

Technical Note (TN)

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Date: 12 August 2024
Prepared By: N/R
Subject: Summary of Pumicestone Road Model

Document History and Status:

Revision	Date Issued	Revised By	Approved By	Date Approved	Revision Type
01	31/05/2024			31/05/2024	Draft Issue
02	12/08/2024		N/R	12/08/2024	Final Issue

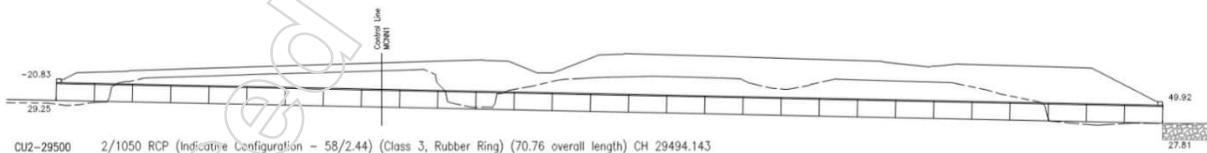
1 INTRODUCTION

The Bruce Highway Upgrade – Caboolture-Bribie Island Road to Steve Irwin Way (Exit 163) (C2SIW or the Project) includes improvements to approximately 11 kilometres of the Bruce Highway between south of the Caboolture-Bribie Island Road interchange up to the Steve Irwin Way interchange (Exit 163). The Project has been broken into two packages:

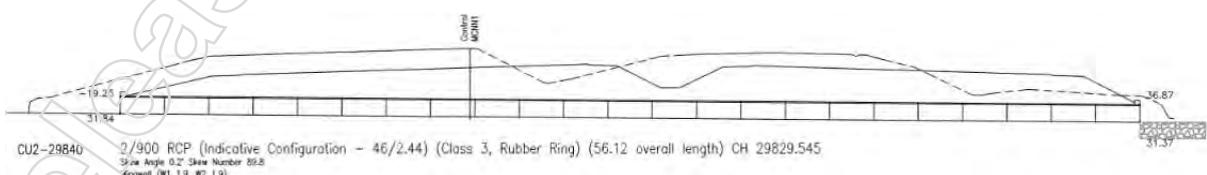
- Package 1; From south of Caboolture-Bribie Island Road (Ch. 23,690) interchange to Ch. 29,200 at the Pumicestone Road interchange, refer Hydraulics Report (South) (481355-DJV-1HF10-RPT-000001); and
- Package 2; From Ch. 29,200 at the Pumicestone Road interchange to the Steve Irwin Way interchange (Exit 163) at Ch. 34,863 (**THIS AREA**), refer Hydraulics Report (North) (481355-DJV-2HF10-RPT-000001).

This technical note specifically relates to the hydraulic assessment undertaken by the Jacobs SMEC Design Joint Venture (JSDJV) of the following project reinforced concrete pipe (RCP) culverts:

- CU2-29500: 2/Ø1050 RCP



- CU2-29840: 2/Ø900 RCP



To control the flow and velocity through these culverts and manage downstream impacts, further amendments to the culvert inlet capacity were developed. This technical memo has been developed to summarise the hydraulic modelling and assessment that was undertaken to assess the hydraulic performance in a 5% and 1% AEP event (including climate change) of the amended project culverts compared to existing conditions.

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2 EXISTING CONDITIONS MODELLING

The project specific hydrologic and hydraulic models were refined for assessing potential impacts downstream of the highway based on the hydraulic performance of both culverts.

Specifically, Lot 9 on SP255124 is directly downstream of both culverts as they feed into the overland flow path that carries through this lot, under Clinker Road and into the State Forrest.

The following sections summarise the methodology and assumptions that were applied to the hydraulic modelling and the resulting downstream impacts with the proposed configuration of the culverts.

The existing culverts present prior to the project were extended in 2012 as part of a previous upgrade to the Pumicestone Road interchange. Their configuration prior to this Project is as follows:

- CU2-29500 (formally R3-2 top/up-stream and R4-1 bottom/downstream): Ø900 RCP

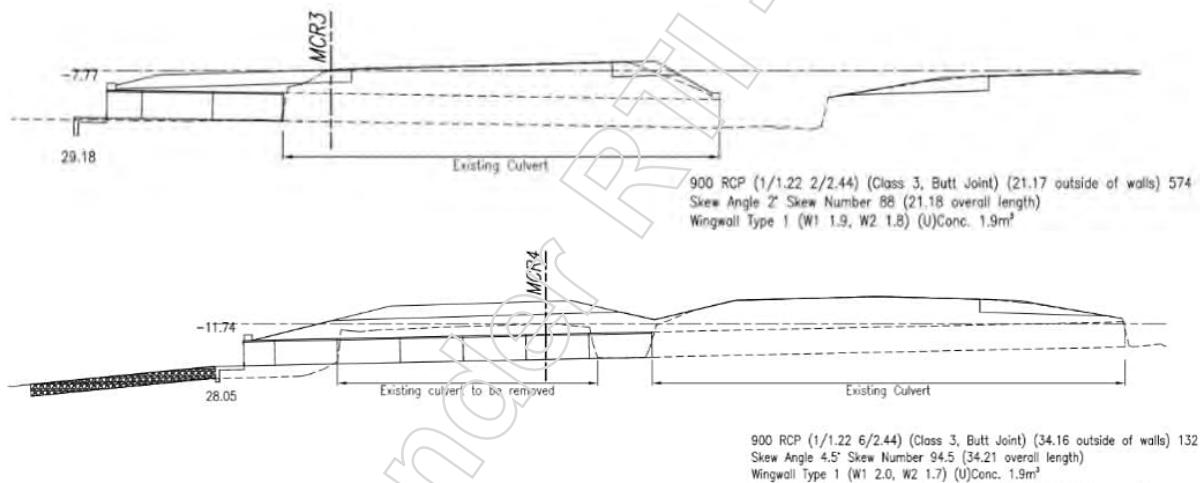


Figure 1 Existing CU2-29500 RCP culvert – top R3-2 (upstream) and bottom R4-1 (downstream)

- CU2-29840: (formally A1-1 up-stream): Ø750 RCP

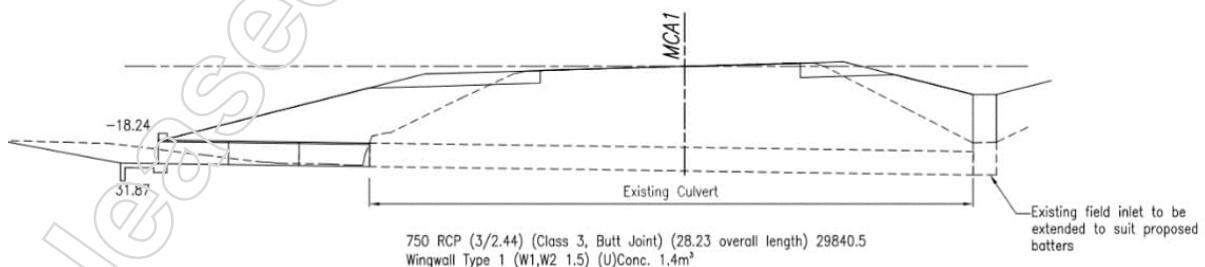


Figure 2 Existing CU2-29840 RCP culvert – A1-1 (upstream)

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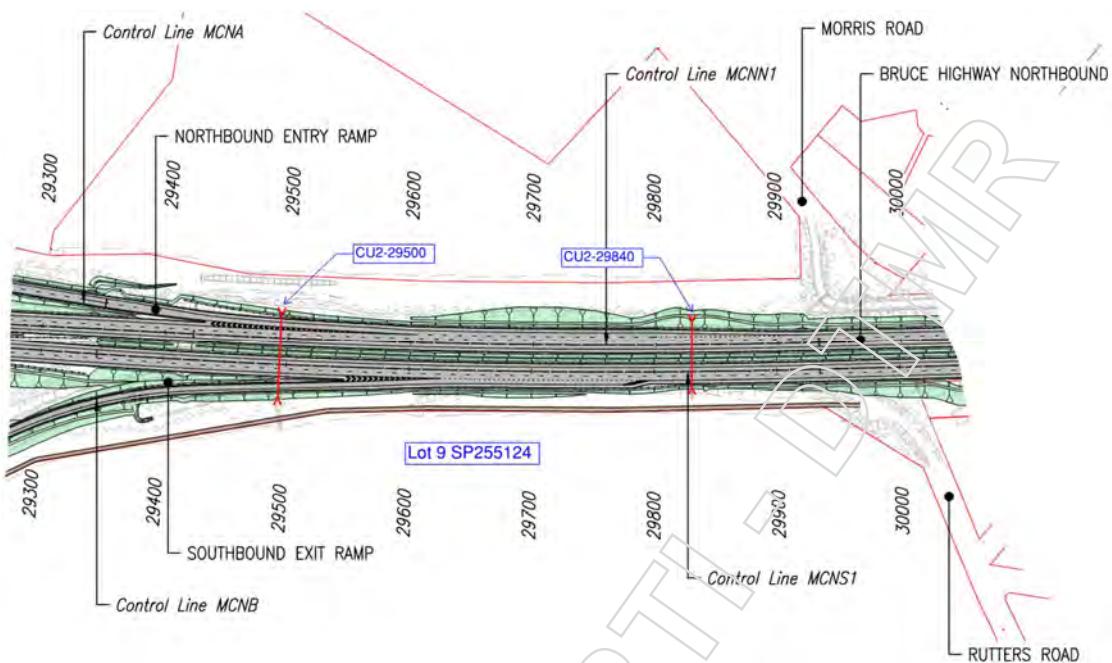


Figure 3 Culvert locations

2.1 Hydrologic Model

The City of Moreton Bay provided the Pumicestone Passage 2014 WBNM hydrologic model to the JSDJV to use as part of the wider Detailed Design of the highway upgrade. The hydrologic model rainfall inputs were refined to account for a reduced ARF (Areal Reduction Factor) due to the small catchment area draining towards the Bruce Highway. No ARF was applied to the hydrological model via Storm Injector due to a total catchment area of less than 1km². Hydrologic modelling was undertaken for the 5% and 1% AEP event which included a 14.6% increase in rainfall intensity to account for climate change. The 14.5% increase in rainfall is consistent with RCP 6 based on the design horizon of 2100. An initial loss and continuing loss of 27mm and 2.6mm/hr was applied respectively to the hydrological model.

The hydrologic model catchment land use imperviousness was left unchanged for the existing and design scenario as the increase in the overall upstream catchment imperviousness was less than 1%.

Flows from the hydrological model were checked using the rational method as a method flow validation. The analysis was undertaken considering no increase in rainfall intensity due to climate change. Figure 4 presents the calculated flows from the hydrological model via Storm Injector for a range of storm durations for the 1% AEP event for the upstream catchment. Flows for the 1% AEP event appear to be very consistent between 7.1 m³/s – 7.4 m³/s for durations between the 30 minute and 2 hour storms. Flow validation using the rational method was only conducted for the 1% AEP as it is the critical AEP event for hydraulic design of highway infrastructure.

The rational method time of concentration (tc) was estimated using Friend's equation due to the high roughness of the catchment. The Friend's equation calculated a tc of approximately 60 minutes. The following parameters were used for the rational method calculation:

- Area = 31.95ha
- C10 Runoff coefficient = 0.68

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- Flow Path = 550m
- Catchment Fraction Impervious = 0.06
- Hortons Roughness = 0.07
- 10% AEP 1hr intensity = 67.6mm/hr

The rational method estimated a flow of 7.4m³/s which is very similar to the 7.3m³/s generated by the hydrological model. The similar peak flows provides confidence in the generated flows from the hydrological model. It is noted there is a pronounced difference in the critical duration within the hydraulic model due to the available storage upstream of the highway which influences longer duration storm events being critical as compared to the rational method.

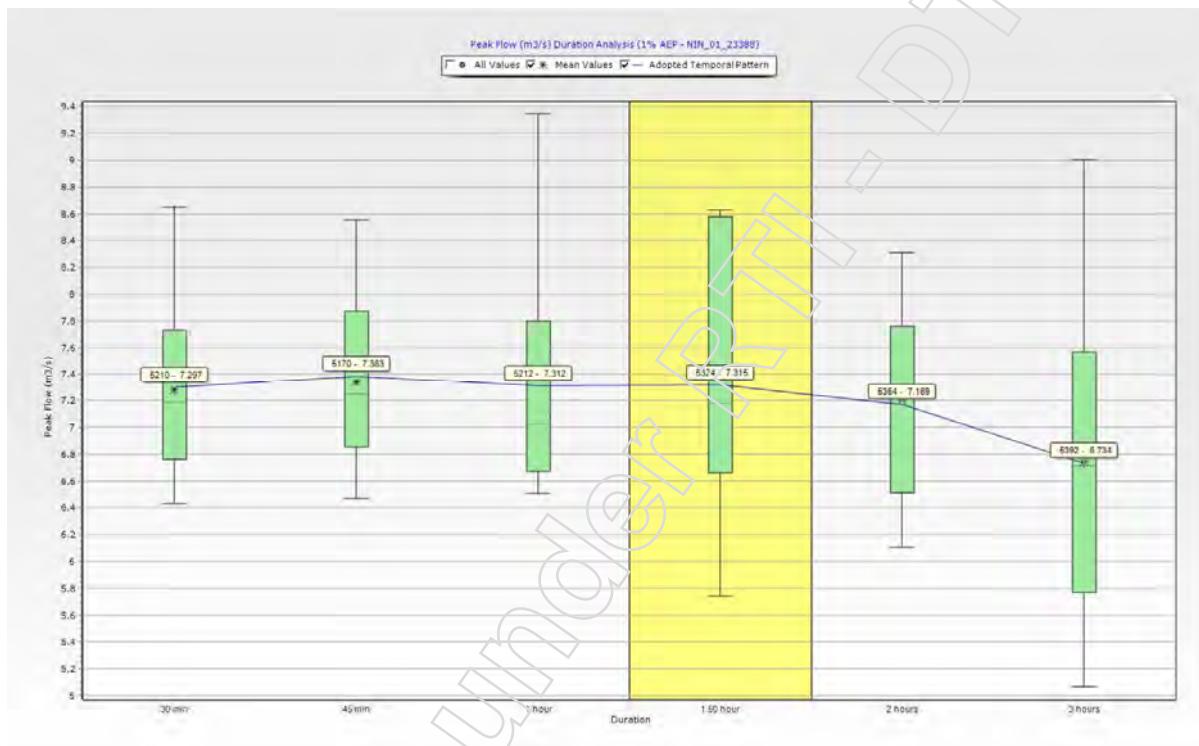


Figure 4 1% AEP WBNM Peak Flows

2.2 Hydraulic Model

The project specific regional Pumicestone Passage TUFLOW model which included Six Mile Creek, Unnamed Creek and Beerburum Creek was truncated to the area contributing to the culvert catchment and to improve model run times. The base model provided by City of Moreton Bay required a number of refinements for assessing the pre- and post-upgrade highway scenarios. Figure 5 presents the model schematisation and model topography. Figure 6 presents the applied Manning's n roughness. The following refinements and updates were applied to the TUFLOW model:

- 4m grid resolution including 1m SGS (Sub Grid Sampling)
- Refinement of existing culverts based on TMR survey and as-constructed drawings
- Refinement of culvert losses
- Manning's n refinements,
- Topographic refinements

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- Changes and splitting of inflow locations
- Downstream truncation of the model

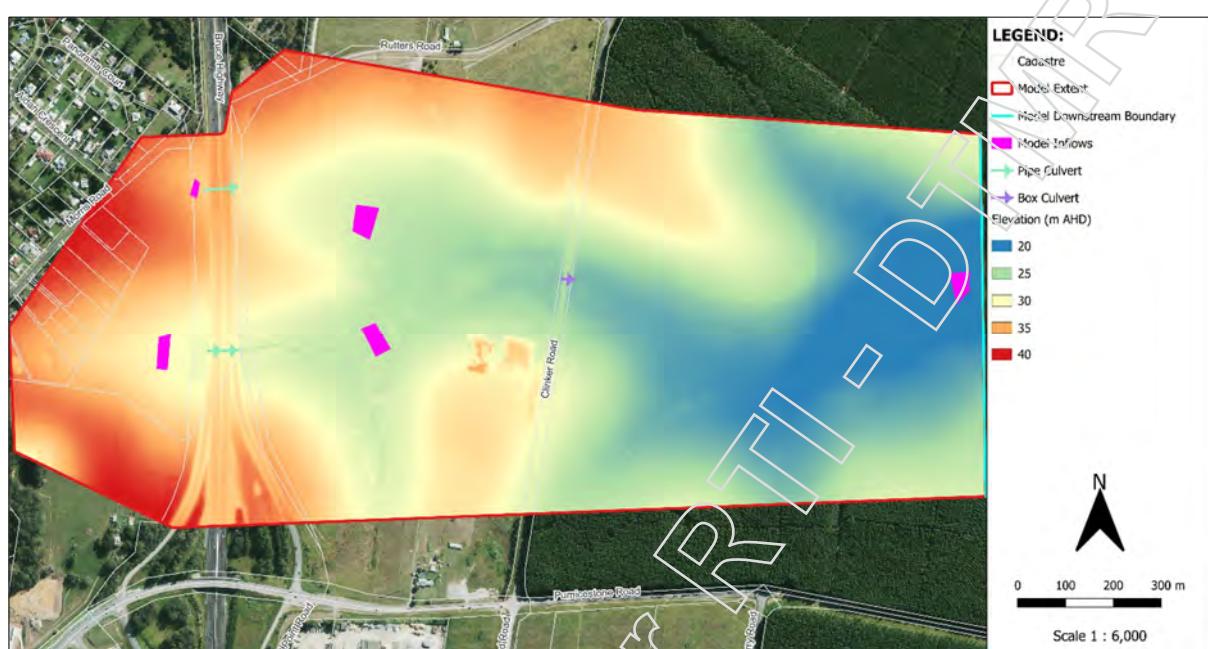


Figure 5 Existing Model Schematisation



Figure 6 Existing Model Manning's n Roughness

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2.3 Assessment of Critical Durations

The critical durations and temporal patterns for the 5% and 1% AEP events were identified within the hydraulic model by simulating all durations and temporal patterns. The relevant critical duration and temporal pattern was selected based on TMRs guidance of the rank 6 temporal pattern which relates to the temporal pattern that is just above the median. In the 1% AEP event, the assessment identified two critical durations relevant to the upstream and downstream of the highway as presented in Figure 7. Immediately upstream and downstream of culvert CU2-29500 the critical duration was determined to be 360 minutes, while CU2-29840 and the overland flow path downstream of the culverts was 120 minutes.

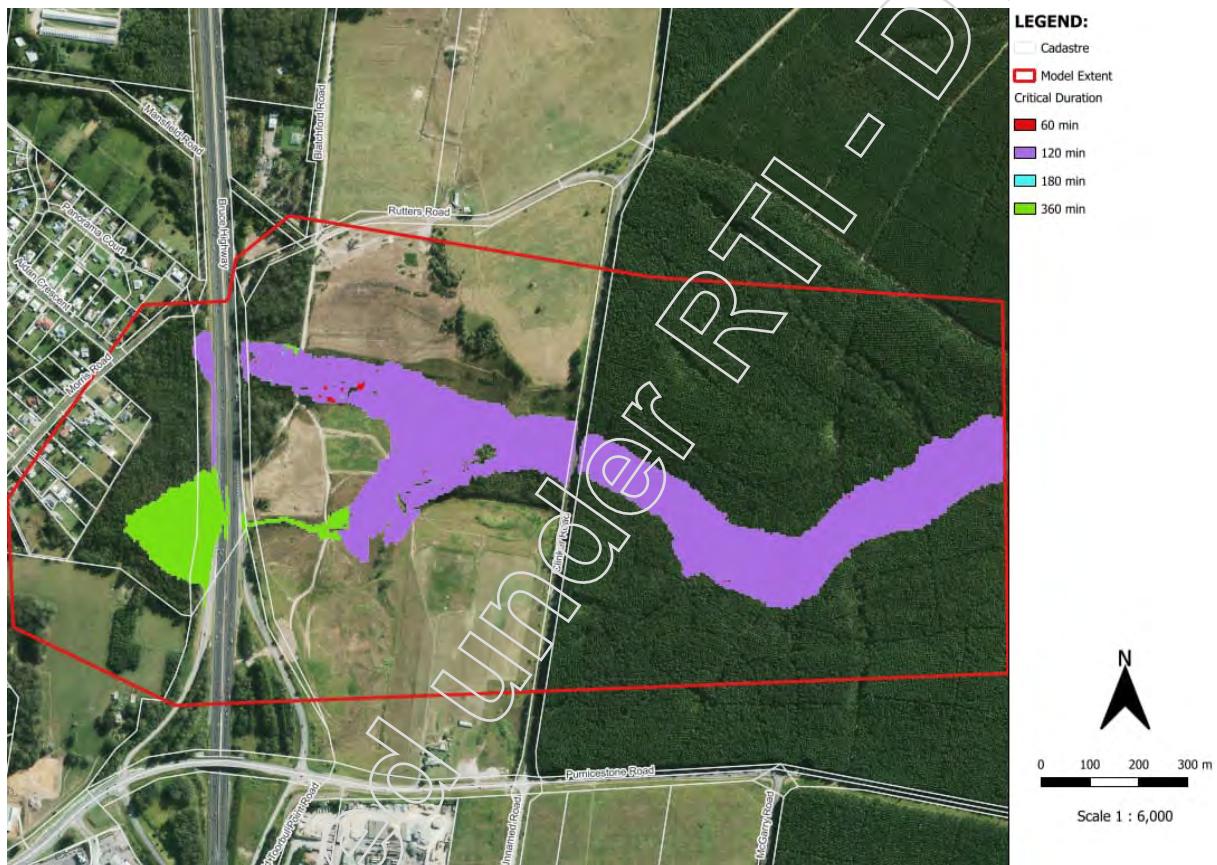


Figure 7 1% AEP Critical storm duration

2.4 Manning's n Sensitivity Test

A Manning's n sensitivity test was undertaken to simulate a higher roughness for the forested area downstream of Clinker Road for the 1% AEP event. A Manning's n value of 0.08 was adopted which represented double the adopted base case value. The results of the sensitivity test predicted increases between 20mm – 100mm downstream of Clinker Road. Upstream of Clinker Road the model predicted less than a 10mm change in level.

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3 CULVERT DESIGN CASE

To control the quantity and velocity of flows from the project culverts and resulting water levels downstream, the inlet structures were amended to control the peak flow. This was undertaken by installation of plates to cover the culverts to restrict the inlet area as required. The amended structures for each project culvert is shown in Figure 8 and Figure 9 below.

