DESIGN LEVEL	258.094 - 257.290 - 257.290 - 257.390 - 257.569 -	257.699 -	257.569 - 257.390 - 257.290 - 257.290 - 257.564 -
EXISTING LEVEL	258.094 257.750 257.444 257.322 257.419	257.618	257.686 257.781 257.718 257.618 257.564
OFFSET	-6.974 -5.365 -4.365 -3.965	0.000	3.250 3.965 4.365 5.365 5.912

CH. 59360.000

# **WARNING!**

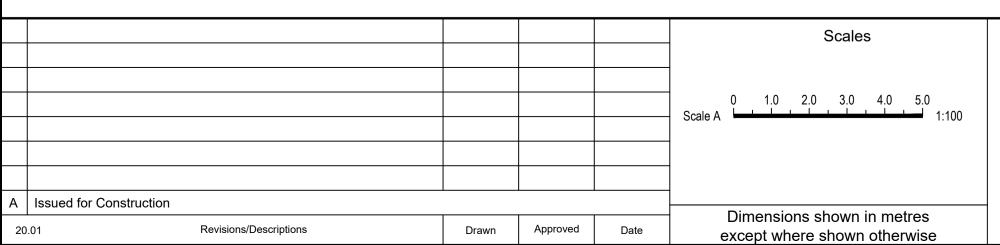
# BEWARE OF UNDERGROUND SERVICES

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**BEFORE** 

# **CROSS SECTIONS**

Scale A







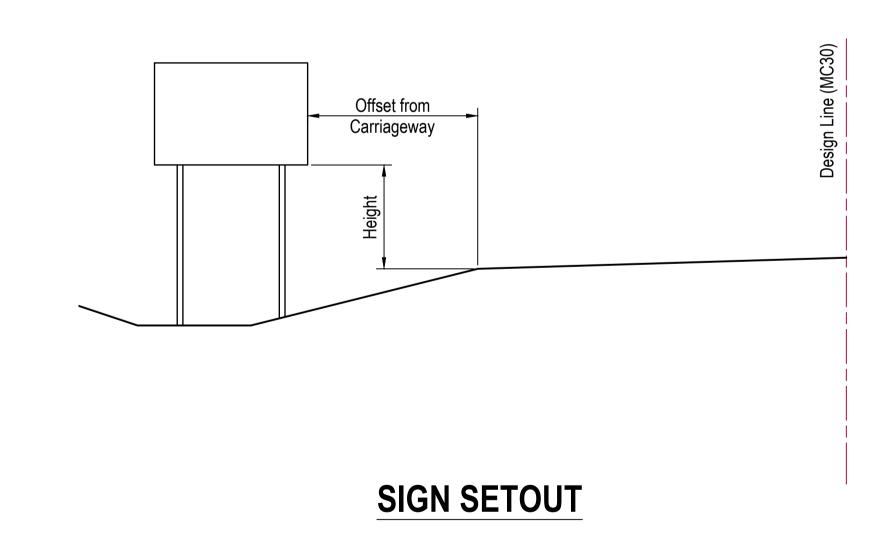
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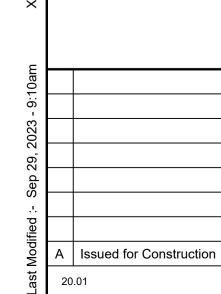
Title CRA	ACOW R	OAD UPGRADE SITE 3 - STAB	•	59400m	۱)	Job No.	CRC00287
	AN	INOTATED CRO				Drawing No.	800
Drawn		ENGINEERING	CERTIFICATION (RPEQ)				
B Doherty	ENG. AREA	NAME	SIGNATURE	NO.	DATE	Revision	Α
 Designed	Civil	T Penrose	The	24087	26/09/23		
B Doherty			-			Series No.	8 of 14



# SIGN SCHEDULE

							SIGN DE	ETAILS			STIFFENE	R DETAILS				NEW S	SUPPORT DETAIL	_S				NEW FOOTI	NG DETAILS	
CHAINAGE (M)	POSITION	SIGN DESCRIPTION	SIGN TYPE	WORK DESCRIPTION	WIDTH (mm)	HEIGHT (mm)	AREA (m²)	OFFSET FROM CARRIAGEWA Y (mm)	HEIGHT ABOVE CARRIAGEWA Y (mm)	TYPE	No.	SPACING (mm)	No. OF BRACKETS	TYPE	No.	SPACING (mm)	DIMENSION (mm) NB	MATERIAL	POST LENGTH 1 (mm)	POST LENGTH 2 (mm)	SLEEVE LENGTH (mm)	SLEEVE SIZE (mm)	DIA. (mm)	DEPTH (mm)
50394 - 59442m at 12m spacings	LHS	CAM	D4-6B (L)	Install New (x5)	750	900	0.63	2000	1200	1	0	0	0	CHS Steel	8 Total	-	50	C350	3500 C.T.S	-	-	-	300	750
12m spacings 59430 - 59478m at 12m spacings	LHS	CAM	D4-6B (R)	Install New (x5)	750	900	0.63	2000	1200	1	0	0	0	CHS Steel	(2 shared posts)	-	50	C350	3500 C.T.S	-	-	-	300	750





Revisions/Descriptions

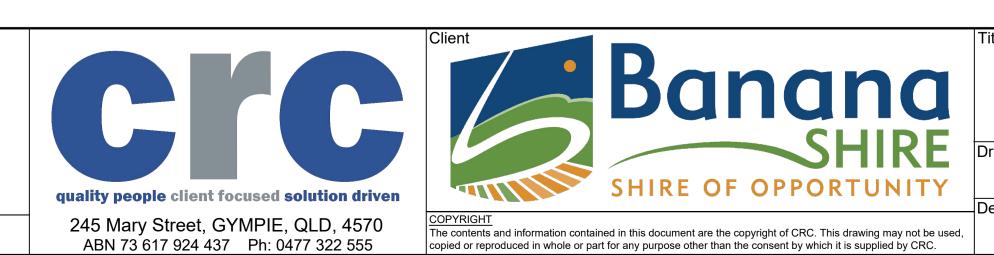
Approved

Dimensions shown in metres

Scales

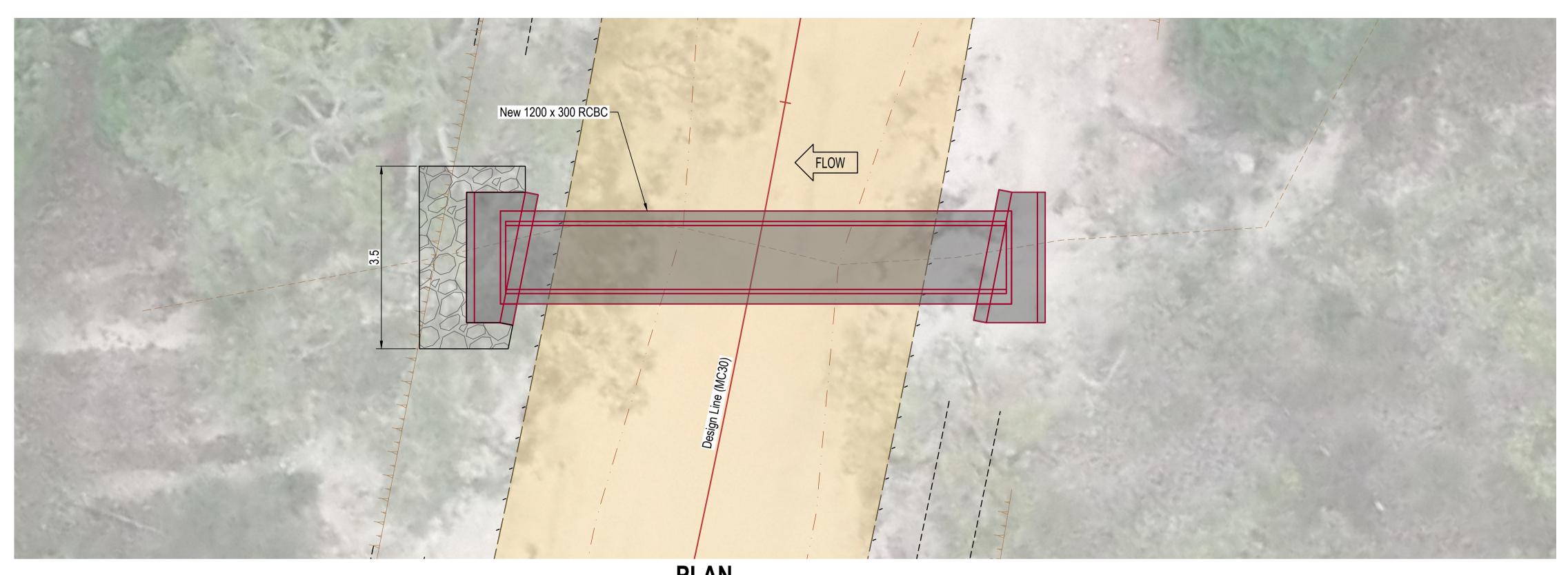
except where shown otherwise

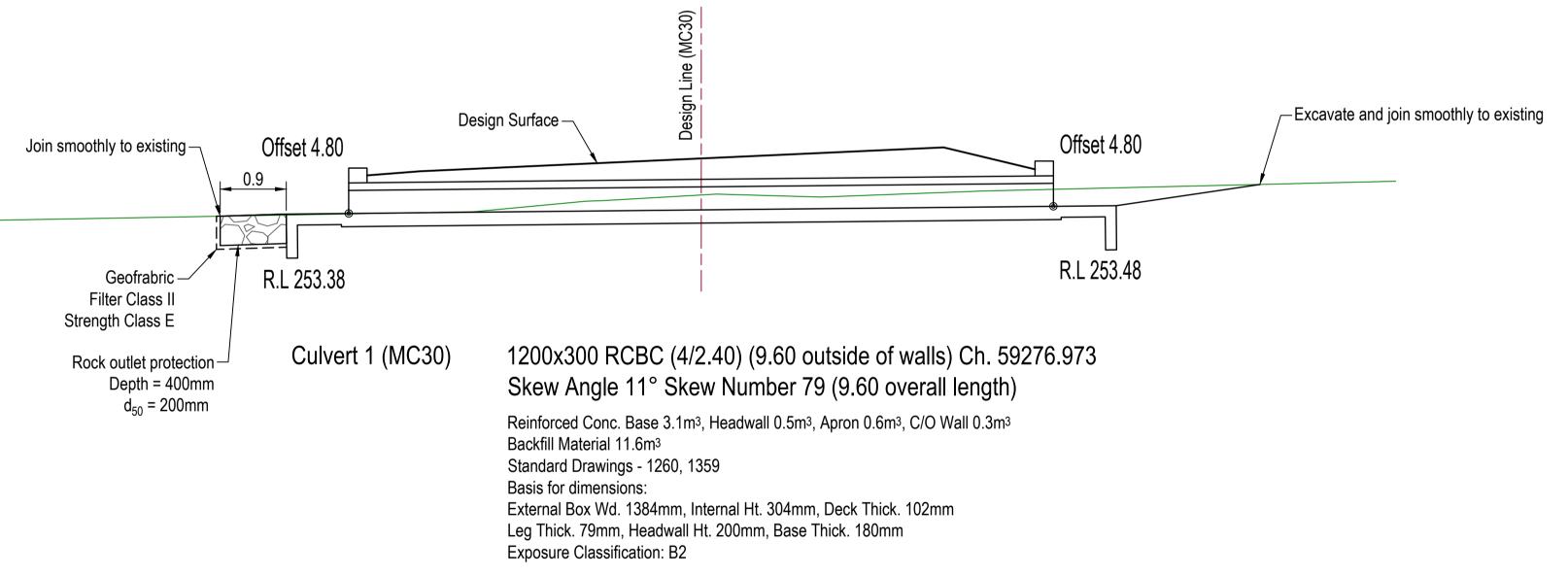




Title	ACOW R	OAD UPGRADE SITE 3 - STAB	•	59400n	า)	Job No.	CRC00287
	SUF	PPLEMENTARY		S		Drawing No.	1000
Drawn		ENGINEERING	G CERTIFICATION (RPEC	1)			Δ.
B Doherty	ENG. AREA	NAME	SIGNATURE	NO.	DATE	Revision	Α
Designed	Civil	T Penrose	Muc	24087	26/09/23		
B Doherty			,			Series No.	9 of 14







# WARNING!

# BEWARE OF UNDERGROUND SERVICES

The location of underground services has been compiled from engineering survey and interpolated from Dial Before You Dig as provided by the Service Authorities. No responsibility is taken for the accuracy of the interpolated information supplied. Ensure all services are accurately located prior to commencement of work.

# NOTES:

# ACHIEVED STORMWATER DESIGN RECURRENCE INTERVALS

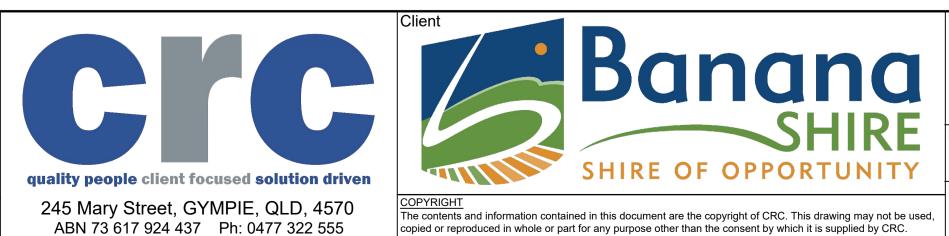
- Major system design AEP (consideration for destructive and nuisance flows) 2% AEP
- Minor system design AEP (cross road drainage) 10% AEP

# DRAINAGE SCHEDULE

			Culvert			Base Slat	o / Footing		Head	iwaii		Apro	on		Cut	orr vvali			vving\	wali 1				vving	wali 2		Billialué	) Excava	ation (m³)		васкі	'	Filters
Alignment	Chainage	Skew	ID Structure	Ехр	Concrete	Rebar	F	abric	Concrete	Rebar	Concrete	Rebar	Fabri	ric	Concrete	Fabric	Le	ength C	Concrete	Rebar	Fabric	Lenç	gth Cond	rete R	ebar	Fabric	Concrete	Culvert	Inlet /	Overlay	Fill	Foundation Bloo	ck Strip
	(m)	No.		Class	(m³)	(kg)	(m²)	Туре	(m³)	(kg)	(m³)	(kg)	(m²)	Туре	(m³)	(m²)   Тур	ре	(m)	(m³)	(kg)	(m²)   Typ	pe (m	n) (m	3) (	kg)	(m²)   Type	(m³)		Outlet	(m³)	(m³)	(m³) Coul	nt Count
MC30	59276.973	79.0	1 1200x300 RCBC (4/2.40)	B2	3.1	100.1	16.1	RL1218	0.5	19.3	0.6	63.4			0.3												1.1	9.4			11.6	2	
			Total Fabric (Area / Type)		16.1	/ RL1218								·			·	·		·	·	·	·	·	·	·				•	·	·	