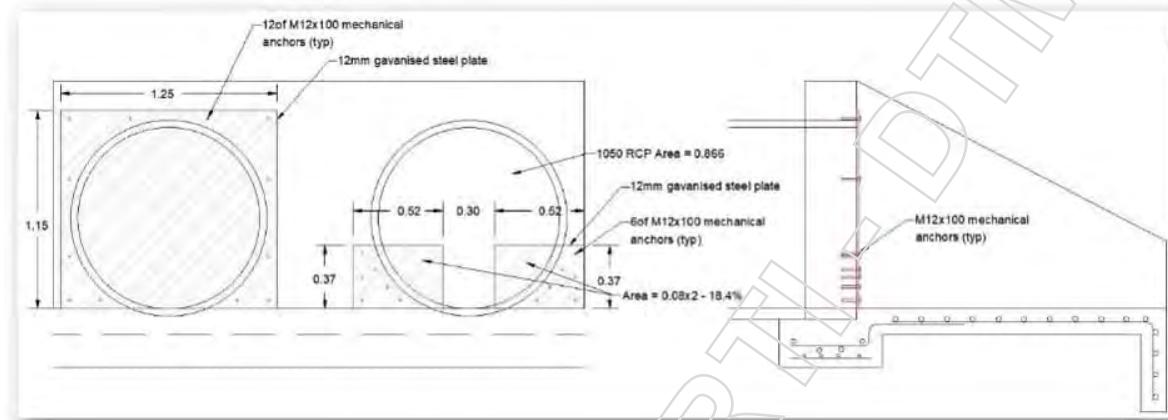


Figure 8 CU2-29500 inlet control

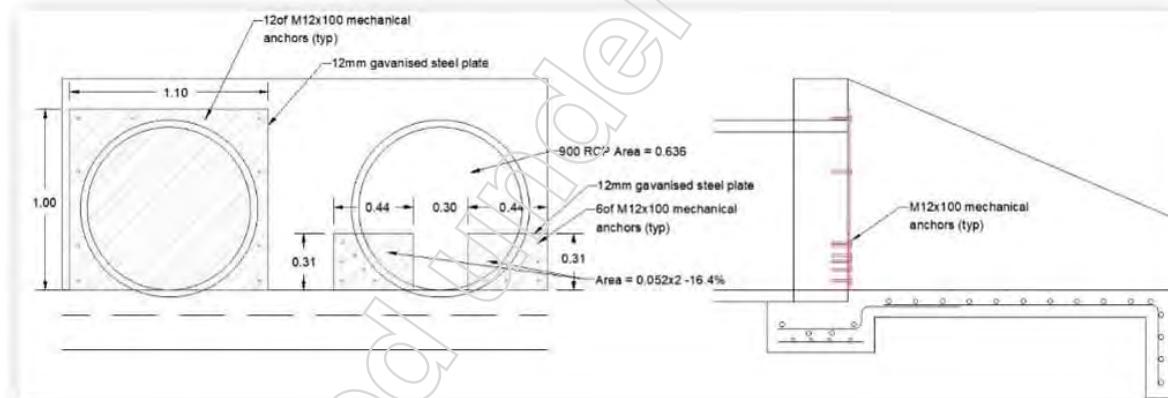


Figure 9 CU2-29840 inlet control

4 DESIGN CASE HYDRAULIC MODELLING

The hydraulic model was updated to reflect the design case and include the design highway embankments, drains, block banks and the project culverts with the amended inlet control. Figure 10 presents the design model schematisation and model topography. Representation of each section of the culverts within the hydraulic model are presented in Table 1.

The culverts under the highway were modelled in two different sections to more accurately represent frictional headloss through the culvert. The first section of culvert included blockage

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due to the inlet plate together with an increased inlet loss of 0.8 to account for increased turbulence/losses due to the presence of the inlet plates¹.

Table 1 Design model culvert details

Location	Size and Class	Number	Inlet Loss	Length (m)	Blockage (%)
CU2-29500_A	Class 3 - 1050RCP	1	0.8	1	18
CU2-29500_B			NA	69.76	0
CU2-29840_A	Class 3 - 900RCP	1	0.8	1	16
CU2-29840_B			NA	55.12	0

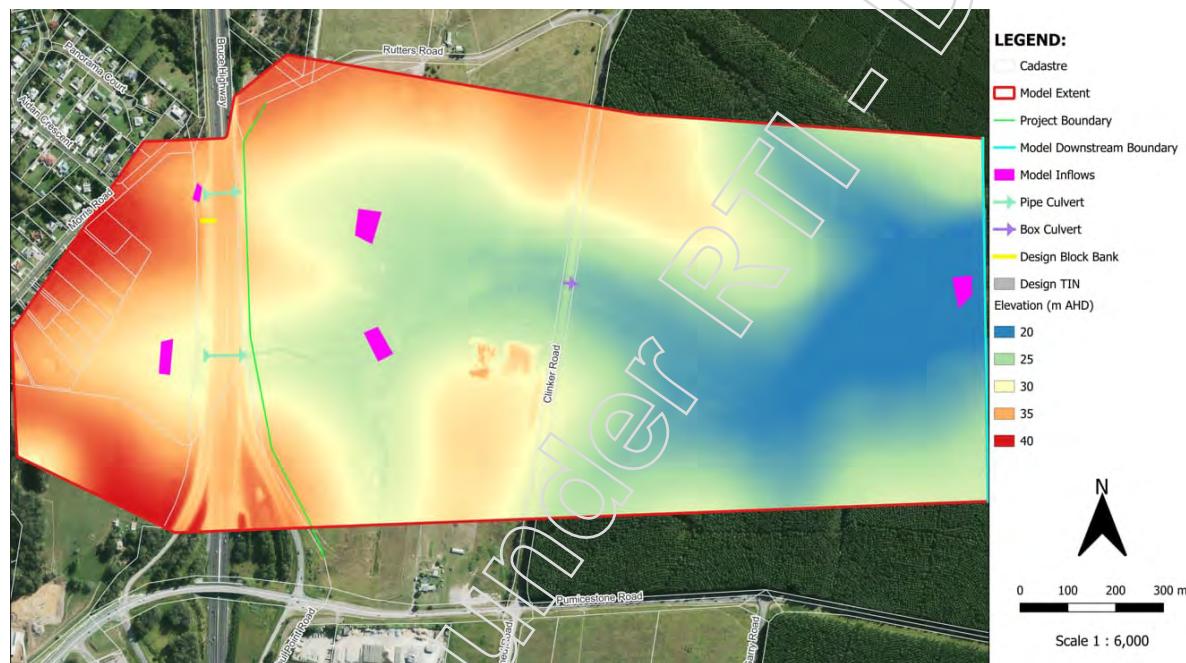


Figure 10 Design Model Schematisation

The presence of the steel plates on the culvert inlet increases the chance of potential debris blockage particularly for the low flow segment. It is noted that the topography upstream of the culverts is relatively flat, and runoff generated by the catchment is likely to be slow moving and unable to uproot and mobilise large debris. However, a sensitivity test was conducted to test two varying degrees of blockage. An additional 20% and 50% increase in blockage (in addition to the baseline plate blockage in Table 1) was simulated.

The highway immunity at CU2-29840 (northern culvert) was not affected by the blockage as any increase in water levels will cause floodwaters to bypass and travel south once the water level overtops the block bank which has an RL of 33.4mAHD.

CU2-29500 (southern culvert) is sensitive to the effects of blockage as it is in the sag point of the catchment. Under a 20% blockage scenario (38% total blockage) the 1% AEP flood level does not inundate the road shoulder. However, under the 50% blockage case flood waters are predicted to partially inundate the Highway with approximately 10m width of the northbound

¹ Refer to paper "Effects of Bottom-Up Blockage on Entrance Loss Coefficients and Head-Discharge Relationships for Pipe Culvert Insets: Comparisons of Theoretical Methods and Experimental Results" - [https://ascelibrary.org/doi/10.1061/\(J\)EDH.IRENG-10219](https://ascelibrary.org/doi/10.1061/(J)EDH.IRENG-10219)

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carriageway free of flood waters. Figure 11 presents a cross section of the no blockage scenario, 20% and 50% blocked.

If a higher blockage case was considered appropriate, the drain block bank could be raised slightly to reduce the volume of water diverted to CU2-29500 to minimise the impact, or, the inlet restriction adjusted to allow greater flow downstream.

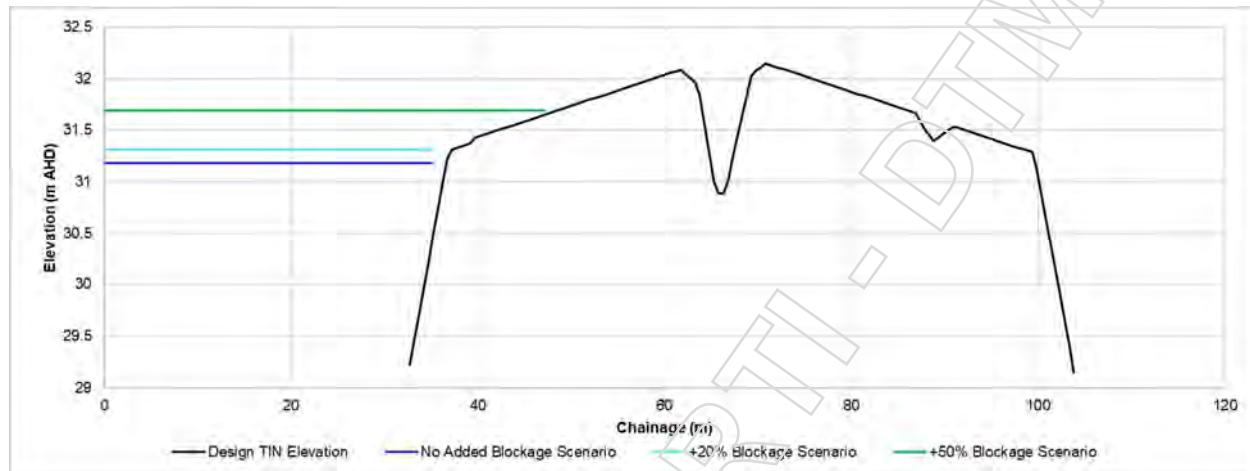


Figure 11 1% AEP Blockage Sensitivity

5 FLOOD IMPACT ASSESSMENT

The following section presents the results of the flood modelling assessment undertaken for the baseline scenario which only includes blockage due to representation of the inlet plate and not debris. All durations and temporal patterns for the design scenario were simulated for comparison against the existing scenario to cover any differences between the existing and design scenario.

5.1 Changes in Flow

Changes to peak flows through the culvert structures were investigated to determine if flows were increasing on the downstream property. The comparison of peak flows was extracted just downstream of the culverts for the existing and design case scenarios. Table 2 presents the peak flows for both CU2-29500 and CU2-29840 culverts as well as the change in flows. The hydraulic modelling results showed a decrease in peak flow in the 5% AEP event for both culvert locations. However, in the 1% AEP event the peak flow increased by 0.1m³/s through culvert CU2-29500 (southern).

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Table 2: Flow comparisons

Location	Culvert's Peak flows pre-Project (m ³ /s)		Culvert's Peak flows Design (m ³ /s)		Change in flow (Design vs Existing) (m ³ /s)	
	5%	1%	5%	1%	5%	1%
CU2-29500 (Southern Culvert)	1.9	2.1	1.8	2.2	-0.1	0.1
CU2-29840 (Northern Culvert)	1.3	1.4	1.1	1.4	-0.2	0.0

Hydrographs have been produced to present changes in flows over the duration of the storm for the critical 5% and 1% AEP events. Refer to Figure 12 to Figure 15 for hydrographs for both culvert locations and AEP events.

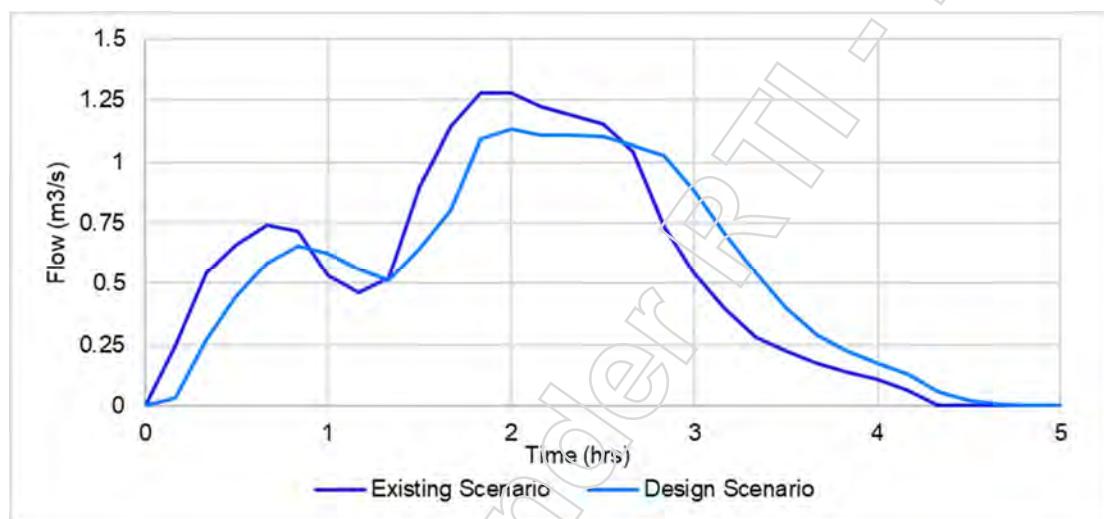


Figure 12 5% AEP CU2-29840 (northern) culvert

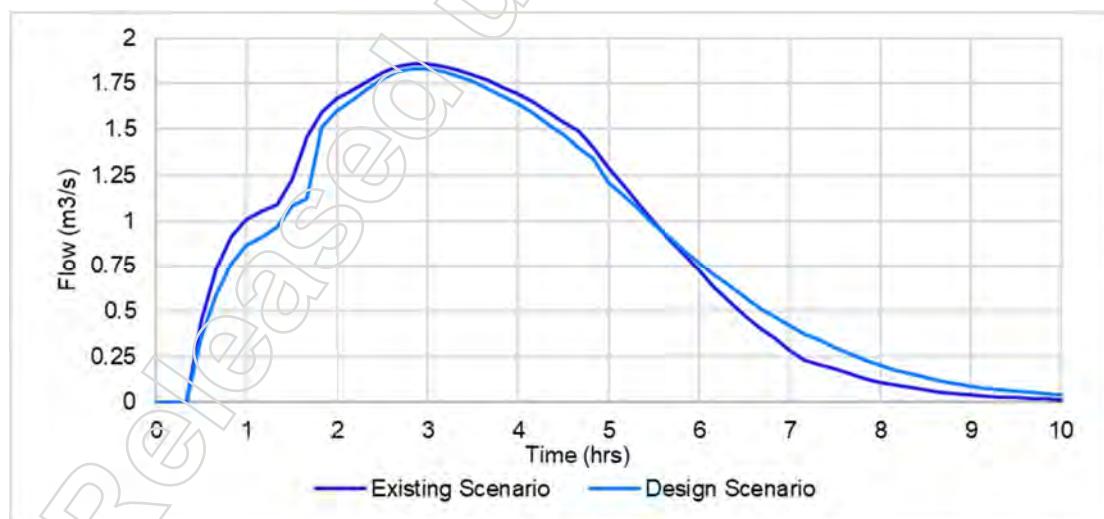


Figure 13 5% AEP CU2-29500 (southern) culvert

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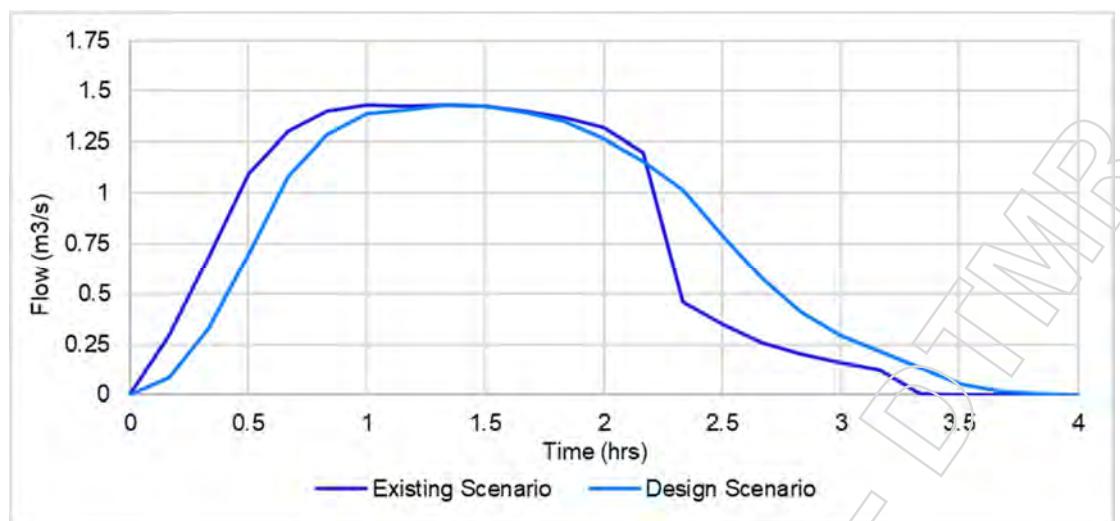


Figure 14 1% AEP CU2-29840 (northern) culvert

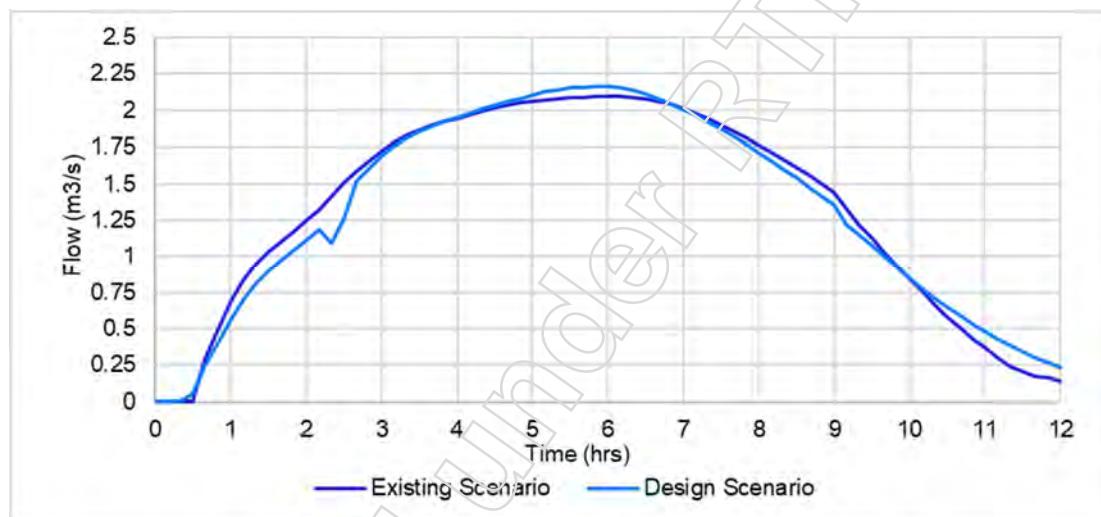


Figure 15 1% AEP CU2-29500 (southern) culvert

5.2 Changes in Flood Level

The hydraulic modelling of existing and design case scenarios resulted in a maximum impact of 13mm downstream of the Highway in the 5% and 1% AEP events. Flood impact maps for the 5% and 1% AEP events are presented in Figure 16 and Figure 17.

Some minor fringe impacts of up to 35mm were identified but were found to be less than a grid cell size. It is important to note that these very isolated impacts are primarily concentrated along the waterway's edges where the LiDAR appears to undulate due to vegetation effects and are potentially not an accurate representation of the flood impact in practice.

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Figure 16 5% AEP Flood Impact Map



Figure 17 1% AEP Flood Impact Map

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5.2.1 Changes in Velocity

Changes in velocity were also considered as part of the hydraulic assessment. Modelling showed no increases in velocity greater than 0.1m/s was predicted downstream. Figure 18 and Figure 19 present the velocity impact maps for the 5% and 1% AEP events.

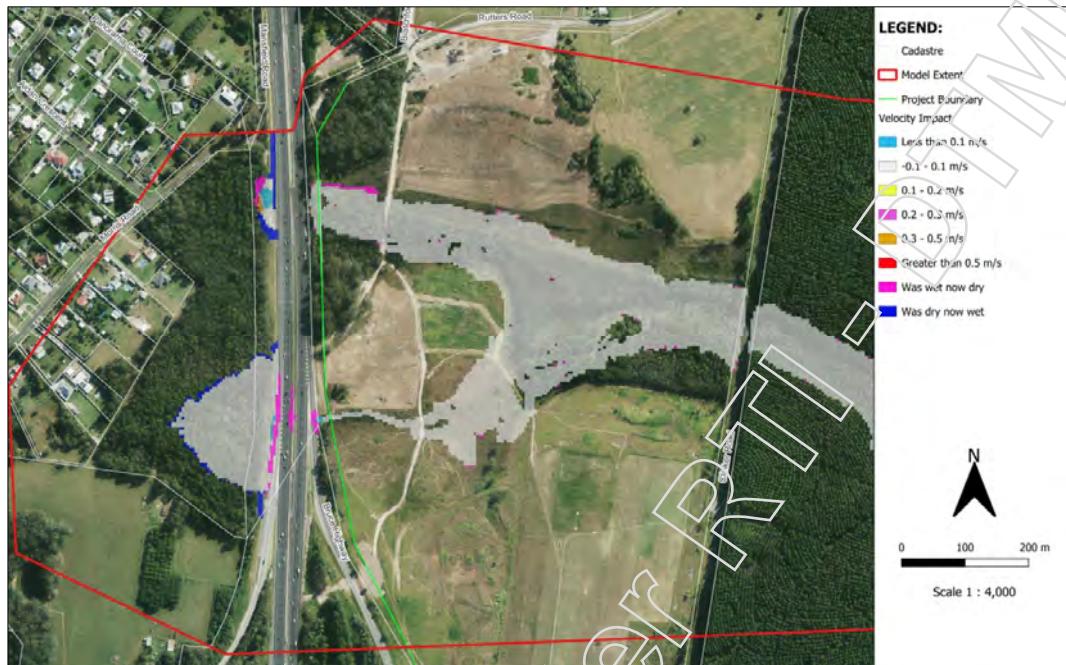


Figure 18 5% AEP Velocity Impact Map

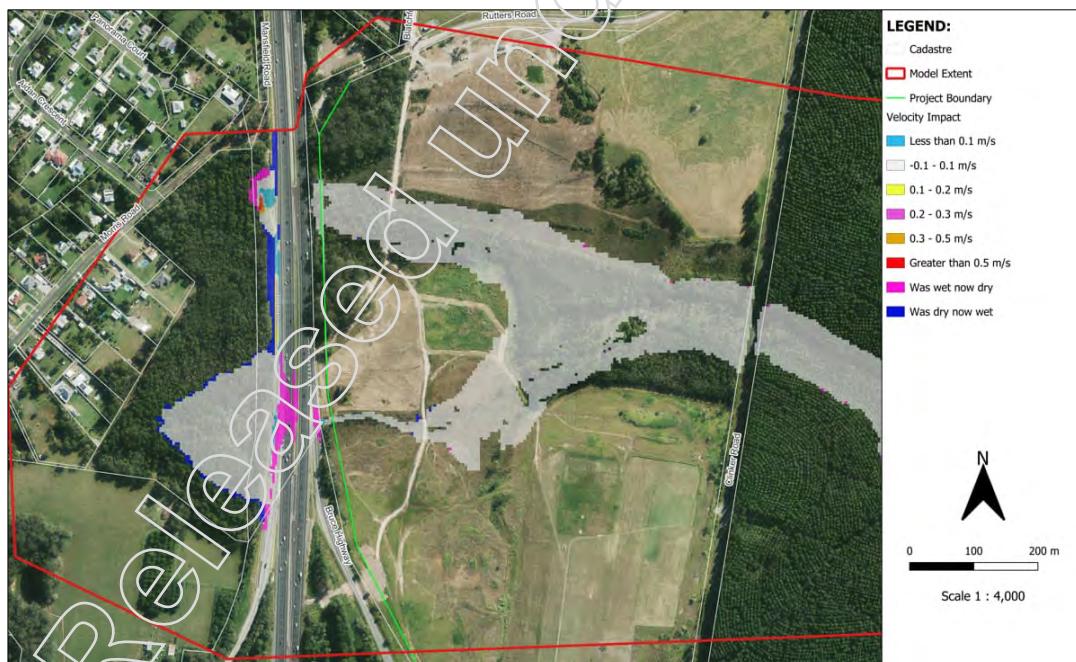


Figure 19 1% AEP Velocity Impact Map

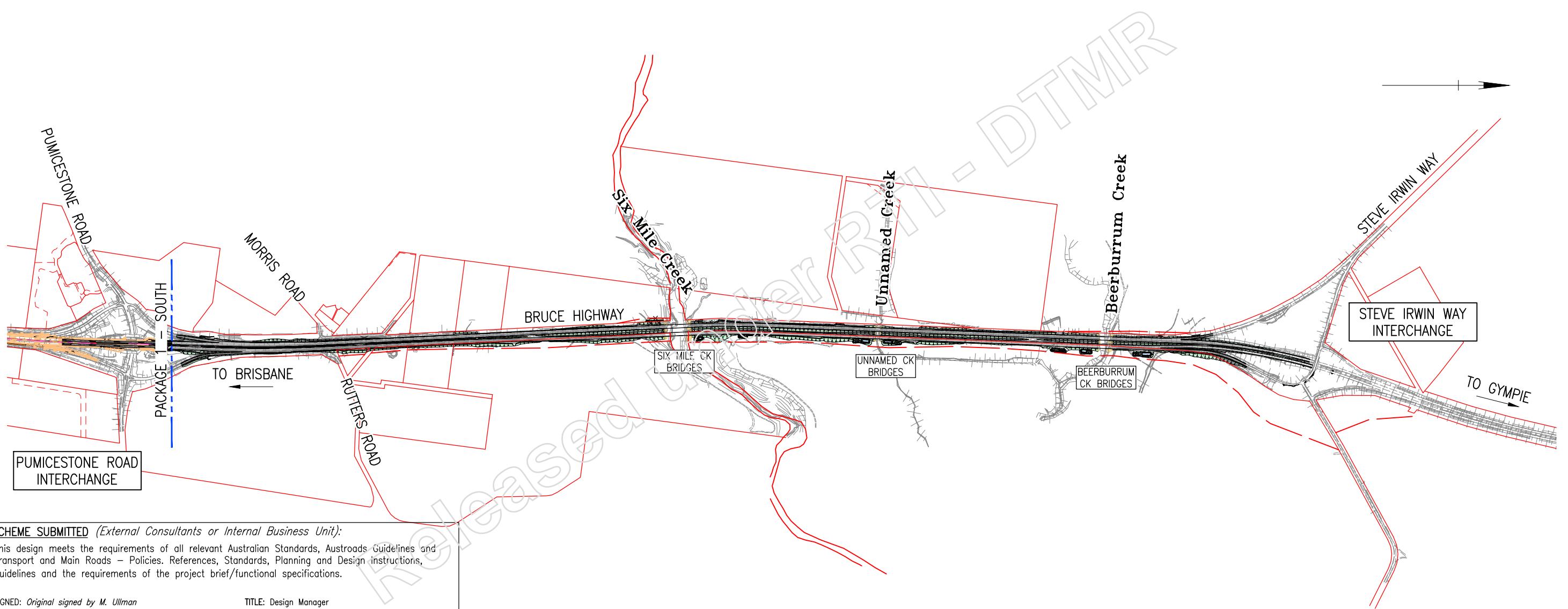
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6 SUMMARY

Hydraulic modelling was undertaken to assess the impact of amending the inlet capacity of two culvert structures, CU2-29500 & CU2-29840 under the Bruce Highway north of Pumicestone Road. The amendments to inlet capacity of the culverts resulted in a minor decrease in flow during the 5% AEP compared to existing. However, in the 1% AEP event a minor increase of 0.1m³/s was predicted to occur through the culvert CU2-29500 (southern). A maximum impact of up to 13mm was predicted by the hydraulic model, however, the extent of the impact is confined within the waterway area defined by City of Moreton Bay.

Released under RTI - DJV

BRUCE HIGHWAY UPGRADE (PUMICESTONE ROAD TO STEVE IRWIN WAY) PACKAGE 2 - NORTH



SCHEME SUBMITTED (External Consultants or Internal Business Unit):

This design meets the requirements of all relevant Australian Standards, Austroads Guidelines and Transport and Main Roads – Policies, References, Standards, Planning and Design instructions, Guidelines and the requirements of the project brief/functional specifications.

SIGNED: Original signed by M. Ullman

TITLE: Design Manager

Organisation: Jacobs SMEC Design Joint Venture Pty Ltd

DATE: 04/12/2019

SCHEME SCOPE AND FINANCIAL APPROVAL: (Regional Director or Delegate):

I hereby certify that this scheme complies with the intent of the scope and financial limits of the relevant project on QTRIP and the scheme is approved for release in accordance with that program.

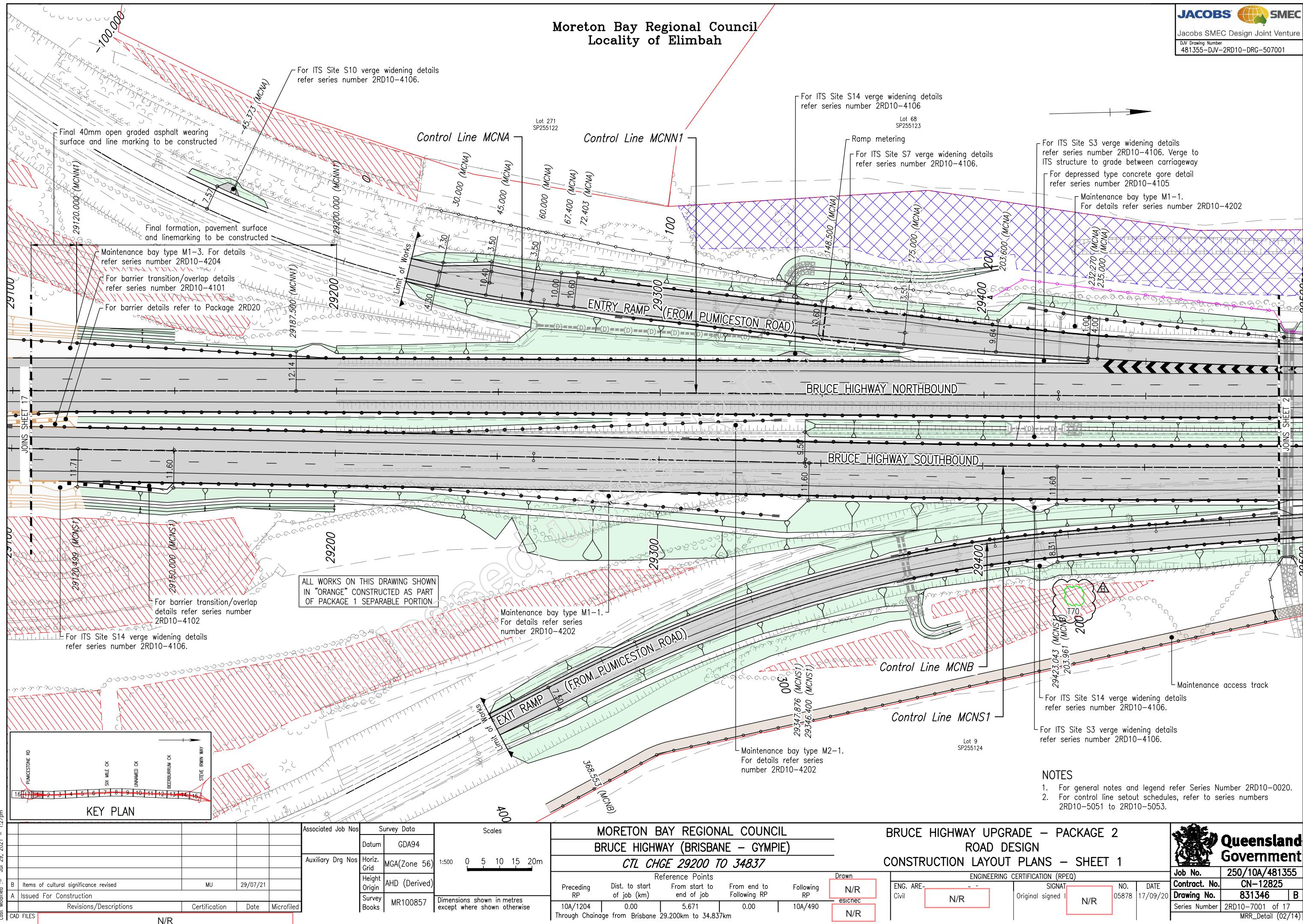
SIGNED: TITLE: DATE:

LOCALITY PLAN
Not to Scale

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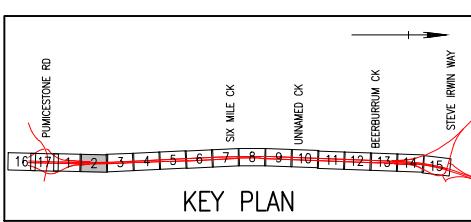
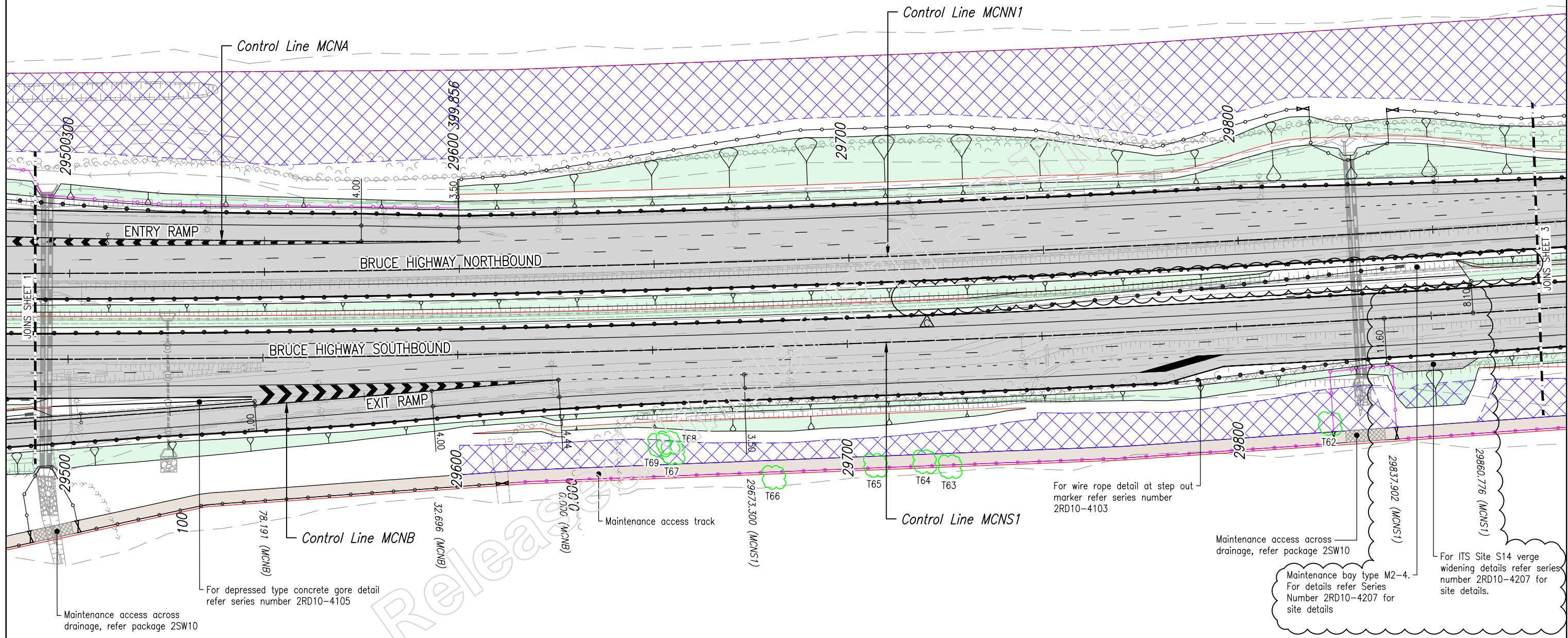
Moreton Bay Regional Council
Locality of Elimbah

JACOBS SMEC
Jacobs SMEC Design Joint Venture
DJV Drawing Number
481355-DJV-2RD10-DRG-507001



Moreton Bay Regional Council
Locality of Elimbah

Lot 68
SP255123



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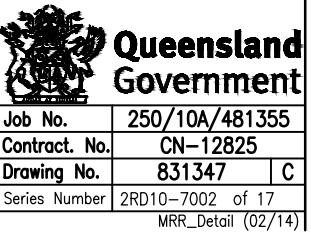
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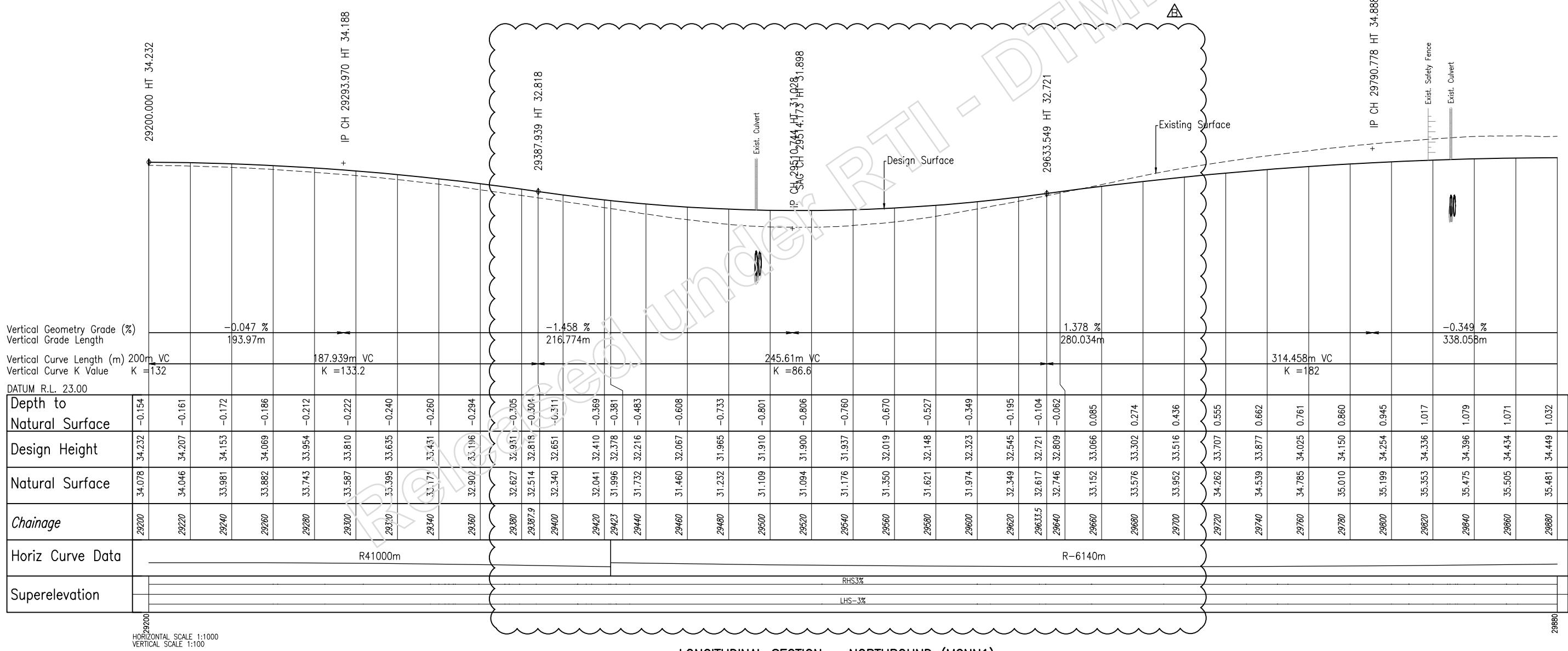
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MORETON BAY REGIONAL COUNCIL				
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Dimensions shown in metres except where shown otherwise				
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BRUCE HIGHWAY UPGRADE – PACKAGE 2
ROAD DESIGN
CONSTRUCTION LAYOUT PLANS – SHEET 2

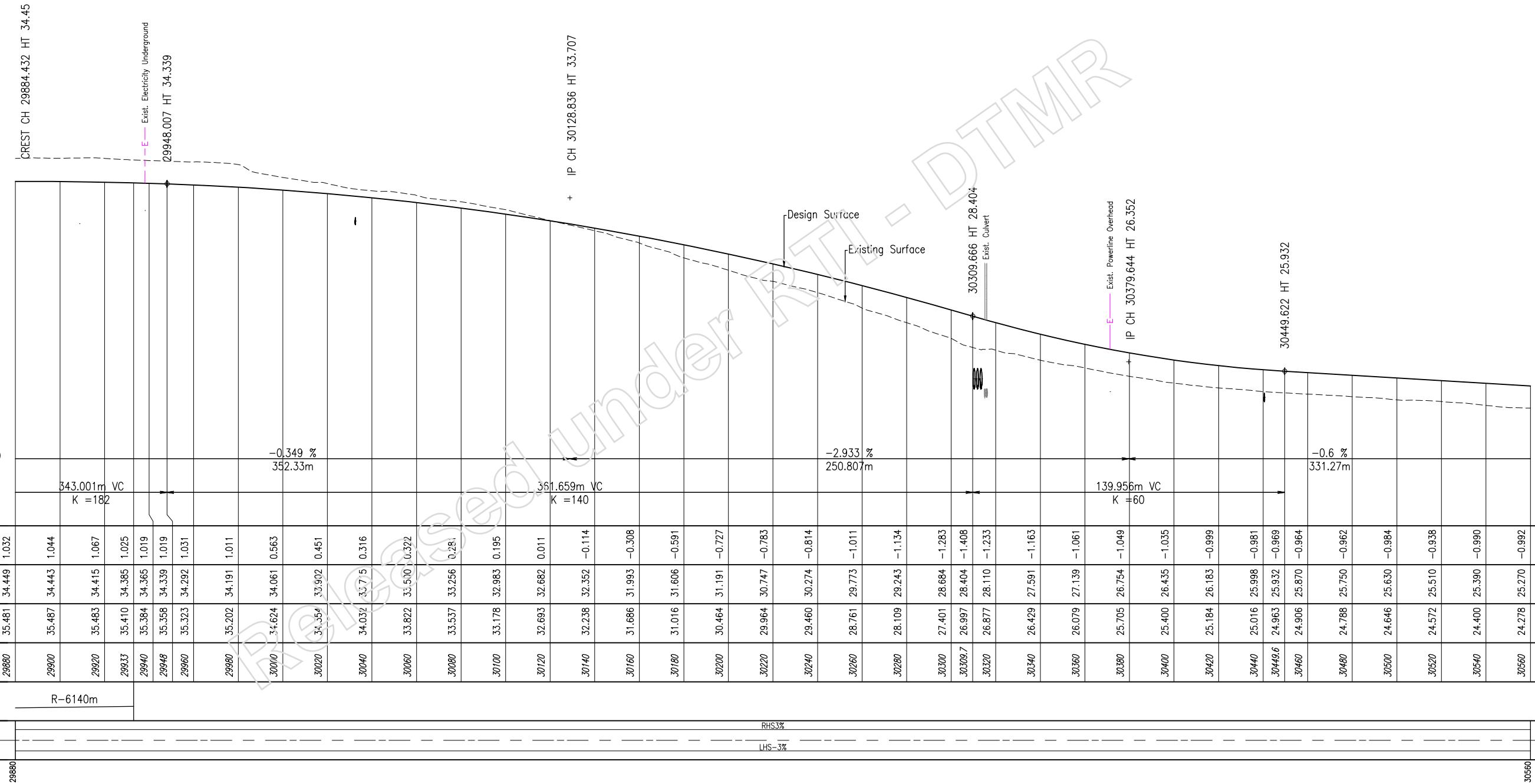
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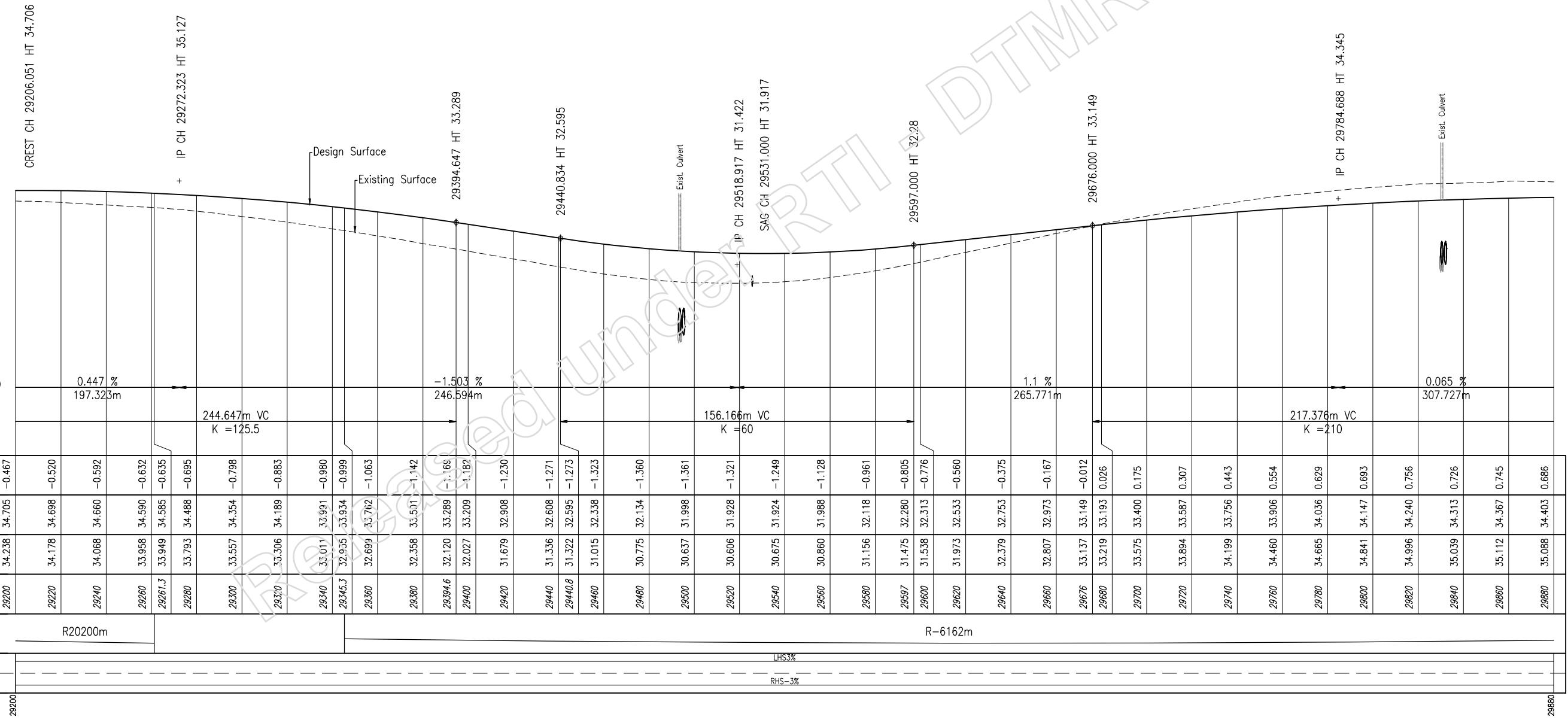
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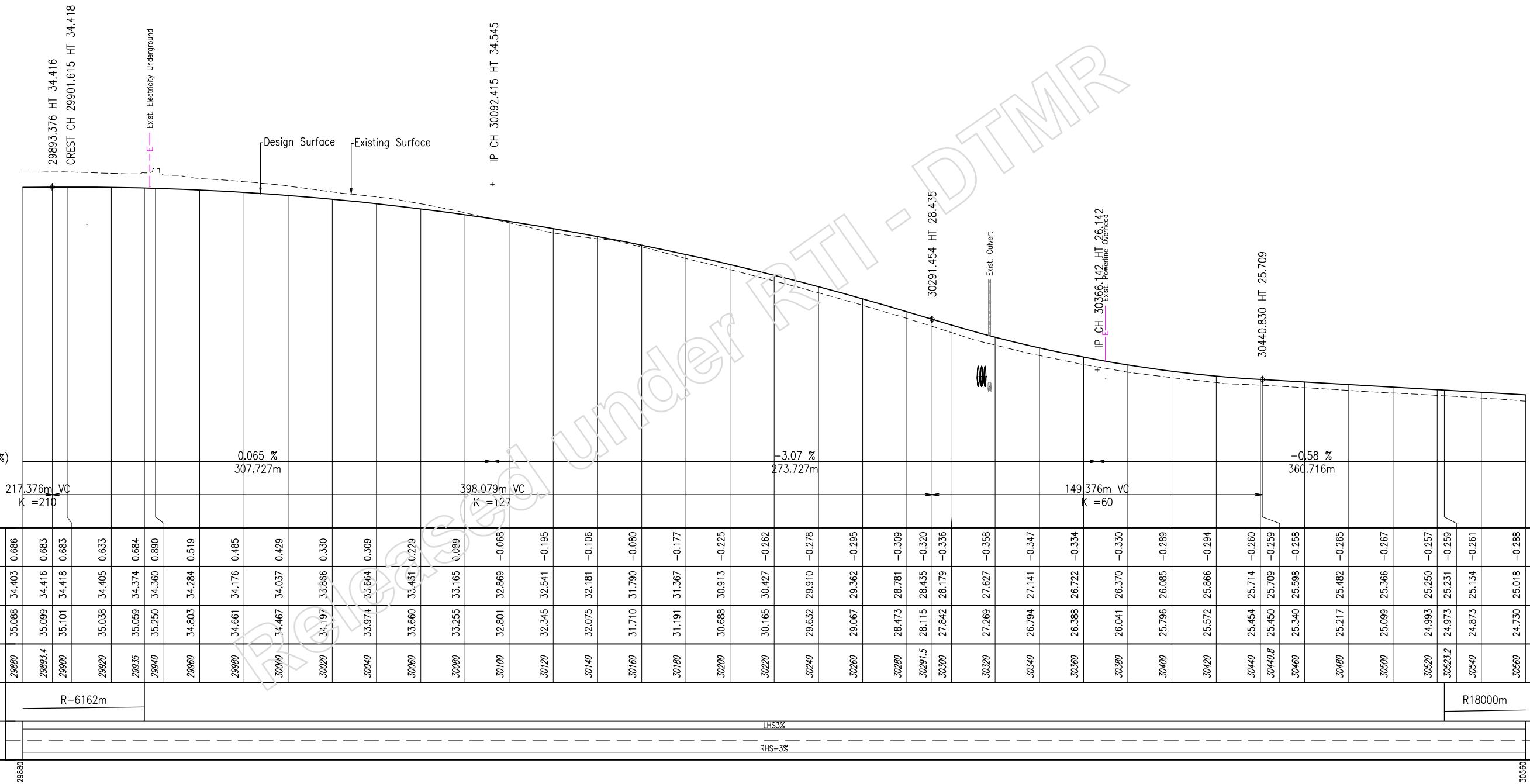
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															MRR_Detail (02/14)							
Last Modified :- Apr 15, 2020 - 8:34am																						