3						Scales
5						
250						
, ,						0 0.5 1.0 1.5 2.0 2.5
2						Scale A 1:50
. [						
2						
	Α	Issued for Construction	•			Discounting of the section
	20	.01 Revisions/Descriptions	Drawn	Approved	Date	Dimensions shown in metres except where shown otherwise





ı	Title	ACOW R	ROAD UPGRADE SITE 3 - STAB	`	59400m	۱)	Job No.	CRC00287
			CULVERT D				Drawing No.	1200
	Drawn		ENGINEERING	G CERTIFICATION (RPEQ)				Δ.
	B Doherty	ENG. AREA	NAME	SIGNATURE	NO.	DATE	Revision	Α
	Designed	Civil	T Penrose	There	24087	26/09/23		
ed,	B Doherty			,			Series No.	10 of 14
	ı ,	1			1		1	



Drainage Model: DRAINAGE

Rainfall File: Cracow Road Site 3.12dhydro

Tc Method: Direct
Rainfall Method ARR 2016
Runoff C Method: QUDM 2013

Storm Event Type: Minor

LOCATION		SUB-C	CATCHM	MENT RU	NOFF			INLE	T DESIG	SN S										DRAII	N DESIGN	N										HEAD LC	OSSES										PART F	ULL	DESIGN I	EVELS						
		Тс	I	fi C	; A		CA C	∖c Qa										Qg Qb		Тс	I	CA	Qrat	Q	L	S		Vf=Q	)/A Qcap	o Vcap	Vt		S/Do	Qg/Qo	Du/Do	Vf²/2g	Ku	hu	Kw	hw	Sf	hf	dn	Vn								
DESIGN AEP STRUCTURE No.	DRAINAGE SECTION	SUB-CATCHMENT TIME OF CONC.	RAINFALL INTENSITY	FRACTION IMPERVIOUS	SUB-CATCHMENT AREA		EQUIVALENI AKEA	FLOW IN K&C (INC. BYPASS)	HALF ROAD CAPACITY	FLOW WIDTH	FLOW DEPTH	FLOW D x V	ROAD GRADE AT INLET	ROAD XFALL AT INLET	12d INLET TYPE		12d INLET CURVE	FLOW INTO INTEL BYPASS FLOW	BYPASS FLOW STRUCTURE	CRITICAL TIME OF CONC.	RAINFALL INTENSITY	TOTAL (C x A)	PEAK FLOW	PIPE FLOW	REACH LENGTH	PIPE GRADE	PIPE SIZE	FULL PIPE VELOCITY	CAPACITY FLOW	CAPACITY VELOCITY	TRAVEL VELOCITY	a) QUDM Vol. 2 Charts 32-47, b) FHWA	SUBMERGENCE RATIO USED IN CHARTS	FLOW RATIO USED IN CHARTS	DIAMETER RATIO USED IN CHARTS	VELOCITY HEAD	U/S HEAD LOSS COEFFICIENT	U/S HEAD LOSS	W.S.E. COEFFICIENT	CHANGE IN W.S.E.	PIPE FRICTION SLOPE	PIPE FRICTION HEAD LOSS	NORMAL DEPTH	NORMAL DEPTH VELOCITY	PIPE U/S I.L.	PIPE D/S I.L.	PIPE U/S H.G.L.	PIPE D/S H.G.L.	W.S.E.	GRATE LEVEL	FREEBOARD	STRUCTURE No.
%		min r	mm/hr	fi C	; ha	a   h	na L	/s L/s	L/s	m	m	m²/s	s %	%				L/s L/s		mir	mm/h	nr ha	L/s	L/s	m	%	mm	m/s	s L/s	m/s	m/s					m		m		m	%	m	m	m/s	m	m	m	m	m	m	m	
HW01	HW01 to HW02	$\frac{10.0}{0}$	157	0.0 0.4	38 3.77	72   1.0	652 7	21 721	1				3.37	7 -3.98	HW inle	et		721 0	LOST	10.0	0   157	1.652	2 721	721	8.402	0.50	300 B	2.00	0 476	1.32	2.00	Inlet Control	2.33			0.205	1.68	0.345		0.345	1.15	0.096	0.300	2.00	253.420	253.378	253.775	253.678	254.120	254.130	0.010	HW01
HW02				0.0											HW outle	et																																	253.678	253.948		HW02

Drainage Model: DRAINAGE

Rainfall File: Cracow Road Site 3.12dhydro

Tc Method: Direct
Rainfall Method ARR 2016
Runoff C Method: QUDM 2013
Storm Event Type: Major

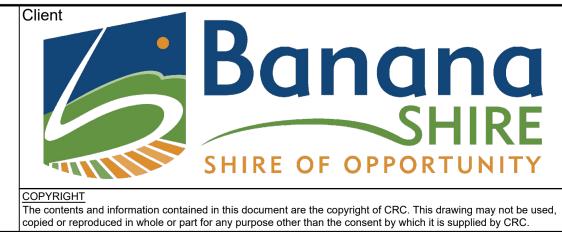
LOCATION	SUB-CATCHMENT RUNOFF	INLET DESIGN	DRAIN DESIGN	HEAD LOSSES	PART FULL DESIGN LEVELS
	Tc I fi C A CA Qc	Qa Qb Qb	Tc I CA Qrat Q L S Vf=Q/A Qcap Vcap V	/t S/Do Qg/Qo Du/Do Vf²/2g Ku hu Kw hw Sf	hf dn Vn
DESIGN AEP STRUCTURE No. DRAINAGE SECTION	SUB-CATCHMENT TIME OF RAINFALL INTENSITY FRACTION IMPERVIOUS COEFFICIENT OF RUNOFF SUB-CATCHMENT AREA EQUIVALENT AREA	FLOW IN K&C (INC. BYPASS) HALF ROAD CAPACITY FLOW WIDTH FLOW D x V ROAD GRADE AT INLET ROAD SFALL AT INLET 12d INLET TYPE FLOW INTO INTEL BYPASS FLOW BYPASS FLOW	CRITICAL TIME OF CONC.  RAINFALL INTENSITY  TOTAL (C x A)  PIPE FLOW  PIPE FLOW  PIPE GRADE  PIPE GRADE  PIPE CLASS  FULL PIPE VELOCITY  CAPACITY FLOW  CAPACITY VELOCITY  TRAVEL VELOCITY	ACLOWER TO USED IN CHARTS  SUBMERGENCE RATIO USED IN CHARTS  CLOW RATIO USED IN CHARTS  VELOCITY HEAD  U/S HEAD LOSS COEFFICIENT  W.S.E. COEFFICIENT  CHANGE IN W.S.E.  PIPE FRICTION SLOPE	PIPE FRICTION HEAD LOSS  NORMAL DEPTH  NORMAL DEPTH VELOCITY  PIPE U/S I.L.  PIPE U/S I.L.  PIPE U/S H.G.L.  W.S.E.  W.S.E.  STRUCTURE No.
%	min mm/hr fi C ha ha L/s	L/s         L/s         m         m         m²/s         %         L/s         L/s         L/s	min         mm/hr         ha         L/s         L/s         m         %         mm         m/s         L/s         m/s         m/s		m m m/s m m m m m m
2 HW01 HW01 to HW02	10.0         213         0.0         0.501         3.772         1.890         1118	8 1118 3.37 -3.98 HW inlet 730 389 LOST	10.00 213 1.890 1118 730 8.402 0.50 1200x BC 2.03 476 1.32 2.0	00 Inlet Control 2.37 0.210 1.69 0.353 0.353 1.17 0	0.099   0.300   2.03   253.420   253.378   253.777   253.678   254.130   254.130   0.000   HW01
HW02	0.0	HW outlet			253.678   253.948   HW02