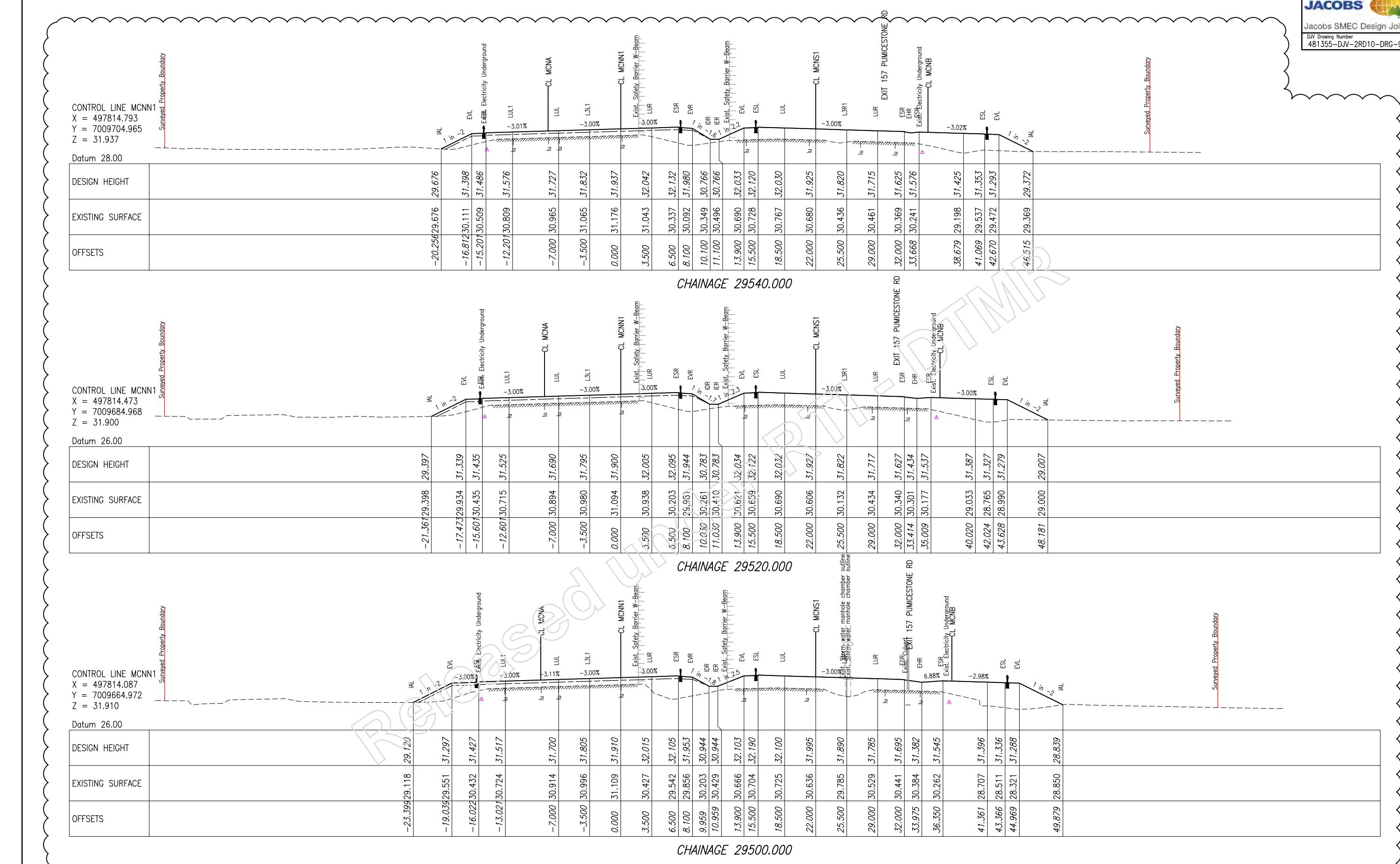
LONGITUDINAL SECTION - SOUTHBOUND (MCNS1)

		Associated Job Nos		Survey Data		Scales Horz 0 10 20 30 40m Vert 0 1 2 3 4m	MORETON BAY REGIONAL COUNCIL				BRUCE HIGHWAY UPGRADE - PACKAGE 2				ROAD DESIGN				QUEENSLAND GOVERNMENT													
		Datum	GDA94	Auxiliary Drg Nos	Horiz. Grid	MGA(Zone 56)	BRUCE HIGHWAY (BRISBANE - GYMPIE)				CTL CHGE 29200 TO 34837				LONGITUDINAL SECTION MCNS1 - SHEET 1				ENGINEERING CERTIFICATION (RPEQ)													
		Height Origin	AHD (Derived)	Survey Books	MR100857	Dimensions shown in metres except where shown otherwise				Preceding RP	Dist. to start of job (km)	From start to end of job	From end to Following RP	Following RP	Drawn N/R Designed N/R	29660 32.807 32.973 -0.167	29676 33.137 33.149 -0.012	29680 33.219 33.193 0.028	29700 33.575 33.400 0.175	29720 33.894 33.587 0.307	29740 34.199 33.756 0.443	29760 34.460 33.906 0.554	29780 34.665 34.036 0.629	29800 34.841 34.147 0.693	29820 34.996 34.240 0.756	29840 35.039 34.313 0.726	29860 35.112 34.367 0.745	29880 35.088 34.403 0.686	Job No. 250/10A/481355	Contract. No. CN-12825	Drawing No. 831397 A	Series Number 2RD10-6031 of 9
Last Modified :- Apr 15, 2020 - 8:36am		Issued For Construction		Revisions/Descriptions		Certification		Date		Microfiled		N/R		N/R		N/R		N/R		N/R		N/R		MRR_Detail (02/14)								

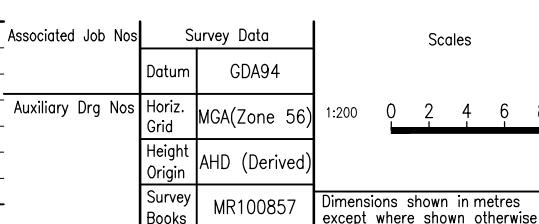


LONGITUDINAL SECTION - SOUTHBOUND (MCNS1)

		Associated Job Nos		Survey Data		MORETON BAY REGIONAL COUNCIL				BRUCE HIGHWAY UPGRADE - PACKAGE 2												
		Datum	GDA94			Horz	0	10	20	30	40	ROAD DESIGN				Queensland Government						
		Auxiliary Drg Nos	Horiz. Grid	MGA(Zone 56)		Vert	0	1	2	3	4m	LONGITUDINAL SECTION MCNS1 - SHEET 2				Job No.	250/10A/481355					
		Height Origin	AHD (Derived)			Survey Books	MR100857	Dimensions shown in metres				Reference Points				Drawn	Engineering Certification (RPEQ)	Contract. No.	CN-12825			
A	Issued For Construction											Preceding RP	Dist. to start of job (km)	From start to end of job	From end to Following RP	Following RP	N/R	ENG. AREA	NAME	SIGNATURE	NO.	DATE
	Revisions Descriptions	Certification	Date	Microfiled								10A/1204	0.00	5.671	0.00	10A/490	-Designed	Civil	N/R	Original signed by	N/R	05878
CAD FILES		NR										Through Chainage from Brisbane	29.200km to 34.837km			N/R						
		NR																				



Associated Job Nos			Survey Data	
			Datum	GDA94
Auxiliary Drg Nos			Horiz. Grid	MGA(Zone 56)
B Sag lifted	Mark Ullman RPEQ 08505 Civil	06.04.2023	Height Origin	AHD (Derived)
A Issued For Construction			Survey Books	MR100857
Revisions/Descriptions			Certification	
N/R			Date	Microfiled



MORETON BAY REGIONAL COUNCIL
BRUCE HIGHWAY (BRISBANE - GYMPIE)

CTL CHGE 29200 TO 34837

Preceding RP	Dist. to start of job (km)	From start to end of job	From end to Following RP	Following RP
10A/1204	0.00	5.671	0.00	10A/490
Through Chainage from Brisbane 29.200km to 34.837km				

BRUCE HIGHWAY UPGRADE - PACKAGE 2
ROAD DESIGN
ANNOTATED CROSS SECTIONS MCNN1 - SHEET 6

ENG. AREA	NAME	SIGNATU	NO.	DATE
Civil	N/R	Original signed by	N/R	05878 17.09.2020

Job No.	250/10A/481355
Contract. No.	CN-12825
Drawing No.	831417 B
Series Number	2RD10-9006 of 115
	MRR_Detail (02/14)

CONTROL LINE MCNN1
X = 497815.363
Y = 7009764.962
Z = 32.323

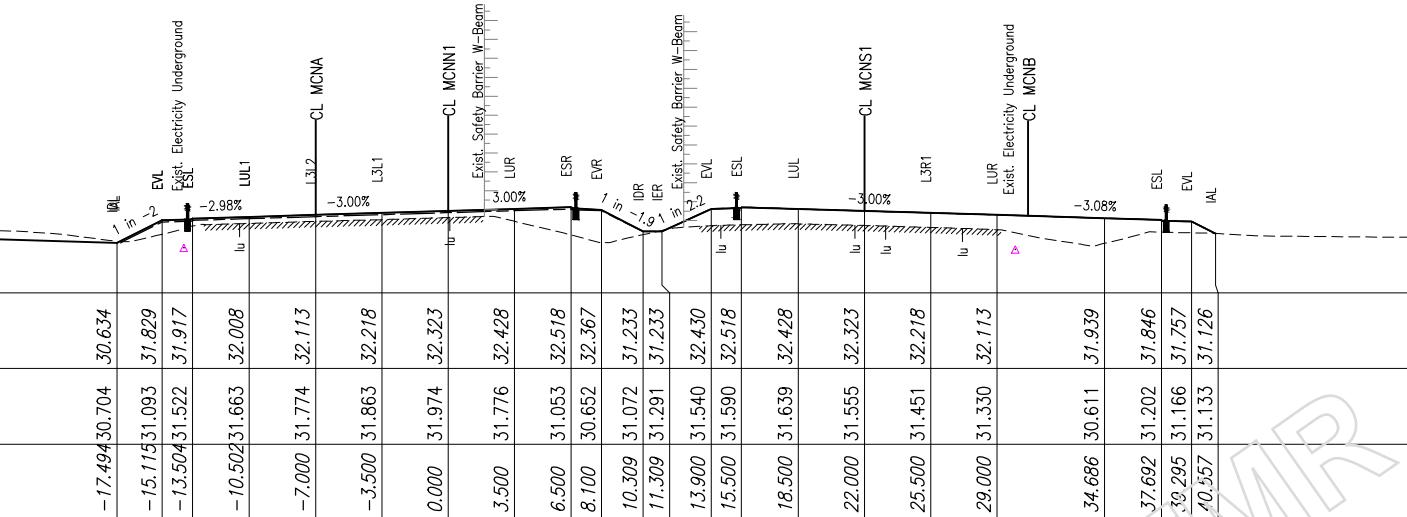
Datum 28.00

DESIGN HEIGHT	
EXISTING SURFACE	
OFFSETS	

Surveyed Property Boundary

-32.80431.161 31.161

ALC



Surveyed Property Boundary

CONTROL LINE MCNN1
X = 497815.238
Y = 7009744.963
Z = 32.148

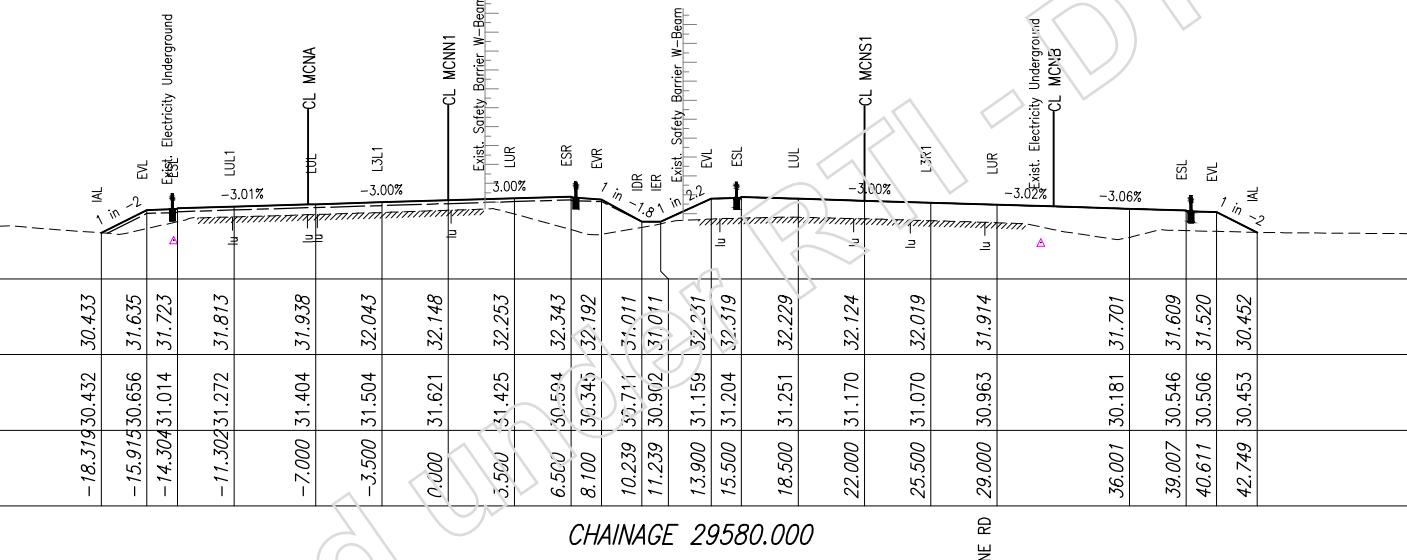
Datum 28.00

DESIGN HEIGHT	
EXISTING SURFACE	
OFFSETS	

Surveyed Property Boundary

-32.80431.161 31.161

ALC



Surveyed Property Boundary

CONTROL LINE MCNN1
X = 497815.048
Y = 7009724.964
Z = 32.019

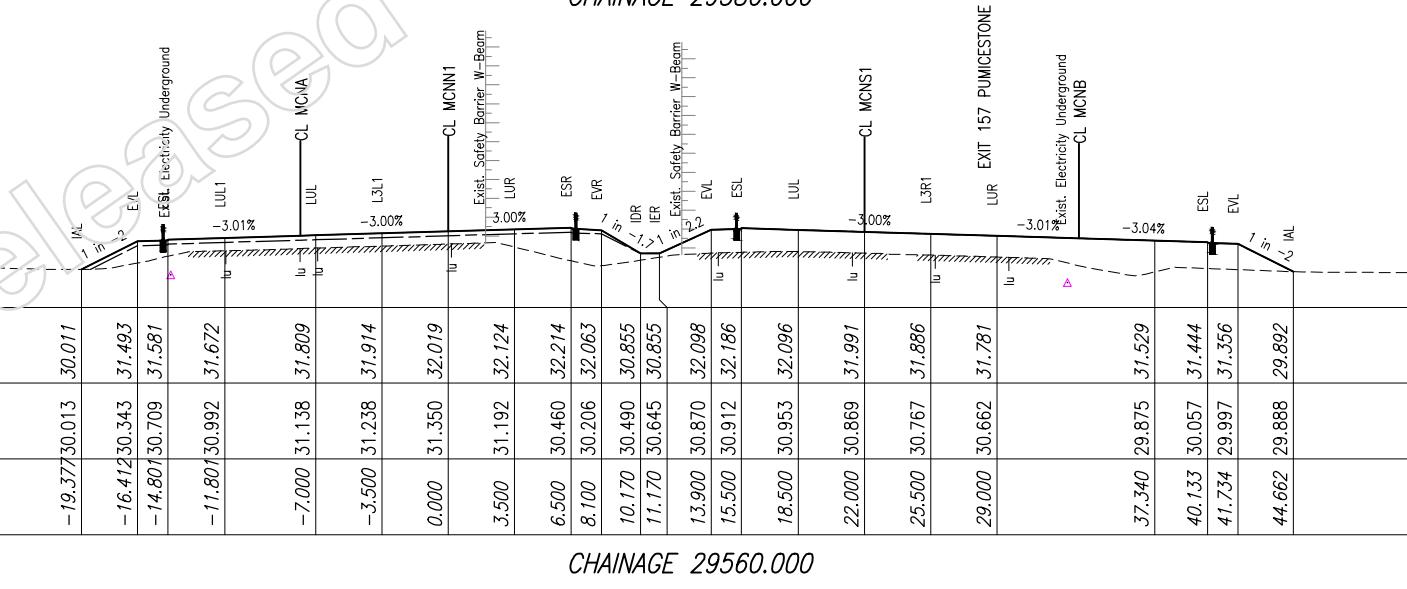
Datum 28.00

DESIGN HEIGHT	
EXISTING SURFACE	
OFFSETS	

Surveyed Property Boundary

-32.80431.161 31.161

ALC



Surveyed Property Boundary

Associated Job Nos	Survey Data
Datum	GDA94
Horiz. Grid	MGA(Zone 56)
Height Origin	AHD (Derived)
Survey Books	MR100857

Dimensions shown in metres
except where shown otherwise

1:200 0 2 4 6 8m

Preceding RP
Dist. to start of job (km)
From start to end of job
Through Chainage from Brisbane 29.200km to 34.837km

10A/1204 0.00 5.671 0.00 10A/490

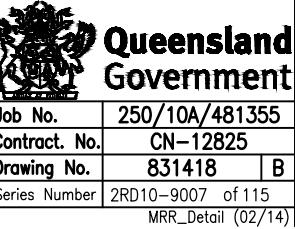
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39.007 30.546 31.609
40.611 30.506 31.520
42.749 30.453 30.452N/R
N/R
N/R
N/R

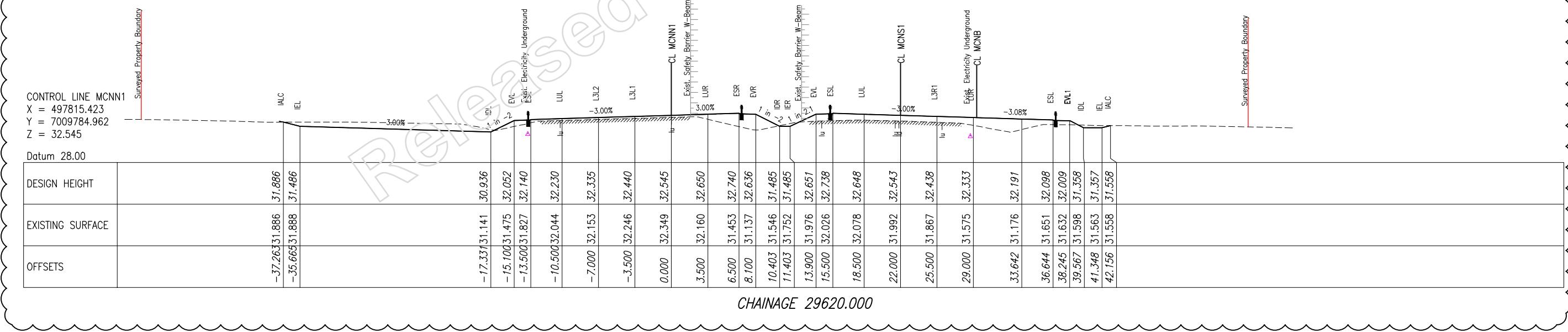
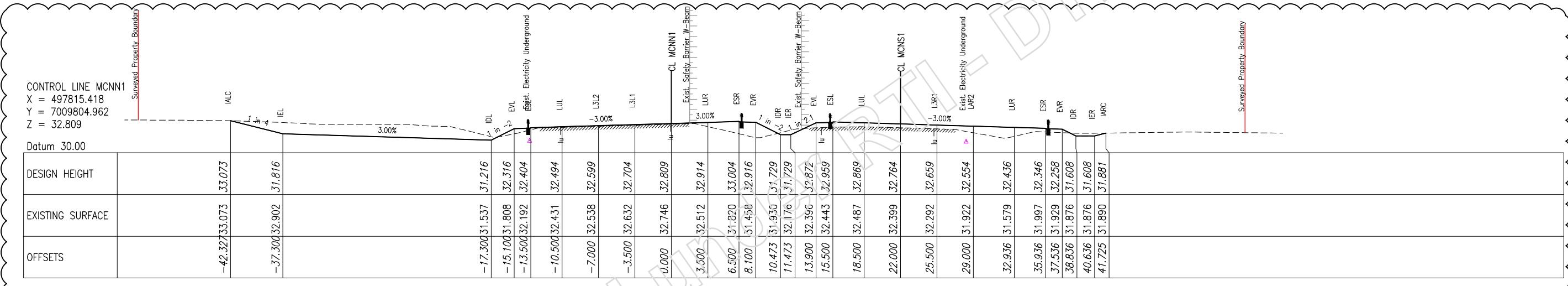
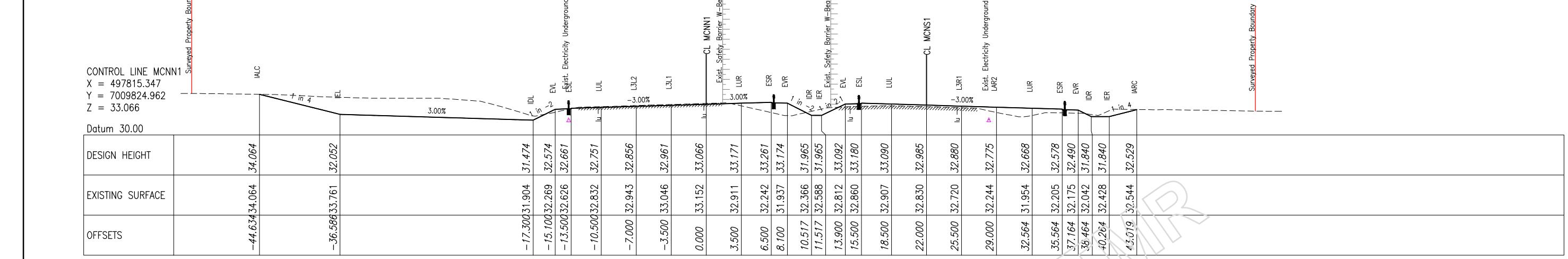
MORETON BAY REGIONAL COUNCIL
BRUCE HIGHWAY (BRISBANE - GYMPIE)
CTL CHGE 29200 TO 34837