Α	Issued for Construction				
20	).01	Revisions/Descriptions	Drawn	Approved	Date

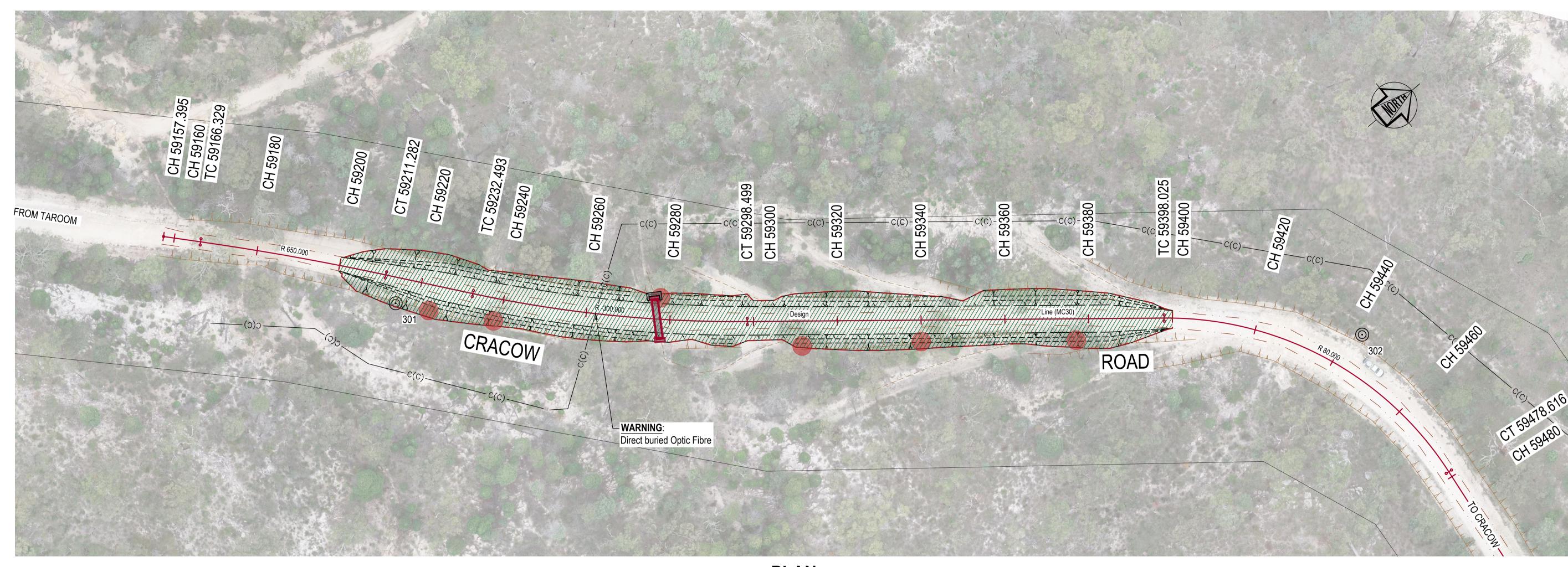


Scales

Dimensions shown in metres except where shown otherwise



Title (	CRAC	OW R	OAD UPGRAD SITE 3 - STAI	E (Ch. 59200m -	59400m	۱)	Job No.	CRC00287
	,	STORI		CULATION TABL	.ES		Drawing No.	1290
Drawn			ENGINEERIN	NG CERTIFICATION (RPEC	<b>(</b> )			Δ.
B Dohe	erty EN	IG. AREA	NAME	SIGNATURE	NO.	DATE	Revision	Α
Designed		Civil	T Penrose	There	24087	26/09/23		
B Dohe	ertv —			,			Series No.	11 of 14



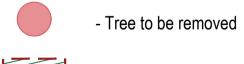
# DESIGN LINE MC30

DESIGN LINE MICSO						
CHAINAGE	OFFSET LHS	OFFSET RHS				
59200	2.051	1.319				
59210	6.162	6.148				
59220	7.626	7.429				
59230	7.356	7.474				
59240	6.691	6.460				
59250	7.174	6.294				
59260	7.414	6.464				
59270	6.924	5.984				
59280	6.382	5.386				
59290	6.372	5.682				

# **DESIGN LINE MC30**

CHAINAGE	OFFSET LHS	OFFSET RHS		
59300	4.954	4.540		
59310	6.550	6.216		
59320	7.074	6.896		
59330	6.638	7.156		
59340	5.897	6.868		
59350	4.493	6.342		
59360	7.138	5.912		
59370	7.284	6.463		
59380	6.520	7.083		
59390	4.830	5.866		

# LEGEND

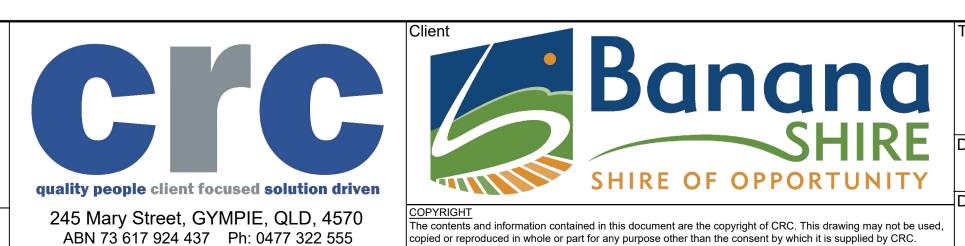


- Limit of clearing

403 - Survey Mark and Label

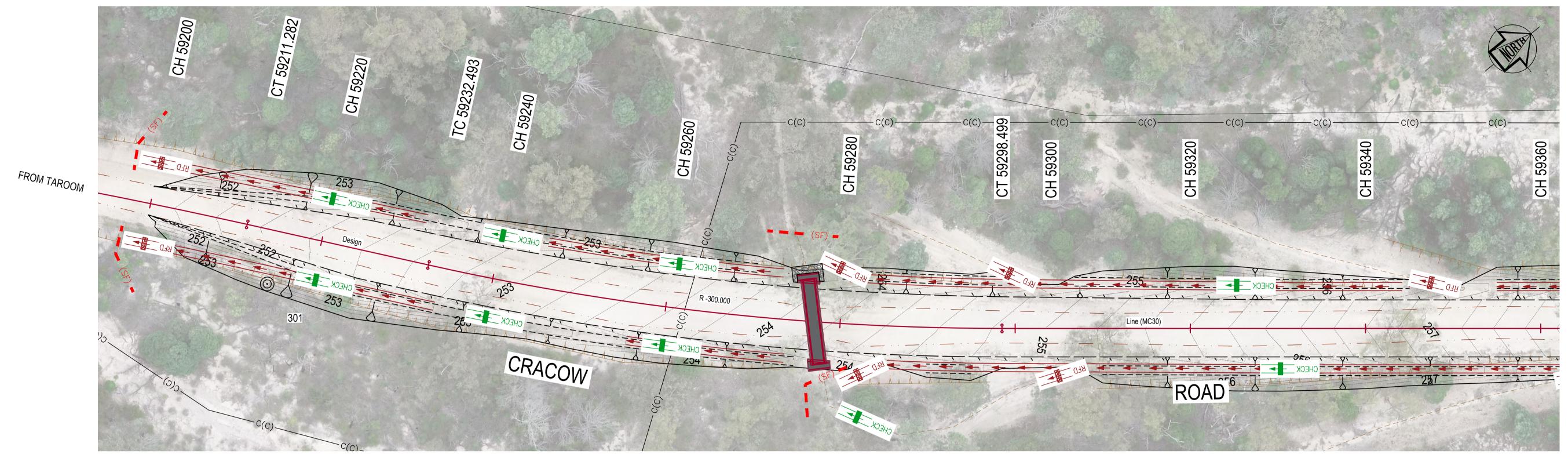
u						
11am						Scales
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Modified	Α	Issued for Construction	!	•		<u> </u>
Last №	20	01 Revisions/Descriptions	Drawn	Approved	Date	Dimensions shown in metres except where shown otherwise