Reference Points
From start to end of job
From end to Following RP
Following RP
Drawn
Designed
N/R
N/R

BRUCE HIGHWAY UPGRADE - PACKAGE 2
ROAD DESIGN
ANNOTATED CROSS SECTIONS MCNN1 - SHEET 7

Engineering Certification (RPEQ)
ENG. AREA Civil SIGNATU Original signed by N/R NO. 05878 DATE 17.09.2020
Contract. No. CN-12825
Drawing No. 831418 B
Series Number 2RD10-9007 of 115 MRR_Detail (02/14)





		Associated Job Nos		Survey Data	
		Auxiliary Drg Nos		Datum	GDA94
B	Sag lifted	Horiz. Grid	MGA(Zone 56)		
A	Issued For Construction	Height Origin	AHD (Derived)		
		Survey Books	MR100857		

Mark Ultman RPEQ 08505 Civil 06.04.2023

N/R

Scales
1:200 0 2 4 6 8m
Dimensions shown in metres
except where shown otherwise

MORETON BAY REGIONAL COUNCIL BRUCE HIGHWAY (BRISBANE - GYMPIE)

CTL CHGE 29200 TO 34837

BRUCE HIGHWAY UPGRADE – PACKAGE 2 ROAD DESIGN ANNOTATED CROSS SECTIONS MCNN1 – SHEET 8

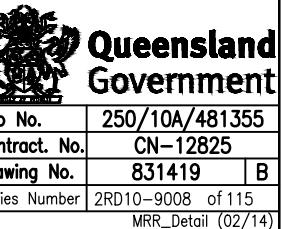
ENGINEERING CERTIFICATION (RPEQ)

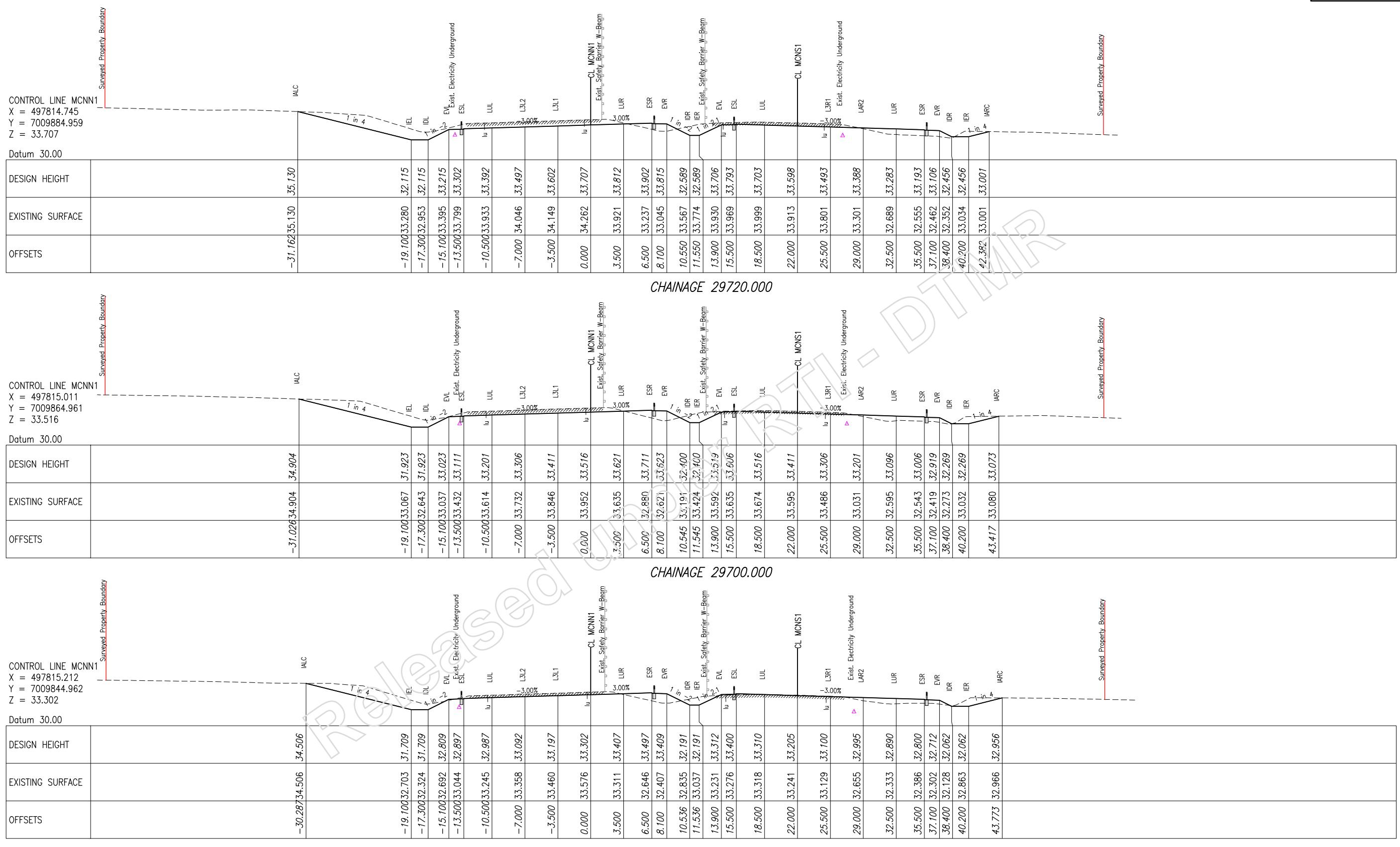
Preceding RP Dist. to start of job (km) From start to end of job From end to Following RP
10A/1204 0.00 5.671 0.00 10A/490

N/R
Designed
N/R

ENG. AREA N/R
Civil N/R
Original signed by N/R

NO. 05878 DATE 17.09.2020
Contract. No. CN-12825
Drawing No. 831419 B
Series Number 2RD10-9008 of 115
MRR_Detail (02/14)





MORETON BAY REGIONAL COUNCIL
BRUCE HIGHWAY (BRISBANE - GYMPIE)

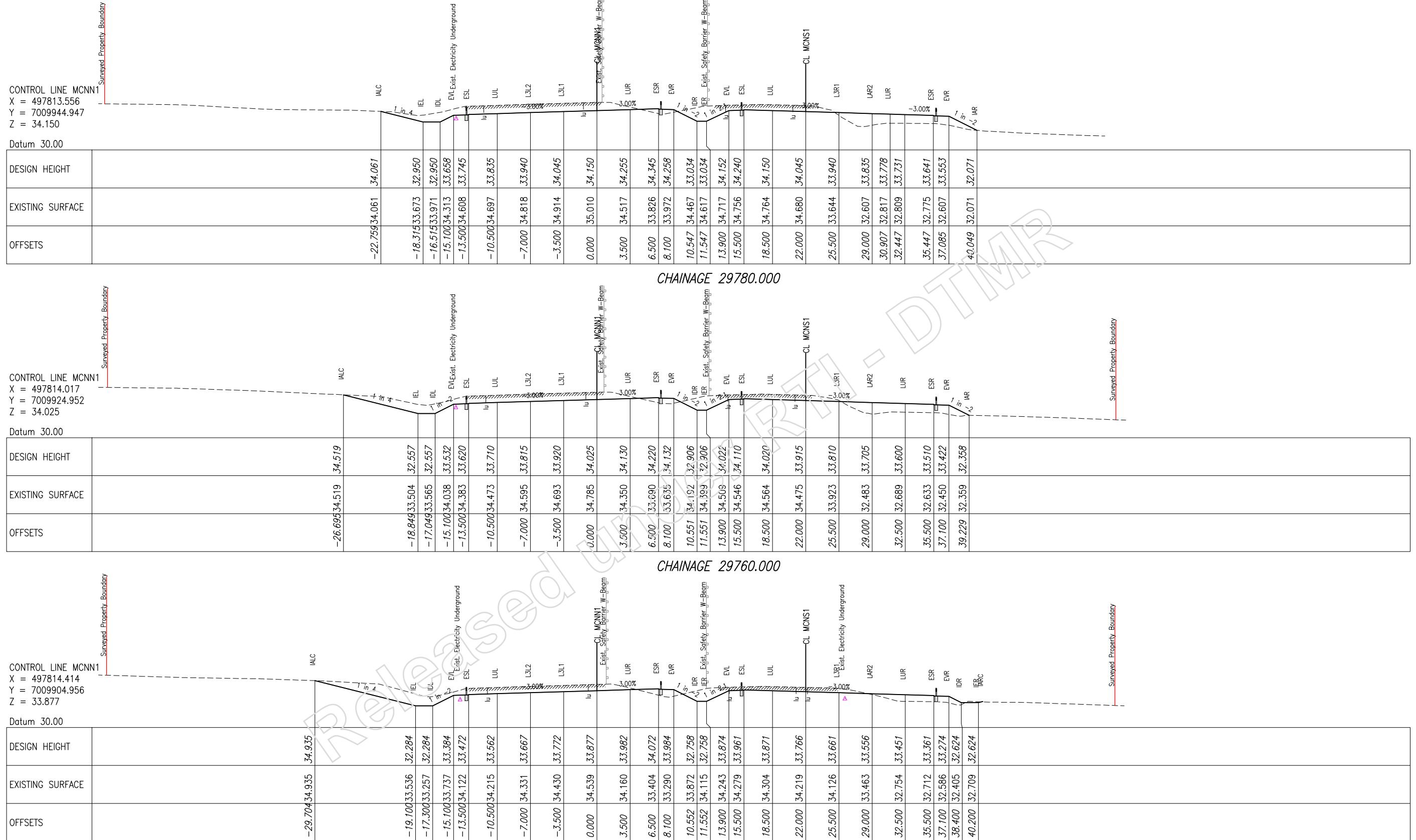
CTL CHGE 29200 TO 34837

Preceding RP	Dist. to start of job (km)	From start to end of job	From end to Following RP	Following RP	Drawn
10A/1204	0.00	Through Chainage from Brisbane 29.200km to 34.837km	5.671	10A/490	N/R esicnec

BRUCE HIGHWAY UPGRADE - PACKAGE 2
ROAD DESIGN
ANNOTATED CROSS SECTIONS MCNN1 - SHEET 9

ENG. AREA	NAME	SIGNATU	NO.	DATE
Civil	N/R	Original signed by	N/R	5878

Queensland Government



				Associated Job Nos	Survey Data		Scales
Survey Data		Datum	GDA94				
				Auxiliary Drg Nos	Horiz. Grid	MGA(Zone 56)	
				Height Origin	AHD (Derived)		
				Survey Books	MR100857		
A Issued For Construction	Revisions/Descriptions	Certification	Date	Dimensions shown in metres	except where shown otherwise		
CAD FILES	N/R						

MORETON BAY REGIONAL COUNCIL
BRUCE HIGHWAY (BRISBANE - GYMPIE)
CTL CHGE 29200 TO 34837

Preceding RP 10A/1204 Dist. to start of job (km) 0.00 From start to end of job 5.671 From end to Following RP 0.00 Following RP 10A/490

Through Chainage from Brisbane 29.200km to 34.837km

Drawn N/R N/R

BRUCE HIGHWAY UPGRADE - PACKAGE 2
ROAD DESIGN
ANNOTATED CROSS SECTIONS MCNN1 - SHEET 10

Engineering Certification (RPEQ)
ENG. AREA NAME SIGNAT NO. DATE
Civil N/R N/R 5878

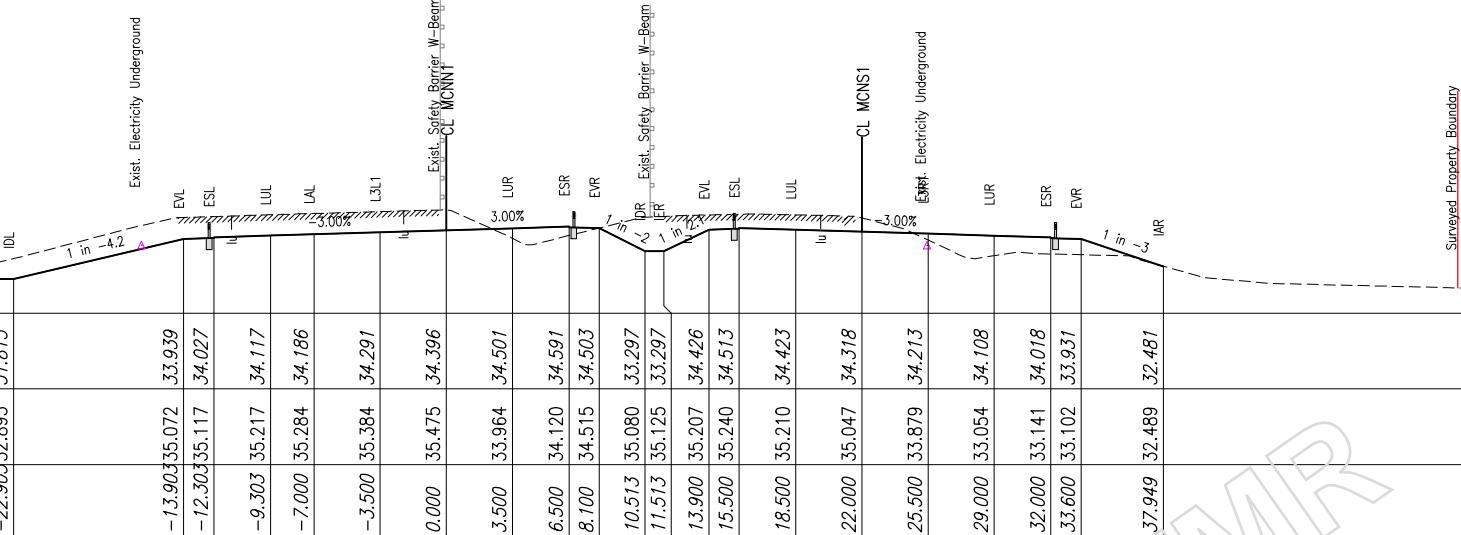
Queensland Government
Job No. 250/10A/481355
Contract. No. CN-12825
Drawing No. 831421 A
Series Number 2RD10-9010 of 115
MRR_Detail (02/14)

CONTROL LINE MCNN1
X = 497811.781
Y = 7010004.920
Z = 34.396

Datum 30.00

DESIGN HEIGHT	
EXISTING SURFACE	
OFFSETS	

-30.82233.232 33.232 IALC
-29.04032.899 32.899 IALC
-24.70332.661 31.815 IEL
-22.90332.893 31.815 IDL



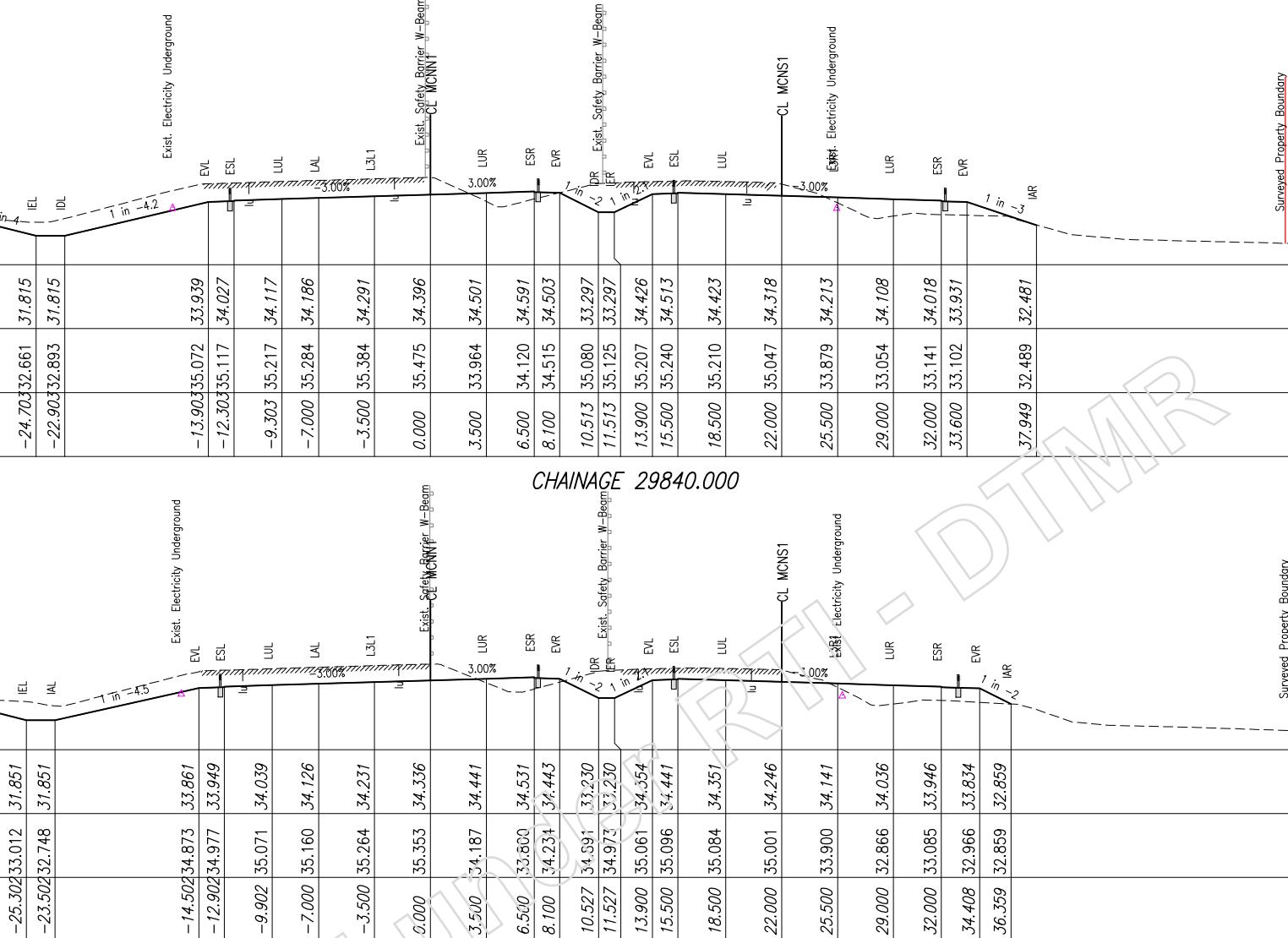
CHAINAGE 29840.000

CONTROL LINE MCNN1
X = 497812.438
Y = 7009984.931
Z = 34.336

Datum 30.00

DESIGN HEIGHT	
EXISTING SURFACE	
OFFSETS	

-26.60833.525 33.525 IALC
-22.10833.518 32.400 IEL
-20.30833.456 32.400 ESL
-15.10034.561 33.767 Existing Electricity Underground
-13.50034.811 33.849 ESL
-10.50034.909 33.939 LUL
-7.00035.017 34.044 LAL
-3.50035.110 34.149 L3.1
0.00035.199 34.254 L3.1



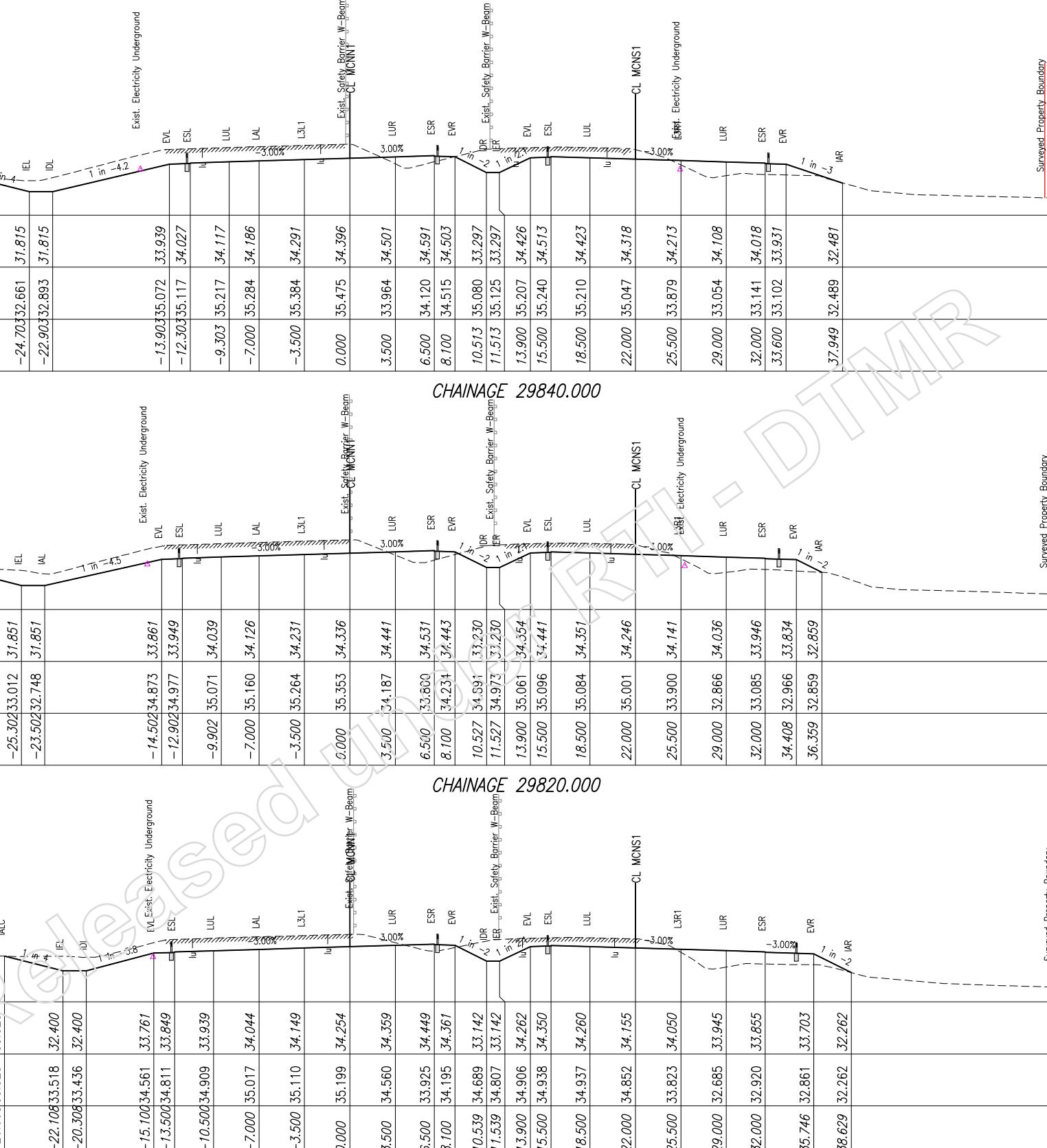
CHAINAGE 29820.000

CONTROL LINE MCNN1
X = 497813.030
Y = 7009964.940
Z = 34.254

Datum 30.00

DESIGN HEIGHT	
EXISTING SURFACE	
OFFSETS	

-26.60833.525 33.525 IALC
-22.10833.518 32.400 IEL
-20.30833.456 32.400 ESL
-15.10034.561 33.767 Existing Electricity Underground
-13.50034.811 33.849 ESL
-10.50034.909 33.939 LUL
-7.00035.017 34.044 LAL
-3.50035.110 34.149 L3.1
0.00035.199 34.254 L3.1



CHAINAGE 29800.000

MORETON BAY REGIONAL COUNCIL

BRUCE HIGHWAY (BRISBANE - GYMPIE)

CTL CHGE 29200 TO 34837

Reference Points

Preceding RP	Dist. to start of job (km)	From start to end of job	From end to Following RP	Following RP
10A/1204	0.00	5.671	0.00	10A/490
Through Chainage from Brisbane 29.200km to 34.837km				

BRUCE HIGHWAY UPGRADE - PACKAGE 2

ROAD DESIGN

ANNOTATED CROSS SECTIONS MCNN1 - SHEET 11

ENGINEERING CERTIFICATION (RPEQ)

ENG. AREA Civil	NAME N/R	SIGNATUP N/R	NO. 5878	DATE
Original signed by N/R				

LEGEND:**GENERAL**

- Existing property boundary
- Retaining wall
- Extent of works
- Single slope concrete barrier
- Wire rope safety barrier
- W-beam guardrail and terminals
- Thrie beam guardrail
- Proposed fauna fence
- Proposed gate
- 50.0 Design contours – major
- Design contours – minor

DRAINAGE**Existing**

- Existing drainage culvert to remain
- Existing drainage pit to remain
- Existing drainage pit to be sealed UNO
- Removal of drainage including end structures and pits UNO
- Existing drainage pipe to remain
- Existing drain to remain
- Existing drainage access chamber to remain
- Existing drainage access chamber to be sealed UNO
- Existing headwall to remain
- Existing headwall to be removed
- Existing structure label

1/1A

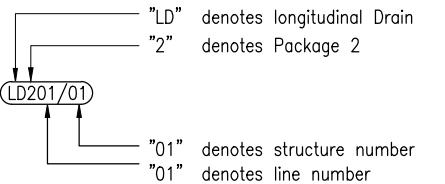
DRAINAGE**Proposed**

- C.D. Catch Bank (Type 3G)
- B.D. Grassed Lined Bund Drain (Type 4G)
- Grass Lined Drain (Type 1G)
- Grass Lined Drain (Type 2G)
- Grass Lined Drain with Concrete Invert (Type 2D)
- Concrete Lined Drain (Type 2C)
- Concrete Lined Drain (Type 1C)
- Rock Lined Drain (Type 1R)
- Grass Lined Channel with Berm (Type 5G)
- Grated Drain
- Batter Chute
- Shaped Concrete Channel
- AC Shoulder Dyke
- Diversion channel
- TMR Type 28 channel
- TMR Type 3 channel
- Existing Channel – Reshaped
- Drainage pipe – Longitudinal (Ø375 UNO)
- Transverse – Culvert
- Headwall
- Drainage access chamber
- Drainage gully
- Standing water level
- Scour protection (rock protection)
- Scour protection (steel-wire mattress)
- Bund
- Water Quality Basin
- Water Quality Catchment Area
- Longitudinal Catchment Area
- Transverse Catchment Area

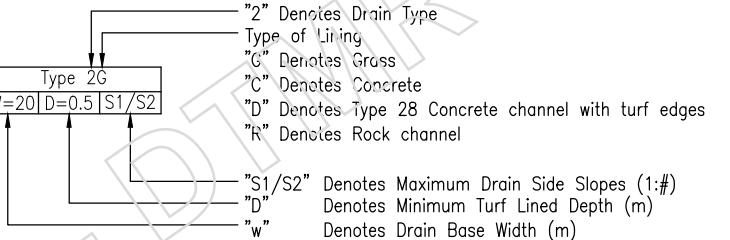
TYPICAL LABEL DESCRIPTIONS

(as specified on plan and DRAINAGE schedule)

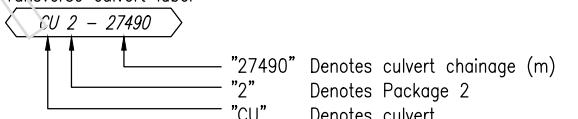
Longitudinal Drainage structure label



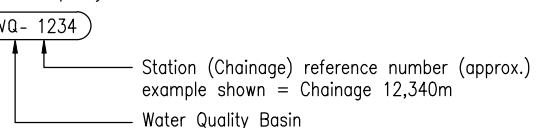
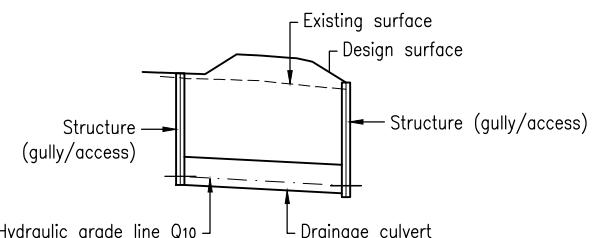
Drain label



Transverse culvert label



Water quality label

**LONGITUDINAL SECTION LEGEND**

				Associated Job Nos	Survey Data	Scales 1:500 0 5 10 15 20m
				Auxiliary Drg Nos	Datum GDA94	
				Horiz. Grid	MGA(Zone 56)	
				Height Origin	AHD (Derived)	
A Issued For Construction	Revisions/Descriptions	Certification	Date	Survey Books	MR100857	Dimensions shown in metres except where shown otherwise

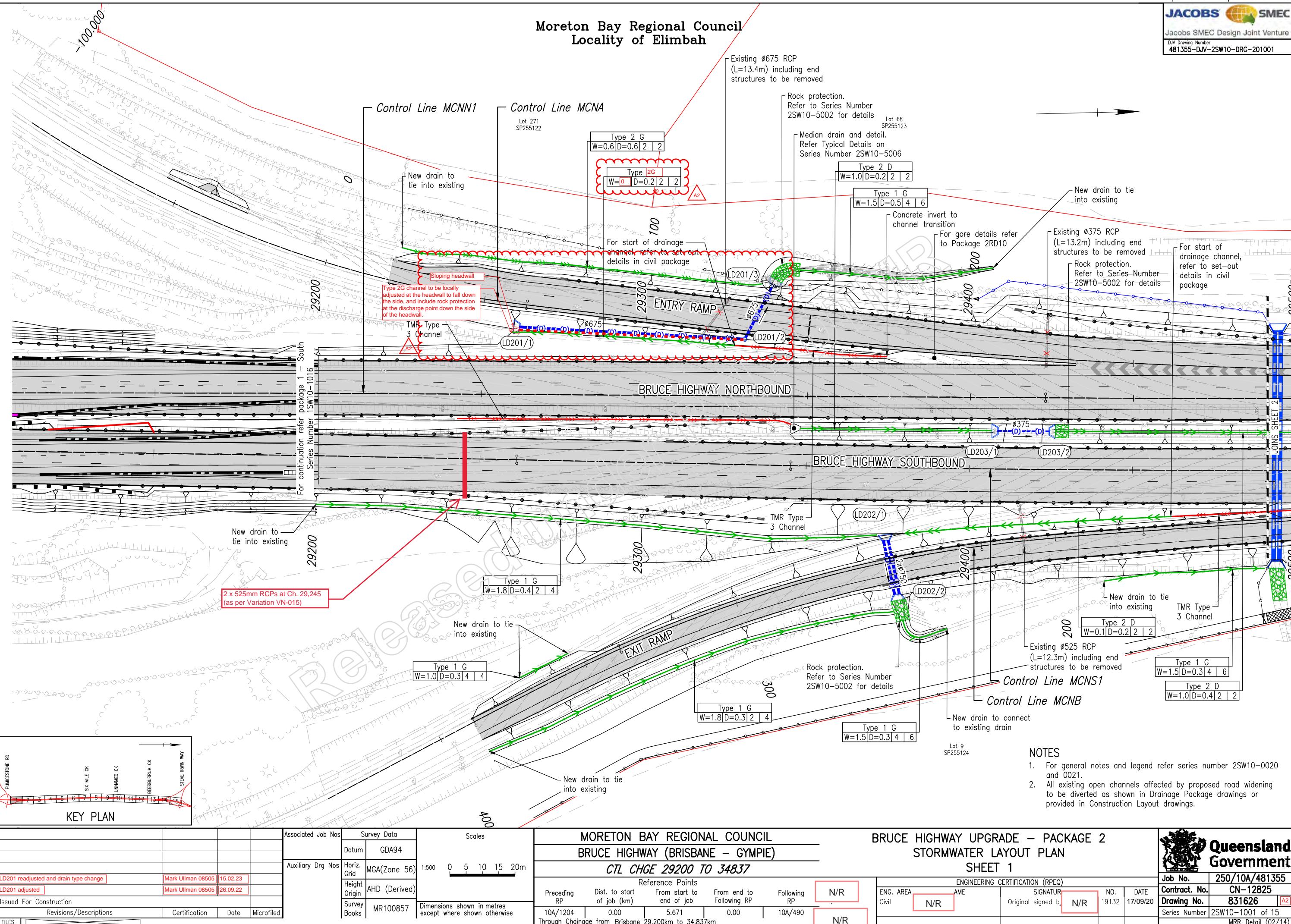
CAD FILES

MRR_Detail (02/14)

MORETON BAY REGIONAL COUNCIL						BRUCE HIGHWAY UPGRADE – PACKAGE 2				
BRUCE HIGHWAY (BRISBANE – GYMPIE)						STORMWATER				
CTL CHGE 29200 TO 34837						GENERAL NOTES AND LEGEND – SHEET 2				
Preceding RP	Dist. to start of job (km)	From start to end of job	From end to Following RP	Following RP	Drawn N/R Described N/R	ENG. AREA Civil	ME N/R	SIGNATU Original signed N/R	NO. 19132	DATE
10A/1204	0.00	5.671	0.00	10A/490						
Through Chainage from Brisbane 29.200km to 34.837km										

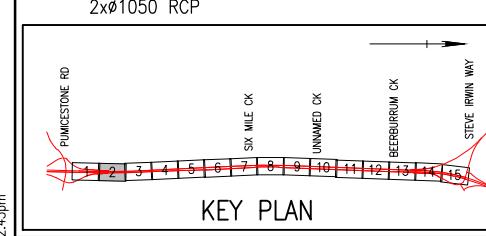
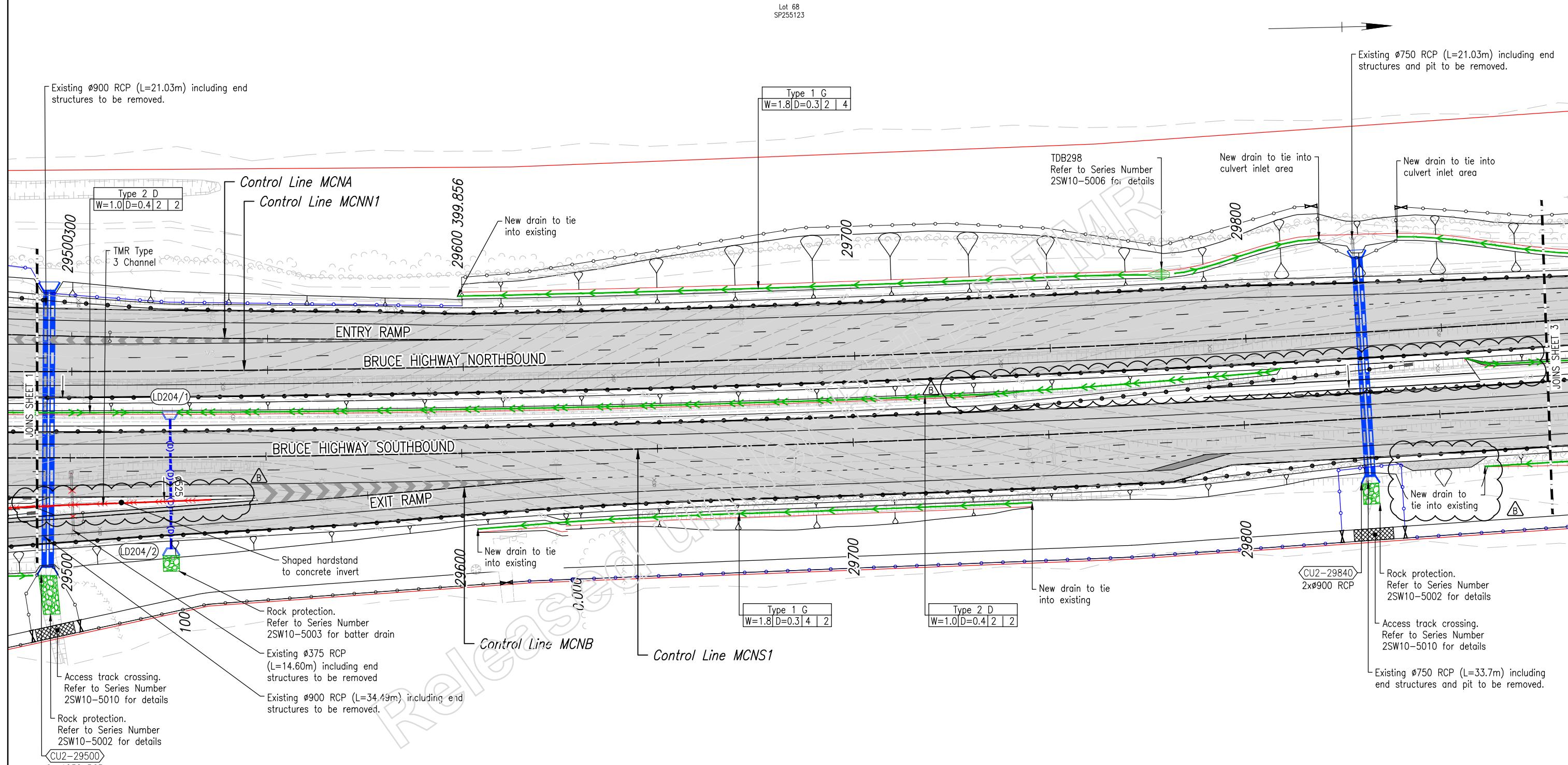
Queensland Government

Moreton Bay Regional Council
Locality of Elimbah



Moreton Bay Regional Council
Locality of Elimbah

Lot 68
SP255123



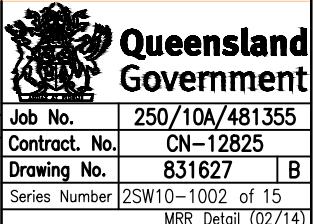
Modified: May 12, 2022 - 12:43pm

Associated Job Nos		Survey Data		Scales			
		Datum	GDA94	1:500	0	5	10
Auxiliary Drg Nos		Horiz. Grid	MGA(Zone 56)	15	20m		
Height Origin	AHD (Derived)	Survey Books	MR100857	Dimensions shown in metres except where shown otherwise			
B	P2P Site amended	Mark Ullman	08505	12/05/22			
A	Issued For Construction						
	Revisions/Descriptions	Certification	Date	Microfiled	N/R		
	CAD FILES						

MORETON BAY REGIONAL COUNCIL
BRUCE HIGHWAY (BRISBANE - GYMPIE)
CTL CHGE 29200 TO 34837
Reference Points
Preceding RP Dist. to start of job (km) From start to end of job From end to Following RP Drawn
10A/1204 0.00 5.671 0.00 N/R
Dimensions shown in metres except where shown otherwise
Through Chainage from Brisbane 29.200km to 34.837km

BRUCE HIGHWAY UPGRADE - PACKAGE 2
STORMWATER LAYOUT PLAN
SHEET 2

Engineering Certification (RPEQ)
Job No. 250/10A/481355
Contract. No. CN-12825
Drawing No. 831627 B
Series Number 2SW10-1002 of 15
MRR_Detail (02/14)



NOTES

- All pipes shall be exposure classification 'N' unless noted otherwise.
- All pipelines with the pipe class shown have been reviewed in accordance with MRTS25. All pipelines have limiting Load Case compliance during construction so suitable construction processes will need to be employed to limit the impact loading from construction traffic. For all pipelines located underneath the highway traffic lanes, the load case limit is a truck and dog at the subgrade level prior to the pavement construction. For all pipelines outside the highway traffic lanes including barrier locations and central median, no construction traffic has been allowed for in the pipe class compliance. If using different or heavier equipment, the contractor shall ascertain the required pipe class for their construction methodology or modify their processes accordingly. The contractor shall be responsible for any additional costs incurred as a result.

PIPE SIZE (mm)
PIPE CLASS
PIPE GRADE (%)
PIPE SLOPE (1 in X)
PIPE MAX VELOCITY (m/s)

DATUM RL 18.0

PIPE FLOW (Cumecs)

H.G.L IN PIPE & W.S.E IN STRUCTURE

DEPTH TO INVERT

INVERT LEVEL OF DRAIN

REFERENCE LEVEL

REFERENCE POINT

CHAINAGE

LINE LD201

LD202

LD203

LD204

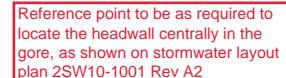
LD205

LD206

LD207

LD208

Reference point to be as required to locate the headwall centrally in the gore, as shown on stormwater layout plan 2SW10-1001 Rev A2



LD201

LD202

LD203

LD204

LD205

LD206

LD207

LD208

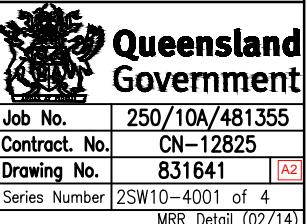
A2	LD201 readjusted and drain type change	Mark Ullman 08505	15.02.23	
A1	LD201 adjusted	Mark Ullman 08505	26.09.22	
A	Issued For Construction			
	Revisions/Descriptions	Certification	Date	Microfiled

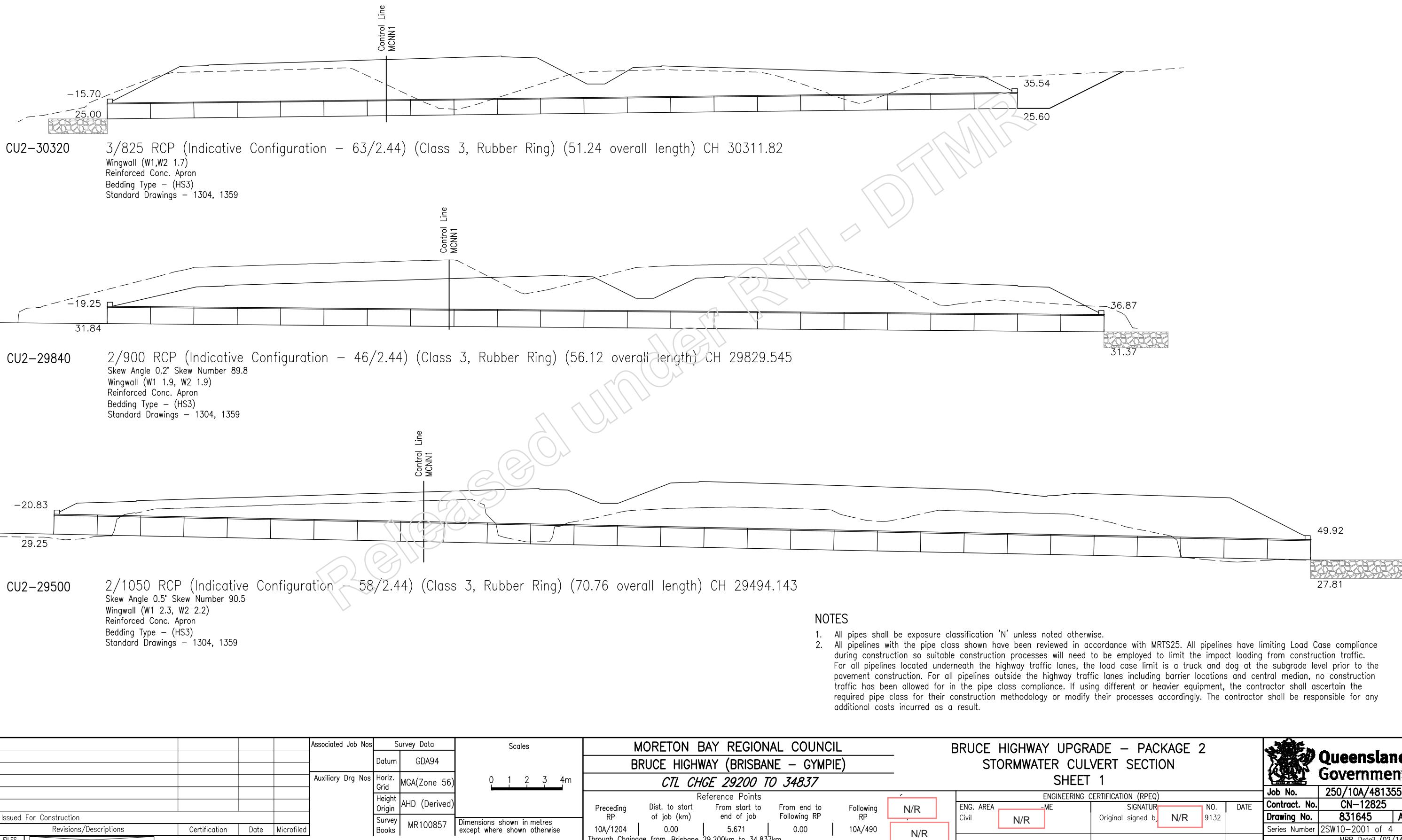
Associated Job Nos	Survey Data		Scales
	Datum	GDA94	
Auxiliary Drg Nos	Horiz. Grid	MGA(Zone 56)	0 10 20 30 40m
	Height Origin	AHD (Derived)	0 1 2 3 4m
	Survey Books	MR100857	Vert

Dimensions shown in metres
except where shown otherwise

MORETON BAY REGIONAL COUNCIL
BRUCE HIGHWAY (BRISBANE - GYMPIE)
CTL CHGE 29200 TO 34837
Reference Points
Preceding RP Dist. to start of job (km) From start to end of job From end to Following RP Following RP N/R
10A/1204 0.00 5.671 0.00 10A/490 N/R
Through Chainage from Brisbane 29.200km to 34.837km

BRUCE HIGHWAY UPGRADE – PACKAGE 2
STORMWATER LONGITUDINAL SECTIONS
SHEET 1
ENGINEERING CERTIFICATION (RPEO)
ENG. AREA NAME SIGNATURE NO. DATE
Civil N/R Original signed by N/R 19132 17/09/20
Contract. No. CN-12825
Drawing No. 831641 A2
Series Number 2SW10-4001 of 4
MRR_Detail (02/14)