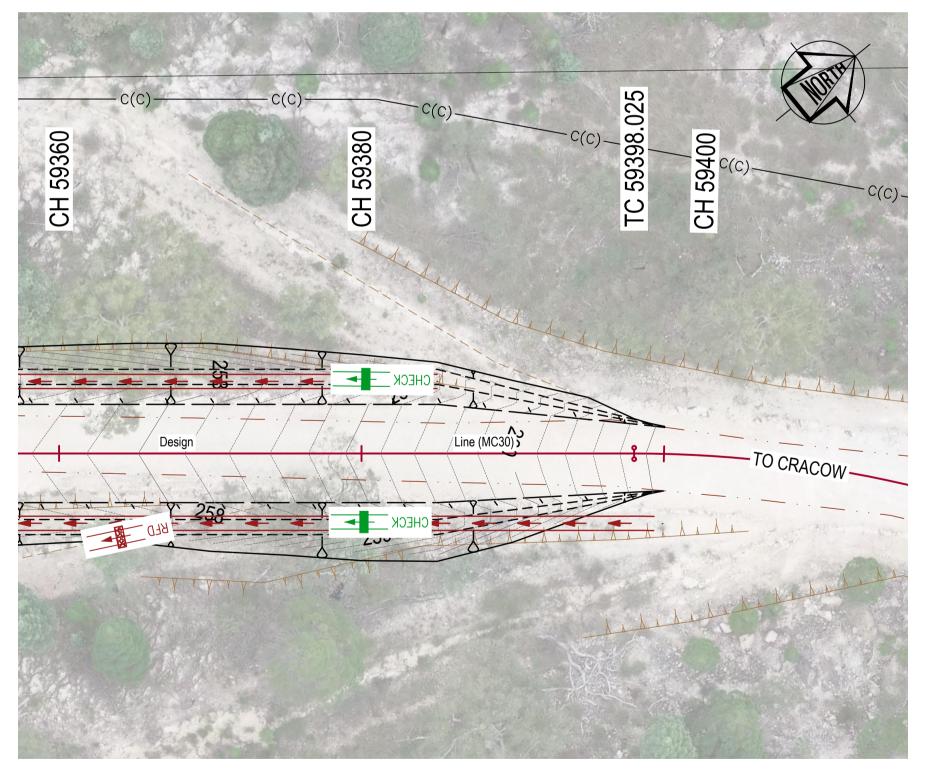




Title	ACOW R	Job No.	CRC00287				
	SITE 3 - STABILISATION LIMIT OF CLEARING PLAN						1600
Drawn		ENGINEERING	G CERTIFICATION (RPEQ	)			Δ.
B Doherty	ENG. AREA	NAME	SIGNATURE	NO.	DATE	Revision	Α
Designed	Civil	T Penrose	There	24087	26/09/23		
B Doherty						Series No.	12 of 14

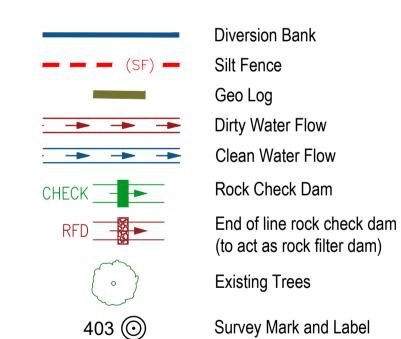






# PLAN Scale 1:250

# **LEGEND**



l1am						Scales
- 9:1						
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29, 2						0 2 4 6 8 10 12 Scale A 1:250
Sep 2						Scale A 1:250
.i.						
Modified						
Mod	Α	Issued for Construction				<u> </u>
Last I	20	.01 Revisions/Descriptions	Drawn	Approved	Date	Dimensions shown in metres except where shown otherwise





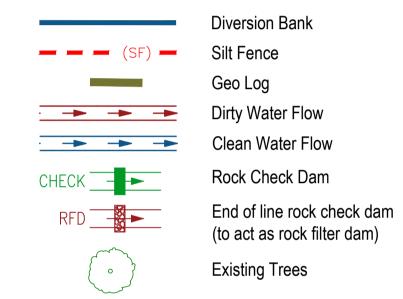
Title CRA	ACOW R	OAD UPGRADE SITE 3 - STAB	•	59400m	۱)	Job No.	CRC00287
TEMPOR	RARY ER	ROSION AND SE		ROL SH	IEET 1	Drawing No.	1700
Drawn		ENGINEERING	CERTIFICATION (RPEQ	)			
B Doherty	ENG. AREA	NAME	SIGNATURE	NO.	DATE	Revision	Α
	Civil	P Meredith		15268			
Designed						Series No.	13 of 14
B Doherty						J Selies NO.	13 01 14

# **GEO-LOG STAKING METHOD**

N.T.S

# LEGEND

Sediment and Erosion Control Design Fact Sheets - Instream Practices



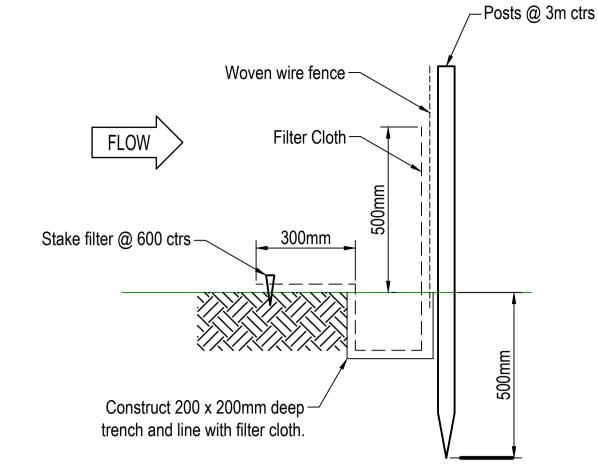
# Notes

- 1. Design and construction of all sediment management devices is the contractors responsibility and shall be completed and effective prior to:
  - (i) Stripping of topsoil and grass.
  - (ii) Bulk earthworks to the site.
  - (iii) Service installations.
- All sediment management devices are to remain in place until notice from the Contract Administrator
   Both temporary and permanent sediment management devices shall be maintained at a suitable level/condition throughout construction. Sediment fences are to be cleaned out when capacity is reduced by 30%.
- 4. If erosion and sediment control devices have been found to be deficient or failed in service, due to unforeseen circumstances, corrective action is to be undertaken immediately which may include amendments/additions to the original approved erosion control plans. such additions or amendments are to be approved by the Contract Administrator.
- 5. All erosion and sediment control devices are to be inspected at least weekly, before and after rainfall events. Any damage or excess erosion/sediment is to be repaired/managed as required to maintain control devices.
- 6. Devices shown on the drawings shall not necessarily be limited to the locations shown.
- Additional devices may be required as directed by Contract Administrator.
- 7. Rock check dams to be installed per detail this drawing in drainage channels with slopes greater than 2%.
- Spacing of check dams to be at every 1.0m vertical drop in drainage channel.