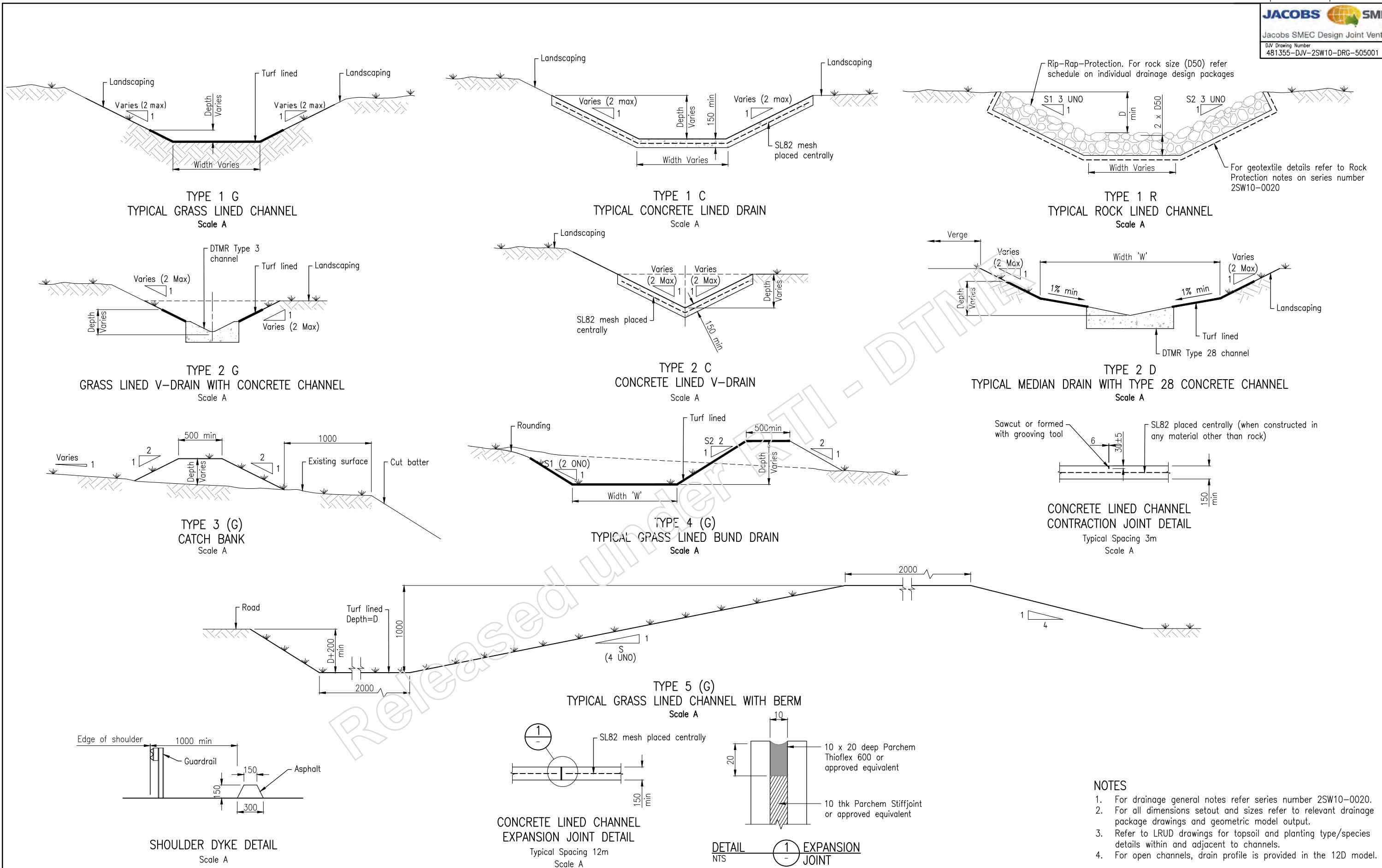
DRAINAGE SCHEDULE

Culvert		Drainage Structure	Wingwalls				EndWalls / Wingwalls			Concrete Bases			Aprons			Cut Off Walls (m³)	Excavation (m³)			Fill / Backfill			No Fines Conc. Block	Reo. Bar Mass (kg)	OLM = Overlay Material				
No.	Chainage		Skew	Type	Lengths	W1 (m)	W2 (m)	(U)Conc. (m³)	(R)Conc. (m³)	Reinforcing (m²) (fabric)	Rock	Wire Matt.	Reinforced	Mass	Culv.	Ends	Inlet Outlet	OLM (m³)	FBM (m³)	BHM (m³)	BSP (m³)	Remarks							
					2309	2308	2302	RL1218 (m²)	N12 (m)	Nibs (m)	Area (m²)	Area (m²)	Thick (mm)	Conc. (m³)	Reinforcing (m²) (fabric)	Conc. (m³)	2314	2315	2316	2313	2314	2315	2316	2317	2318	2315	2316	2317	2318
CU2-29500	29494.143	2/1050 RCP (58/2.44)	0.5	4	2.3 2.3	2.2 2.2	2.2	3.3						1.5				0.6	479.9	2.5		109.5	53.7	85.4		8	26		
CU2-29840	29829.545	2/900 RCP (46/2.44)	0.2	4	1.9 1.9	1.9 1.9	1.9	1.9						1.1				0.5	601.6	26.7		76.4	36.5	57.4		4	16		
CU2-30320	30311.820	3/825 RCP (63/2.44)	0	4	1.7 1.7	1.7 1.7	3.0	2.2						1.6				0.7	500.6	29.3		101.8	46.0	65.4		4	13		
CU2-30740	30730.196	4/750 RCP (88/2.44)	0	4	1.5 1.5	1.5 1.5	3.8	1.9						1.9				0.8	714.2	34.1		134.7	52.6	85.1		4	10		
CU2-32100	32090.363	3/1200 RCP (78/2.44)	0	4	2.6 2.6	2.6 2.6	4.2	5.3						3.4				1.0	729.5	29.4		174.2	77.9	127.5		8	35		
CU2-33120	33113.200	4/675 RCP (100/2.44)	3				4.2							1.9				0.9	463.2	13.8		131.8	51.7	77.2					
CU2-33500	33548.307	1800 RCP (30/2.44)	15	4	4.6 4.6	3.1 3.1	1.7	12.2	REFER TMR STD. DRG. 1304					1.6				0.7	553.5	44.0		79.9	65.9	105.9		12	75		
CU2-34100	34092.362	7/2100x1500 SLBC (4/2100x1500 RCBC + 3/2100 RCSS) (7/1.2 231/2.4)	25	4	5.1 8.7	2.9 5.1		22.0	REFER TMR STD. DRG. 1250	286.7	1330.9	6501	0.745 (804)		21.8	REFER TMR STD. DRG. 1250			3.0	2928.5	126.8		920.8	100.0			17	6617	
Total Quantities				21.1	49.5		286.7	1330.9	6501	598				34.9				8.2	6971	306		808	1305	704		57	6789		

△



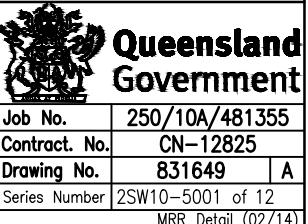
				Associated Job Nos	Survey Data		Scales 1:100 0 1 2 3 4m			MORETON BAY REGIONAL COUNCIL BRUCE HIGHWAY (BRISBANE - GYMPIE) <i>CTL CHGE 29200 TO 34837</i>				BRUCE HIGHWAY UPGRADE – PACKAGE 2 STORMWATER CULVERT SCHEDULE SHEET 4					ENGINEERING CERTIFICATION (RPEQ)				 Queensland Government	Job No.	250/10A/481355	
C	CU2-31550 changed to open channel	Mark Ullman 08505	27/07/22		Datum	GDA94																		Preceding RP	Dist. to start of job (km)	From start to end of job
B	Reinforcement refer to TMR Std. Drg	MU	15/10/20		Auxiliary Drg Nos	Horiz Grid MGA(Zone 56)				Height Origin AHD (Derived)	Dimensions shown in metres except where shown otherwise									Designed	Civil	N/R		Original signed b	19132	17/09/20
A	Issued For Construction			Survey Books	MR100857		10A/1204	0.00	5.671	0.00	10A/490	N/R	N/R				Series Number 2SW10-2004 of 4									
	Revisions/Descriptions	Certification	Date	Microfiled	N/R												MRR_Detail (02/14)									

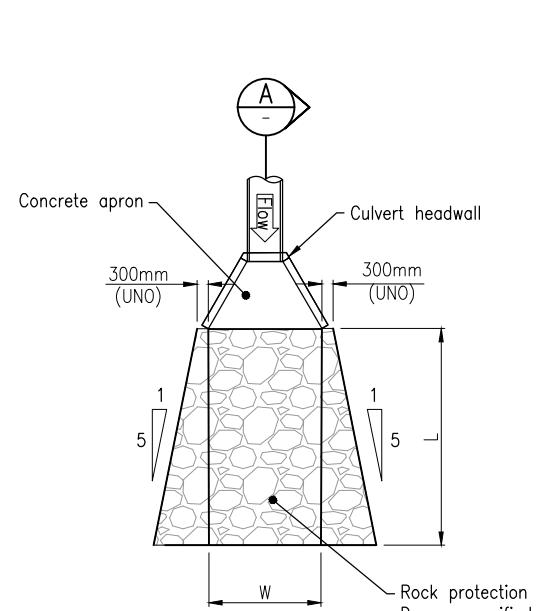
**NOTES**

- For drainage general notes refer series number 2SW10-0020.
- For all dimensions setout and sizes refer to relevant drainage package drawings and geometric model output.
- Refer to LRUD drawings for topsoil and planting type/species details within and adjacent to channels.
- For open channels, drain profile is provided in the 12D model.

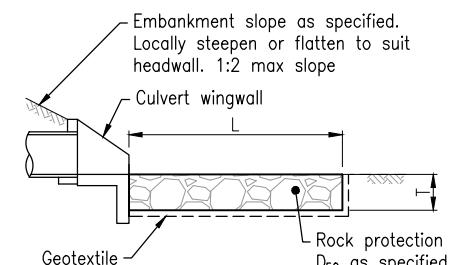
			Associated Job Nos	Survey Data	Scales	MORETON BAY REGIONAL COUNCIL			BRUCE HIGHWAY UPGRADE – PACKAGE 2			STORMWATER TYPICAL DETAILS			
			Auxiliary Drg Nos	Horiz. Grid		0 200 400 600 800mm	BRUCE HIGHWAY (BRISBANE – GYMPIE)			SHEET 1			ENG. AREA		
A	Issued For Construction			Height Origin	AHD (Derived)	Dimensions shown in metres	CTL CHGE 29200 TO 34837			Following RP	Preceding RP	Dist. to start of job (km)	From start to end of job	From end to Following RP	N/R
CAD FILES	Revisions/Descriptions	Certification	Date	Survey Books	MR100857		10A/1204	0.00	5.671	0.00	10A/490	Through Chainage from Brisbane	29.200km to 34.837km	N/R	N/R

CAD FILES



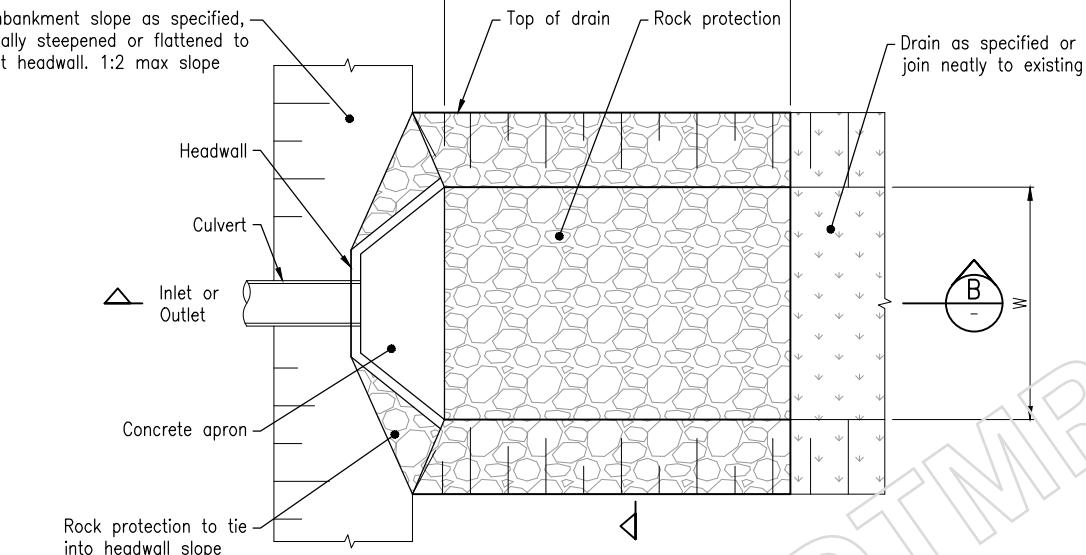


ROCK PROTECTION – TYPE A
PLAN
Scale A

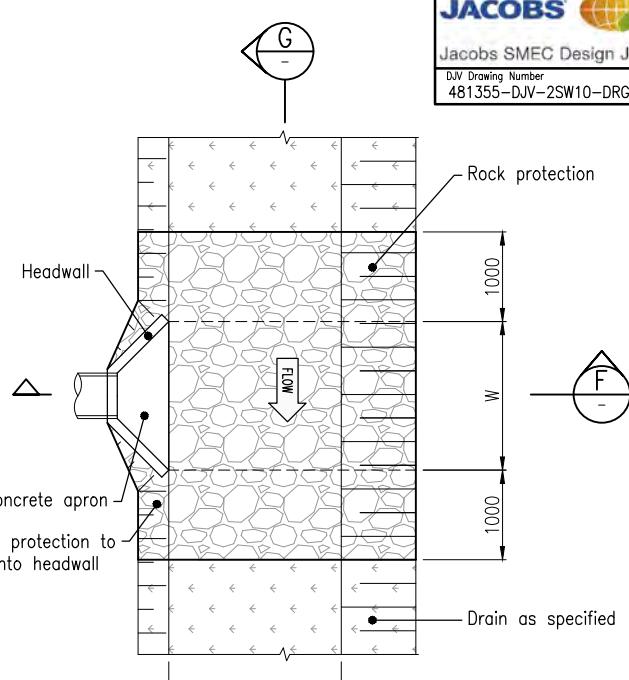


SECTION
Scale A

Detail for headwall outlet directly into basin to be similar



ROCK PROTECTION – TYPE B PLAN
NTS



ROCK PROTECTION – TYPE C
PLAN
NTS

OUTLET ROCK PROTECTION TYPE A						
DRAINAGE OUTLET	CULVERT HEIGHT (m)	1% AEP PIPE FLOW RATE (m^3/s)	MAX. OUTLET VELOCITY (m/s)	L (m)	W (m)	D_{50} (mm)
CU2-30320/2	0.825	2.674	3.000	3.300	6.000	300
CU2-30740/2	0.750	4.223	2.900	3.000	7.000	300
LD207/3	0.525	0.482	2.230	3.000	1.700	200
LD218/2	0.375	0.032	1.700	2.000	1.600	200
LD221/2	0.600	0.354	1.730	2.000	1.700	200
LD224/2	0.450	0.356	2.240	2.000	1.600	200
LD225/2	0.600	0.600	2.120	2.000	1.700	200
LD226/2	0.675	1.596	2.230	2.025	3.000	200
LD227/2	0.750	0.906	2.050	2.250	1.850	200
LD229/2	0.600	0.664	2.540	2.000	1.700	200
LD231/2	0.750	0.954	2.510	2.250	1.850	200
LD204/2	0.525	0.320	3.240	3.300	1.700	300

OUTLET ROCK PROTECTION TYPE B						
DRAINAGE OUTLET	CULVERT HEIGHT (m)	1% AEP PIPE FLOW RATE (m^3/s)	MAX. OUTLET VELOCITY (m/s)	L (m)	W (m)	D_{50} (mm)
CU2-29500/2	1.050	4.341	2.700	5.250	5.500	500
CU2-29840/2	0.900	2.983	2.730	3.600	4.800	300
CU2-32100/2	1.200	6.847	2.420	4.300	8.200	300
CU2-33120/2	0.675	2.783	2.340	2.700	6.700	300
CU2-33550/2	1.800	6.498	3.540	9.000	6.100	230mm THK STEEL WIRE MATTRESS
CU2-34100/2	1.500	50.140	2.270	8.400	24.500	300
LD201/3	0.675	0.634	3.420	2.025	1.900	200
LD202/2	0.750	1.085	1.970	2.250	4.100	200
LD203/2	0.375	0.140	1.980	2.000	1.600	200
LD208/2	0.450	0.208	1.650	2.000	1.800	200
LD213/2	0.450	0.311	2.200	2.000	1.800	200
LD222/2	0.300	0.153	2.500	2.000	1.800	200
LD230/2	0.375	0.300	2.710	2.000	1.600	200
LD214/6	0.300	0.488	1.470	2.000	2.000	200

OUTLET ROCK PROTECTION TYPE C						
DRAINAGE OUTLET	CULVERT HEIGHT (m)	1% AEP PIPE FLOW RATE (m^3/s)	MAX. OUTLET VELOCITY (m/s)	L (m)	W (m)	D_{50} (mm)
LD205/2	0.375	0.105	1.940	2.000	1.600	200
LD217/3	0.450	0.988	6.500	2.000	1.600	200
LD219/2	0.600	1.216	1.770	2.000	5.500	200
LD220/2	0.450	0.884	3.290	2.000	4.100	300
LD223/2	0.525	0.323	1.880	2.000	1.700	200

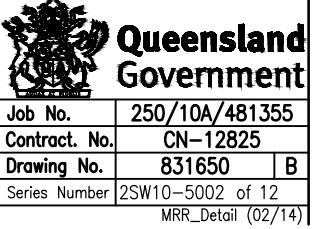
Associated Job Nos
Auxiliary Drg Nos
B LD204 outlet type added (DRR-0099) Mark Ullman 08505 27/07/22
A Issued For Construction
Revisions/Descriptions Certification Date Microfiled
CAD FILES N/R

Survey Data
Datum GDA94 Scales
Scale A 0 1 2 3 4m
Horiz Grid MGA (Zone 56) Scale B 0 2 4 6 8m
Height Origin AHD (Derived)
Survey Books MR100857 Dimensions shown in metres except where shown otherwise

MORETON BAY REGIONAL COUNCIL
BRUCE HIGHWAY (BRISBANE – GYMPIE)
CTL CHGE 29200 TO 34837
Reference Points
Preceding RP Dist. to start of job (km) From start to end of job From end to Following RP Following RP N/R
10A/1204 0.00 5.671 0.00 10A/490
Through Chainage from Brisbane 29.200km to 34.837km
Designed N/R
N/R

Engineering Certification (RPEC)
ENG. AREA ME SIGNATURE
Civil N/R
Original signed by N/R
N/R

Job No. 250/10A/481355
Contract. No. CN-12825
Drawing No. 831650 B
Series Number 2SW10-5002 of 12
MRR_Detail (02/14)

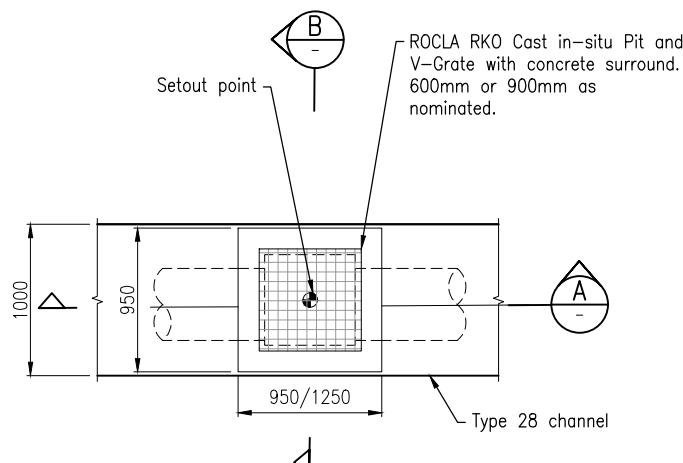
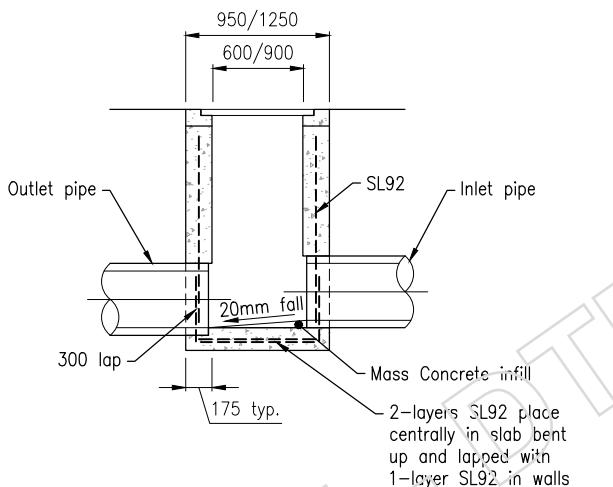
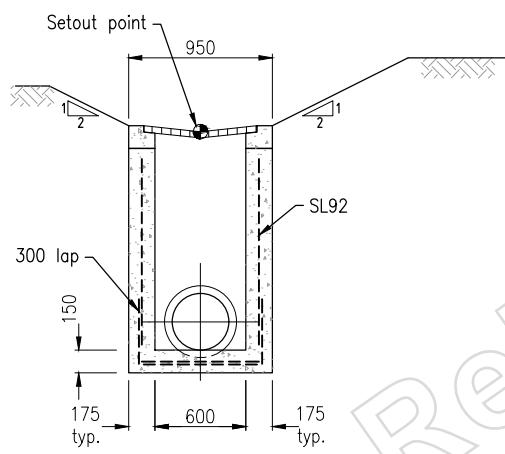


NOTES

- For inlets, minimum L dimension shall be 1.0m. For outlets minimum L dimension shall be 2.0m.
- Dimension T= $D_{50} \times 2$.
- Geotextile type for rock protection, refer to series number 2SW10-0020.

NOTES

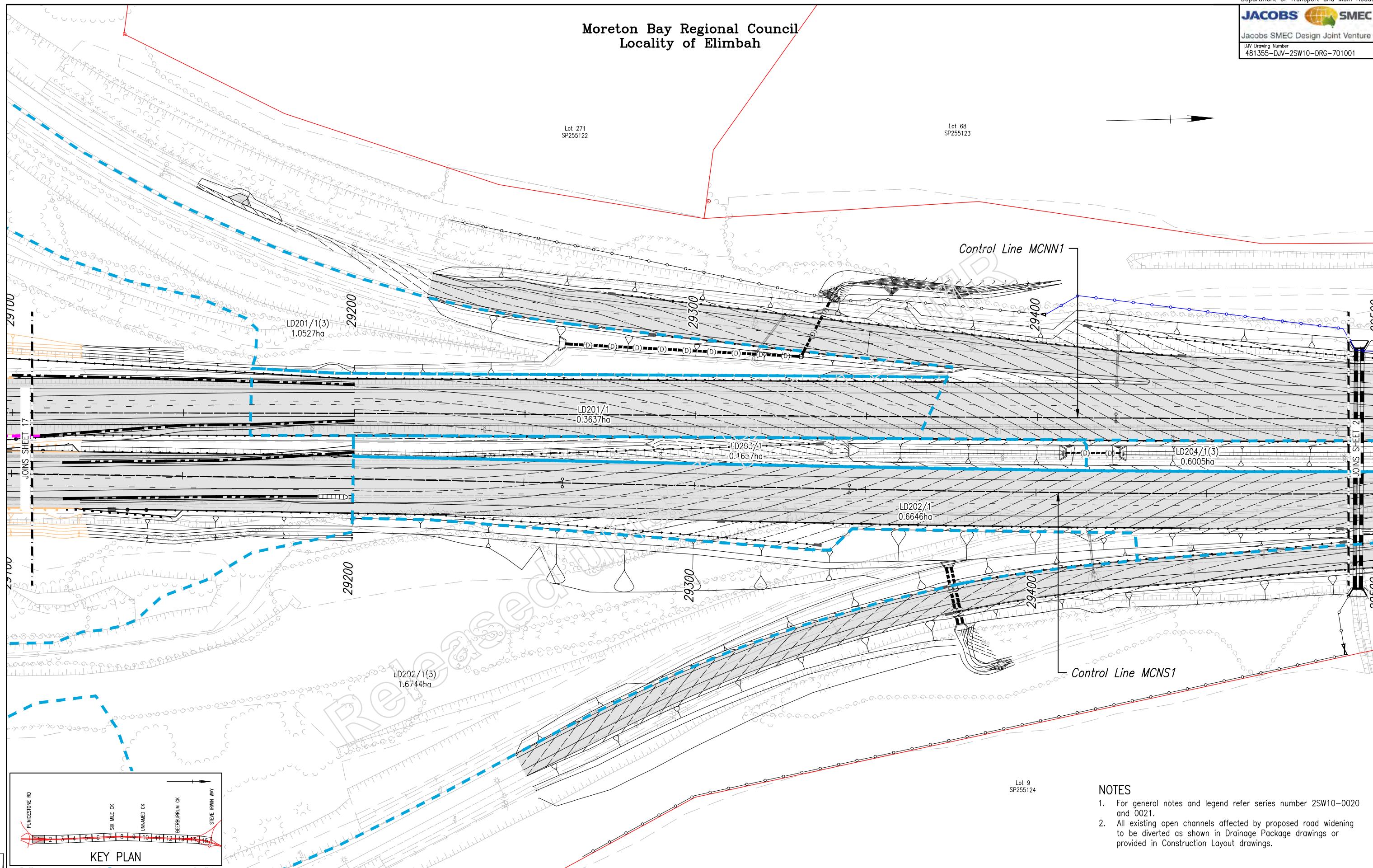
- ROCLA RKO V-Grates with concrete surround (or approved equivalent) shall be installed in accordance with manufacturers standards and specifications.
- Cast in situ concrete: Class S40/20, unless noted otherwise on design package drawings.
- Reinforcement typically in accordance with DTMR Standard Drawing No. 1312. One layer of SL92 reinforcing fabric shall be placed centrally in the walls, 2-layers placed centrally in base. 300mm laps.
- Reinforcing fabric to AS 4671.
- Grates and frames shall comply with the requirements of AS 3996 Class D Design load. Bicycle safety testing of grates shall be in accordance with AS 3996.
- Subsoil drainage is detailed in Pavement design drawings. Where a subsoil drain is discharged into a gully pit, the outlet of the subsoil drain shall be located above the top of the stormwater pipes/culverts. The subsoil drain outlets shall be provided with pest-proof flaps.
- Live load surcharge, earth pressure and ultimate load factors shall be in accordance with AS 5100.
- Refer to DTMR standard drawing no. 1442 for details regarding gullies at concrete barrier. Contrary to Std Drg. 1442, Note2, all gully pits up to and including 3.0m in height shall have SL81 mesh included in all walls and floor.
- For DTMR Field Inlets refer to DTMR Standard Drawings no 1309 and 1310 for all other details.
- For DTMR lip in line gully pits refer to DTMR Standard Drawings no 1311 for all other details.
- For DTMR kerb in line gully pits refer to DTMR standard drawing no. 1312 for all other details.