  8. Contract Administrator to order installation of topsoil and grass seeding to disturbed areas.
- 9. The contractor shall ensure all turfed and/or seeded areas are regularly watered to ensure vegetation is maintained until there is 80% coverage.
- 10. Stockpiles shall be protected from erosion and sediment loss by:
  - The installation of diversion works on the upstream side.
    The use of silt fences or other approved controls on the downstream side.
  - Compaction.
  - Re-vegetation if left exposed for longer than 30 days

# MATERIALS

TYPE
1.5kg/m (min) Steel Star Picket
or 1500mm <sup>2</sup> (min) Hardwood
or 2500mm <sup>2</sup> (min) Softwood
Woven wire 14 guarge
150mm max aperture
Filter as specified
(terram 100, polyfelt ts500, Bidim u24 or equivalent)
Geofab, envirofence or approved equivalent

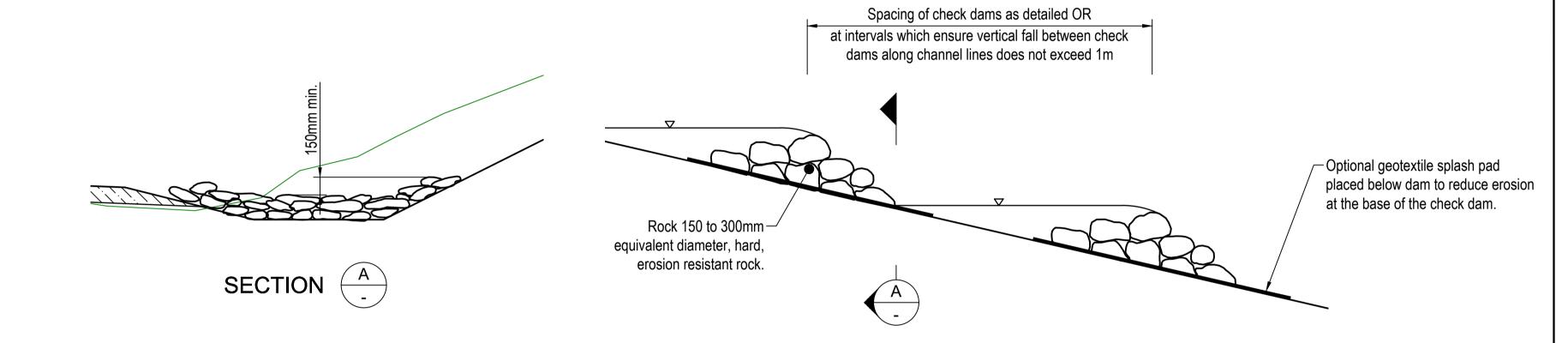


# Erection Notes

Woven fence to be fastened securely to fence posts with wire ties or staples. Filter cloth to be fastened securely to woven wire fence with teis speaced every 600mm at top of mid section. When two sections of filter cloth adjoin each other they shall be overlapped by 150mm and folded and material removeed when bulging of fence occurs.

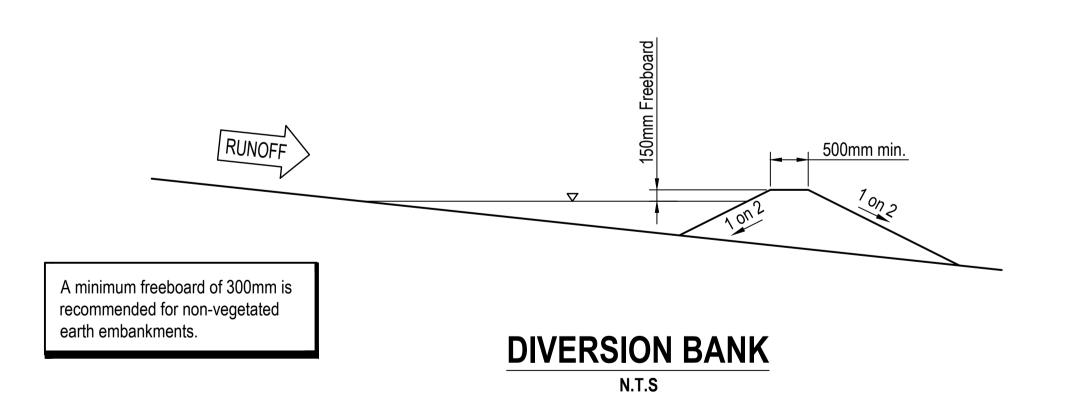
# SILT FENCE

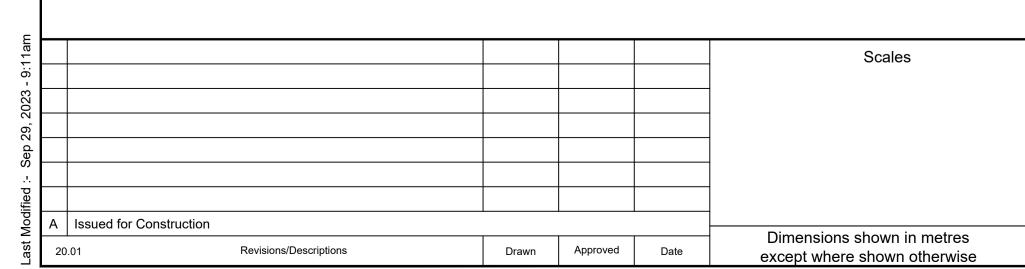
N.T.S



# **ROCK CHECK DAM**

N.T.S







ABN 73 617 924 437 Ph: 0477 322 555



CRACOW ROAD UPGRADE (Ch. 59200m - 59400m)  SITE 3 - STABILISATION  Job No. CRC						CRC00287	
TEMPOR	ARY ER	SITE 3-31AB		ROL SH	HEET 2	Drawing No.	1701
rawn		ENGINEERING	CERTIFICATION (RPEQ)				
B Doherty	ENG. AREA	NAME	SIGNATURE	NO.	DATE	Revision	Α
) Designed	Civil	P Meredith		15268			
9						Series No.	14 of 14
B Doherty						3311331101	17 % 17



# Cracow Road — Site 3 Stabilised Section 1 Ch. 59200 - 59400m

Safety in Design

Client: Banana Shire Council

#### **Document Control**

#### **Document History**

Date	Version	Name	Position	Action (Review/endorse/approve)
19/06/2023	0.1	Bryan Doherty	Senior Designer (Civil)	Draft for internal review
30/08/2023	0.2	Bryan Doherty	Senior Designer (Civil)	Final for council review
26/09/2023	1.0	Bryan Doherty	Senior Designer (Civil)	Final

#### Certification

Date	Name	Position	Signature
26/09/2023	B. Doherty	Senior Designer	
26/09/2023	T. Penrose	RPEQ	There

#### Contents

Doo	cument Control
	Document History
C	Certification
Cor	ntents
1.	Purpose of this Document
2.	Project Scope and Objectives
3.	Safe Design
4.	Duty of Care/Disclaimer
5.	Risk Management
6.	Appendix A – Safe Design Risk Register

#### Purpose of this Document 1.

The purpose of this document is to identify and control project specific risks, where possible, in the civil design phase to ensure the safety of constructors, maintenance providers and end users. All risks identified as part of the design are documented in this report and provided for appropriate risk management in future phases. Risks unable to be closed out in the design phase are be documented in the report and communicated to the Client, for action in the construction and or later phases. This document has been produced to provide support to the design undertaken for Cracow Road, Stabilised Section 1 (Site 3, Ch. 59200 – 59400m).

#### **Project Scope and Objectives** 2.

Scope of works for this project include,

- Pavement widening, overlay and stabilization.
- Geometric improvements.
- New Culvert
- Road edge guideposts.
- Clearing

#### Safe Design 3.

Safe design begins from the outset or planning phase of a project and is further refined in the concept and development phases. Safe design covers the:

- Design of a project or a component of a project and its intended purpose or future use
- Materials being used
- Possible methods of construction, maintenance, and operation of the product, and
- Legislation, codes of practice and standards that need to be complied with.

Safe design is a collaborative effort between all parties involved throughout the lifecycle of the project and where possible should eliminate or minimize the risk of project lifecycle occupational health and safety hazards as early as practical. It also encompasses the management and documentation of remaining risks so all parties involved can understand and be aware of all risks identified in the design phase of the project lifecycle.

Safe design consists of a balance between cost, functionality, and aesthetics; without compromise to the health and safety of those who will construct, use, and maintain the product and community expectations. While not all risks can be eliminated or it be cost effective to remove all risks, Safe Design principles in the planning phase should aim to:

- Prevent injury and disease
- Improve useability of products, systems, and facilities
- Improve productivity in all phases
- Reduce operation costs
- Better predict and manage production and operational costs over the lifecycle of a product
- Comply with legislation, and
- Incorporate innovative design which fosters safer design practices and demands new thinking.



#### Duty of Care/Disclaimer 4.

This document is not intended to be a standalone document, it should be read in conjunction with the Work Health and Safety Act 2011 and the Work Health and Safety Regulation 2011. The Act and Regulation applies to all phases of a project lifecycle from concept, through design, construction, maintenance, and decommissioning and provides that all risks to health and safety be eliminated, so far as is practical or minimised so far as is reasonably practical where they cannot be eliminated. To properly manage exposure to a risk, a person must:

- Identify hazards
- Assess risks that may result because of the hazards
- Identify appropriate control measures to eliminate of minimise the level of risk
- Implement control measures, and
- Monitor and review the effectiveness of control measures.

To comply with the above, assumptions are made during the assessment as to what construction and maintenance practices may be adopted which may differ from actual methods adopted by those undertaking the works. Use of this document does not remove any obligation of any party involved, either during or after this document is published. A duty of care applies to all parties during subsequent phases and it is incumbent on those involved to further assess risks and hazards include:

- the client
- project managers
- constructor
- maintenance personnel
- users
- visitors
- demolishers, and
- disposers.

Further Safety advice, hazard identification, risk assessment or control measures may indicate other risks associated with the project that have not been identified in the document. Reference is made to the principle of what is considered 'reasonably practical' regarding the extent of Safe Design achievable by the designers.

Use of this document does not remove the obligation of the client, constructor end user or other parties during the lifecycle of the project.

Any party who has read this document and disagrees with the assessment or requires clarification of an item should contact the Project Designer at their earliest opportunity.



#### 5. Risk Management

Table 1 – Methods of controlling risk in order of preference

Method	
Elimination	Remove the risk by modifying the design
Substitution	Remove or reduce the risk by modifying the design
Isolation	Physically separate the hazard
Engineered Control	Using <i>Design Safety</i> measure to reduce risks
Administration	Using formal process to reduce the risk
PPE	Ensure appropriate Personal Protective Equipment is used or worn.

The Risk Assessment Matrix is intended to assist our designers in:

- Fulfilling their obligations under the Work Health and Safety Act 2011.
- Achieving safe, economical and efficient constructions for our clients.
- Consulting and communicating with all parties involved in a project (designers, client, end-users, constructors etc.) to establish the hazards and risks identified during the design phase associated with the construction, operation, maintenance and decommissioning of a project.
- Consulting and communicating with all parties involved in a project on the controls that have or are required to mitigate these risks. This is not an exhaustive list and all parties should therefore undertake a thorough review of this document to satisfy themselves that it accurately reflects the intended purpose.
- Consulting and communicating to all parties the controls adopted to mitigate these risks and any residual risks that are considered present during construction, operation, maintenance and decommission that may need continual monitoring to achieve a safe working environment.



Appendix A – Safe Design Risk Register 6.



# Safety in Design Register

Cracow Road, Site 3, Stabilised Section 1, Road Upgrade

	Hazards Controls Action												
			Hazarus	Raw	Risk (no controls)		Control		Residual Risk			ACTION	
				Likelihood	Consequence			Likelihood	Consequence				
				1. Very Unlikely	A. Minor			1. Very Unlikely	A. Minor				
No.	Project Phase	Risk Description	Consequence Description	2. Unlikely	B. Major	Risk	Mitigation Strategy / Control Measures	2. Unlikely	B. Major	Risk	Responsibility	By When	Comments / Notes
				3. Possible	C. Severe	Rating		3. Possible	C. Severe	Rating			
				4. Likely	D. Critical				D. Critical				
				5. Almost Certain	E. Catastrophic			5. Almost Certain	E. Catastrophic				
1	Pre-Design	Insufficient/inaccurate data collection. (e.g. GIS, Traffic Data, LIDAR, Aerial photography)	Risk results in inadequate or substandard design that could lead to potential safety risk to travelling public, Constructors and maintenance workers.	4	D	Significant	Project is adequately scoped, discussed and documented during pre-detailed design phases to ensure data collection is appropriate. Detailed survey has been supplied for this project	1	С	Low	Designer/ Principal	Detailed Design	Residual risk with Principal
2	Pre-Design	Poor Scoping/Client brief on project requirements.	Risk results in inadequate design that could lead to potential safety risk. EDD, design exceptions, funding constraints.	4	D	Significant	Risks identified and accepted by Client. Mitigating treatments incorporated into design to the available funding.	2	В	Negligible	Designer/ Principal		Residual risk with Principal Client decisions recorded within Design Decision Register.
1	Design	Errors and omissions in design.	Errors/omissions in design resulting in inadequate or substandard design that could lead to potential safety risk to travelling public. Constructor, maintenance – workers	t 3	E	Extreme	Design has been carried out in accordance with quality management procedures to avoid potential for errors in design. Design has been carried out in accordance with Australian Standards and quality management procedures in line with scope and deliverables to avoid potential for errors in design.	1	D	Moderate	Designer/ Principal	Detailed Design	Residual risk with Principal
2	Design		E.g. Traffic management, working near overhead power lines, lifting, trenching, site access, materials storage and handling (Asbetos identified within site), working close to travelling public due to corridor restrictions.	4	E	Extreme	Design incorporates learnings from previous projects and include recommendations from industry experts on appropriate site treatments in the design.	2	С	Low	Designer/ Principal	Detailed Design	Residual Risk transferred to Contractor.
3	Design	Project exceeds budget	Identified saftety issues will not be addressed leading to an unsafe environment for the travelling public.	3	D	Significant	BSC to prepare contingency plans to reduce project cost to within budget constraints.	2	D	Moderate	BSC	Detailed Design	Residual risk with Principal
4	Design	Hazards in designated clear zones and road corridor.	Poor Scoping of project requirements resulting in inadequate design that could lead to potential safety risk to travelling public, constructor, maintenance. Impact of errant vehicle resulting in injury or death.	3	E	Extreme	Risks identified and accepted by BSC. Mitigating treatments have been incorporated into the design. Hazard Treatment Evaluation undertaken in accordance with Austroads and the information available at the time of detailed design.	2	D	Moderate	Designer/ Principal	Detailed Design	Residual risk with Principal
5	Design	Inadequate treatment of private entrance or turnout design.	This could lead to potential safety risk to travelling public. SISD, ASD, angles, vertical clearance, appropriate layout, design vehicle.	3	D	Significant	Private entrances and turnouts to be designed in accordance with BSC standard drawing and incorporating validated road function, traffic volumes and usage. Key stakeholder consultation, EDD/Design Exceptions.	1	D	Moderate	Designer/ Principal	Detailed Design	Residual Risk with Principal
6	Design	Services not identified during design.	This could lead to the potential safety risk of constructors and/or closure of key services to the general public.	4	D	Significant	Contact DBYD and other relevant authorities to identify existing services (DBYD received 17/02/23). Designers have noted known services on drawings. Carry out field inspection to confirm and identify any potential service related issues e.g. potholing and locating activities. Direct Buried Optic Fibre has been located during the design phase using non destructive methods (wanding). Locating details have been provided in the plans. The recorded depths indicate no conflict with the Optic Fibre. Contractor to complete service locations to verify investigations carried out during the design phase.	2	D	Moderate	Designer/ Principal	Detailed Design	Residual Risk with Principal and Contractor
1	Construction	Drainage during construction	Poor drainage during construction affecting pavements/traffic/etc	3	В	Low	Maintain flow paths during construction where practical.  Make pumping equipment available if required.	2	А	Negligible	Contractor		Residual risk with Principal and contractor
2	Construction	Exposure to asbestos	Existing abandoned conduits/pits/culverts may be present which could be exposed during construction.	2	D	Moderate	Details of existing services/culverts where known have been provided. Contractor to undertake appropriate intestigations as required.	1	D	Moderate	Contractor		Residual risk with Principal and Contractor It is unknown if any asbestos infrastructure is located within the project limit.
3	Construction	Deep excavation of trenches	Trench collapse injuries	2	E	Significant	Depth of culverts to be minimised where possible.  Contractor to employ appropriate temporary work measures.	1	E	Moderate	Contractor	Construction	Residual risk with Principal and contractor
4	Construction	Design changes made by Contractor or Administrator following design completion	Design changes do not meet safety requirements.	3	С	Moderate	Contractor / Administrator to advise the Designer or any proposed design changes. Follow RFI process.	1	С	Low	BSC	Construction	Residual risk with Principal and contractor
-	Construction	Working in vicinity of High Voltage Ergon power lines, both overhead	1 Doobh as sasious inium.	2	E	Significant	Contractor to identify all services and have construction procedures for working	1	E	Moderate	Contractor	Construction	Constructors shall conduct their own DBYD and verify all utilities on site prior to commencing any
		and underground.					near HV services.  Designer has nominated traffic volumes in design documentation. It is noted that the traffic volumes are low.	1	Ľ	Moderate			roadworks.
6	Construction	The risk of traffic not being managed adequately.	Traffic chaos, delays and accidents caused by lack of controls.	2	E	Significant	Contractor to engage a suitably qualified traffic manager to implement traffic management controls considering road function; traffic volumes; constructability and road users.	1	E	Moderate	Contractor		Residual Risk with Principal and Contractor
7	Construction	Working on top of high and steep embankments	Injury due to personnel fall or overturning construction plant	3	E	Extreme	Consider construction methodology prior to implemenation.	2	D	Moderate	Contractor	Construction	Residual risk with Principal and contractor
8	Construction	Lighting levels during construction.	Inadequate lighting of conflict points during construction resulting in confusion/collisions	2	В	Negligible	Temporary standalone LED lighting, if required.	1	В	Negligible	BSC	Construction	Residual risk with Principal and contractor
9	Construction	Disruption / damage to existing services	Constructors may damage existing services during construction. Service may/may not have been shown on design plans.	3	D	Significant	Constructors to conduct dial before you dig and no work shall be carried out over utility or within 3m of services without prior notification to the appropriate service authorities.  Contractor to complete service locations to verify existing infrastructure. Appropriate demarcations and planning by contractor to highlight any locations where work activities are undertaking in the vicinity of existing services.	2	D	Moderate	Contractor	Construction	Constructors shall conduct their own DBYD and verify all utilities on site prior to commencing any roadworks or excavations.
10	Construction	Unexpected weather events resulting in potential injury to construction personnel and/or travelling public	Sudden weather events resulting in the need to evacuate the site.	4	D	Significant	Constructor to consider location, likely duration and characteristics of project to determine likelihood of event and consider project specific mitigation strategies via risk management.	3	D	Significant	Contractor	Construction	Residual Risk with Principal and Contractor
11	Construction	Unearthing unexpected soil types e.g. acid sulphate soil, sodic soils or contaminated soil from rail reserves. resulting in potential safety risk to construction personnel and general public.	This results in potential safety risk to construction personnel and general public.	3	D	Significant	<ul> <li>Design to consider location and likelihood of encountering specific soil type.</li> <li>Site inspection and/or geotechnical investigation to confirm presence of soils requiring specific treatment.</li> <li>Include comments in "notes to contract administrators" advising of potential for presence of hazardous materials.</li> <li>Experienced construction staff that can recognise potential hazards</li> </ul>	3	С	Moderate	Contractor	Construction	Residual Risk with Principal and Contractor
12	Construction	Incorrect or unsuitable surface treatment either temporary or permanent resulting in potential safety risk to the travelling public. e.g. line marking removal, appropriate seal design	This results in potential safety risk to construction personnel and general public.	3	D	Significant	Constructor to consider road function, traffic volumes, location and seasonal conditions to propose suitable surface treatment.	2	E	Significant	Contractor	Construction	Residual Risk with Principal and Contractor
1	Maintenance	Final product leads to potential safety issues with maintenance activities.	Personel cannot undertake maintainance activities safely due to the proposed design.	3	с	Moderate	Design to consider maintenance requirements including provision of safe environment to facilitate maintenance activities including safe ingress and egress and clear work area. E.g. batter slopes, under bridge inspections, gardens in medium strips, allowance for access tracks etc.	1	E	Moderate	BSC	Ongoing	Residual risk with Principal
2	Maintenance	Inadequate as constructed information.	Existing conditions not accurately reflected.	4	E		Adequate handover to maintenance provider.	1	D	Moderate	BSC	Ongoing	Residual risk with Principal
1	Finalisation	Not applying all the appropriate standards.	This could result in an unsafe design.	3	D	Significant	Carry out appropriate design reviews and RPEQ approvals	1	D	Moderate	Designer	Ongoing	Residual risk with Principal