ROADWAY TYPE GULLY FOR TYPE 28 CHANNEL
Scale ASECTION
Scale ASECTION
Scale A

				Associated Job Nos	Survey Data		Scales Scale A 0 0.5 1.0m Datum GDA94 Auxiliary Drg Nos Horiz. Grid MGA(Zone 56) Height Origin AHD (Derived) Survey Books MR100857
					Datum	GDA94	
					Horiz. Grid	MGA(Zone 56)	
A Issued For Construction	Revisions/Descriptions	Certification	Date		Height Origin	AHD (Derived)	
CAD FILES					Survey Books	MR100857	

				MORETON BAY REGIONAL COUNCIL				BRUCE HIGHWAY UPGRADE – PACKAGE 2				STORMWATER TYPICAL DETAILS				Queensland Government																	
				BRUCE HIGHWAY (BRISBANE – GYMPIE)				SHEET 4				ENGINEERING CERTIFICATION (RPEO)																					
CTL CHGE 29200 TO 34837																																	
Reference Points																																	
Preceding RP 10A/1204 Dist. to start of job (km) 0.00 From start to end of job 5.671 From end to Following RP 0.00 Following RP 10A/490 N/R N/R N/R																																	
Dimensions shown in metres except where shown otherwise Through Chainage from Brisbane 29.200km to 34.837km																																	
ENG. AREA Civil N/R ME N/R SIGNATUP- NO. 19132 DATE																																	
Original signed b N/R Drawing No. 831652 A Series Number 2SW10-5004 of 12 MRR_Detail (02/14)																																	

Moreton Bay Regional Council
Locality of Elimbah



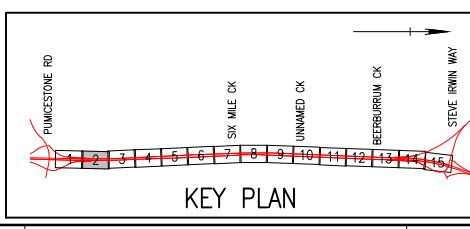
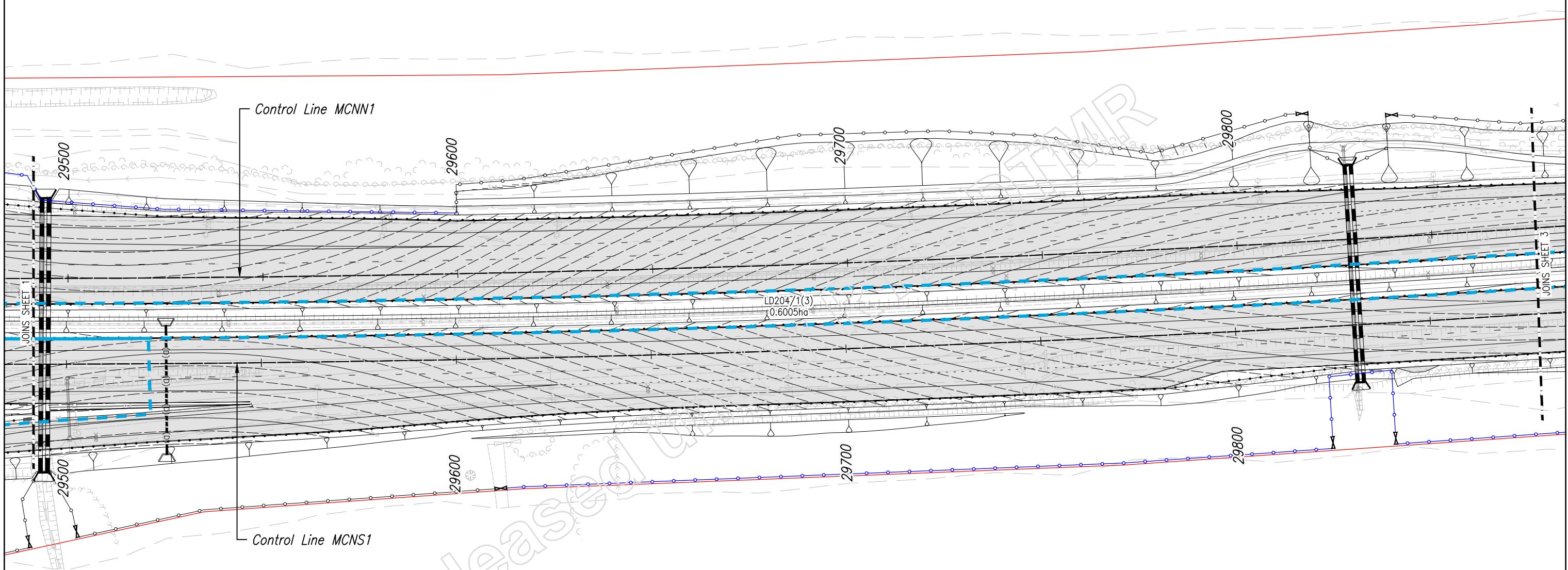
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		Datum	GDA94		Horiz. Grid	MGA(Zone 56)	AHD (Derived)	Reference Points	Preceding RP	Dist. to start of job (km)	From start to end of job	From end to Following RP	Following RP	
A	Issued For Construction	Certification	Date	Microfiled	Survey Books	MR100857	Dimensions shown in metres except where shown otherwise		10A/1204	0.00	5.671	0.00	10A/490	Described
CAD FILES									Through Chainage from Brisbane	29.200km to 34.837km			N/R	



Moreton Bay Regional Council
Locality of Elimbah

Lot 68
SP255123

Lot 68
SP255123

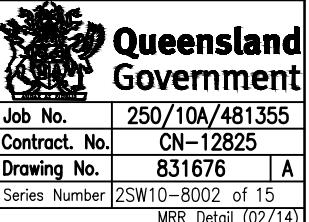


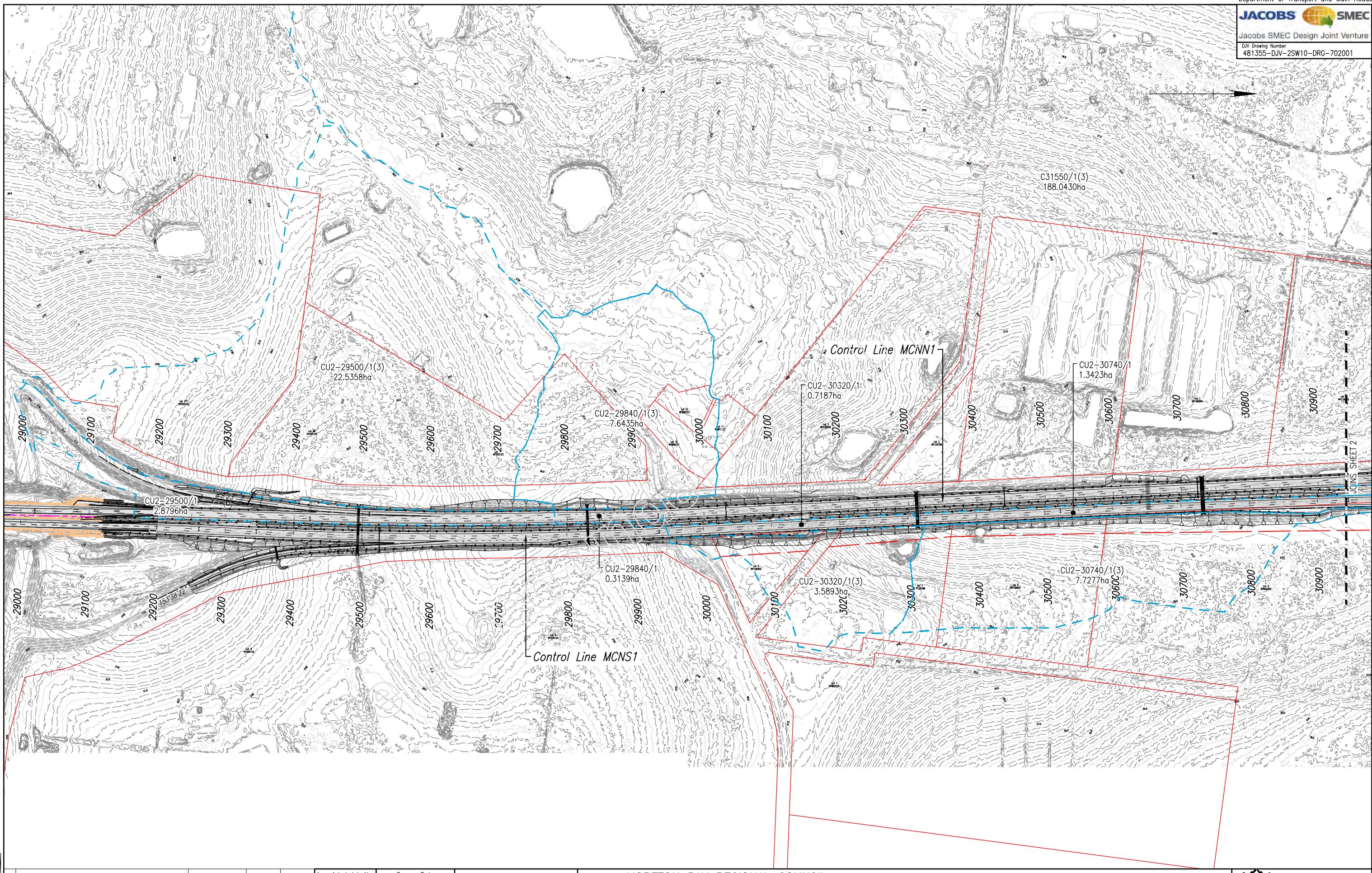
Lot 9
SP255124

NOTES

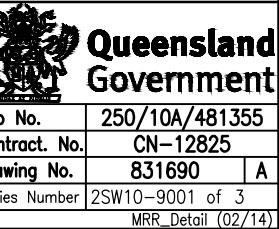
- For general notes and legend refer series number 2SW10-0020 and 0021.
- All existing open channels affected by proposed road widening to be diverted as shown in Drainage Package drawings or provided in Construction Layout drawings.

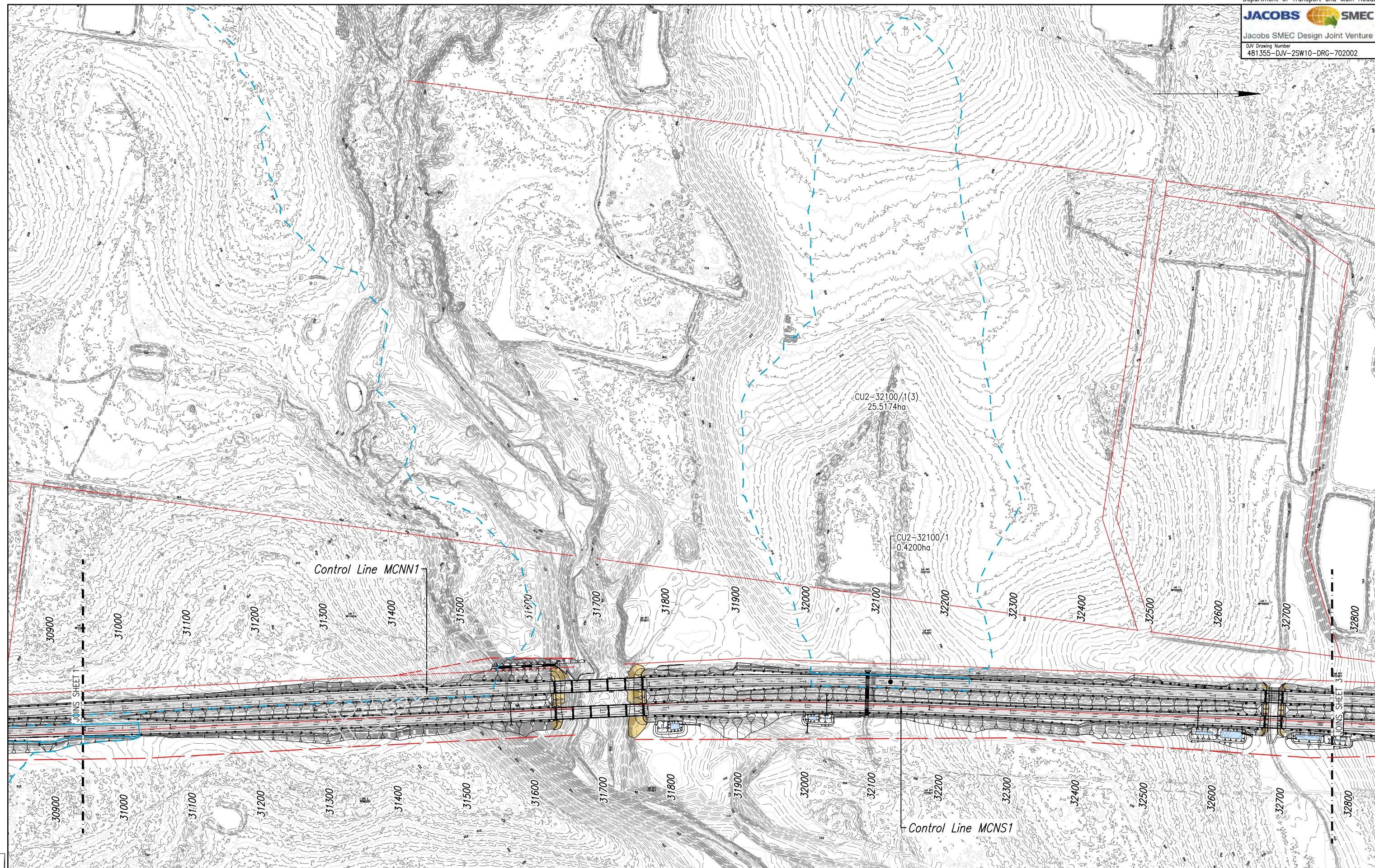
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		Datum	GDA94		BRUCE HIGHWAY (BRISBANE - GYMPIE)					SHEET 2					Engineering Certification (RPEQ)					
	Auxiliary Drg Nos	Horiz. Grid	MGA(Zone 56)	1:500	0	5	10	15	20m	CTL CHGE 29200 TO 34837	Reference Points	Preceding RP	Dist. to start of job (km)	From start to end of job	From end to Following RP	Following RP	Engineering Certification (RPEQ)		Engineering Certification (RPEQ)	
		Height Origin	AHD (Derived)														Job No.	250/10A/481355		
A	Survey Books	MR100857	Dimensions shown in metres except where shown otherwise														Contract. No.	CN-12825		
A Issued For Construction																Drawing No.	831676 A			
Revisions/Descriptions	Certification	Date	Microfiled													Series Number	2SW10-8002 of 15			
CAD FILES																MRR_Detail (02/14)				





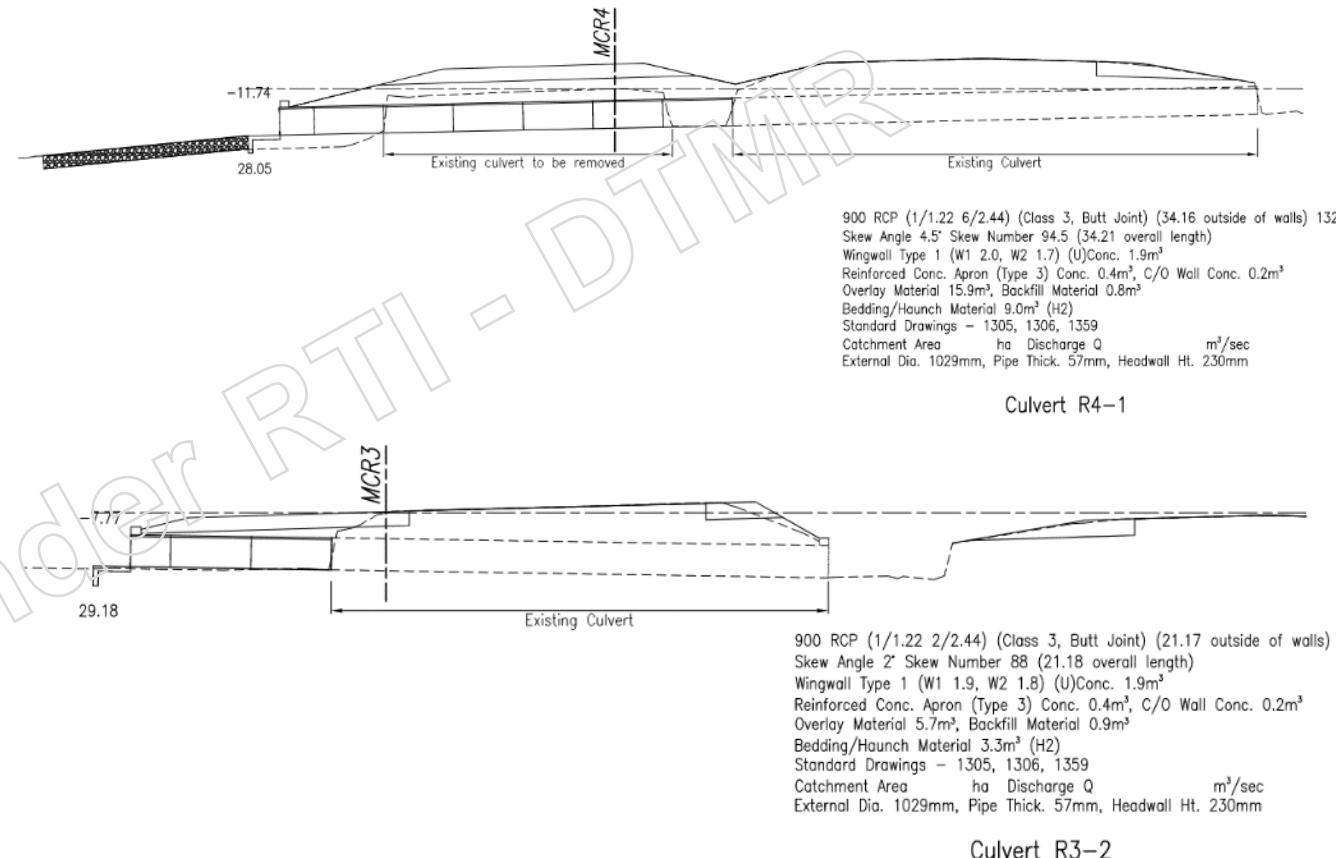
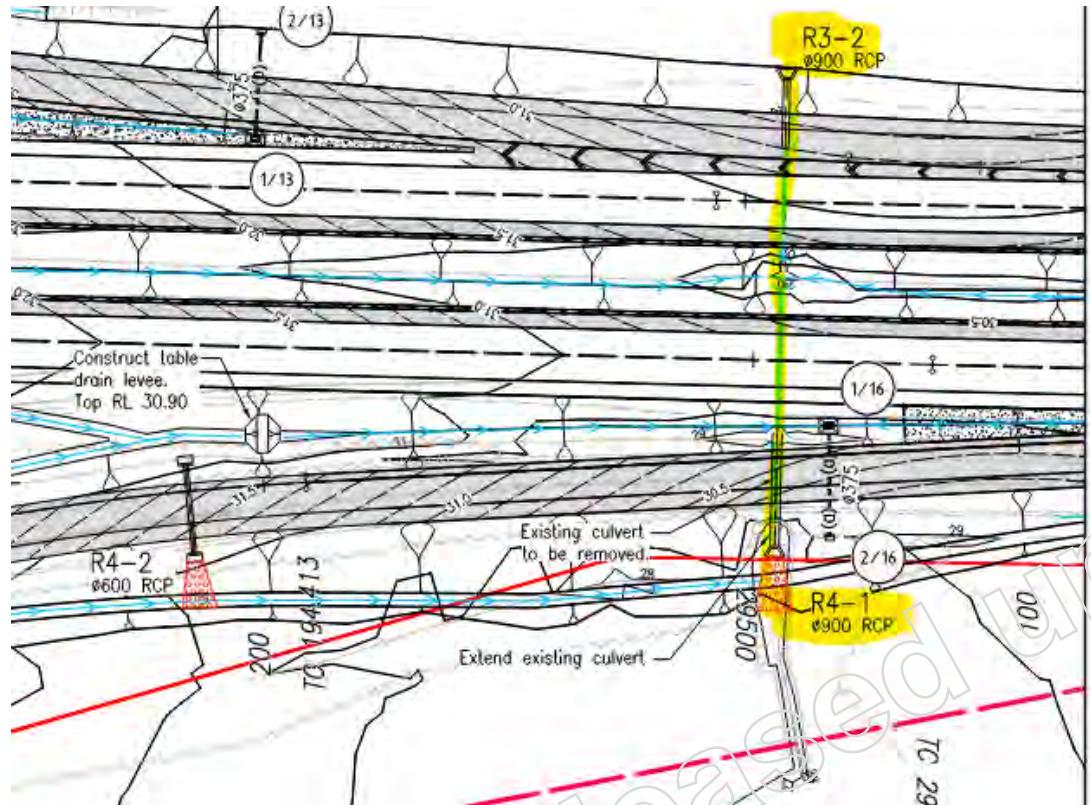
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		Datum	GDA94		BRUCE HIGHWAY (BRISBANE - GYMPIE)		CTL CHGE 29200 TO 34837	Reference Points	Drawn				
A	Issued For Construction				Preceding RP	Dist. to start of job (km)	From start to end of job	From end to Following RP	Following RP	ENG. ARE	ME	SIGNATURE	NO.
					10A/1204	0.00	5.671	0.00	10A/490	Civil	N/R	Original signed by	Date
Revisions/Descriptions		Certification	Date	Dimensions shown in metres except where shown otherwise	MR100857	Through Chainage from Brisbane 29.200km to 34.837km				N/R	N/R	N/R	19132
CAD FILES													



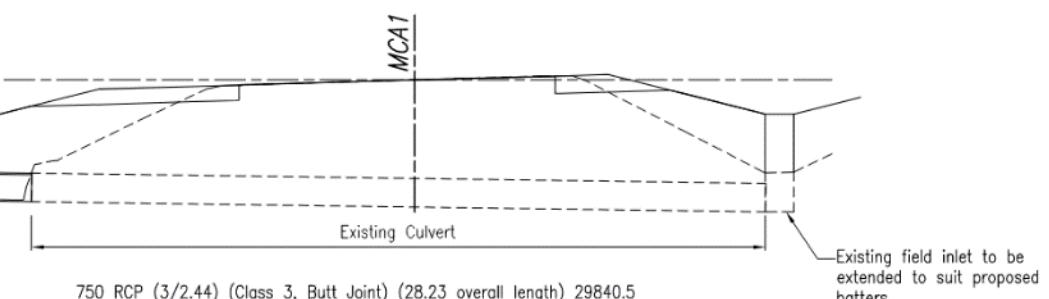
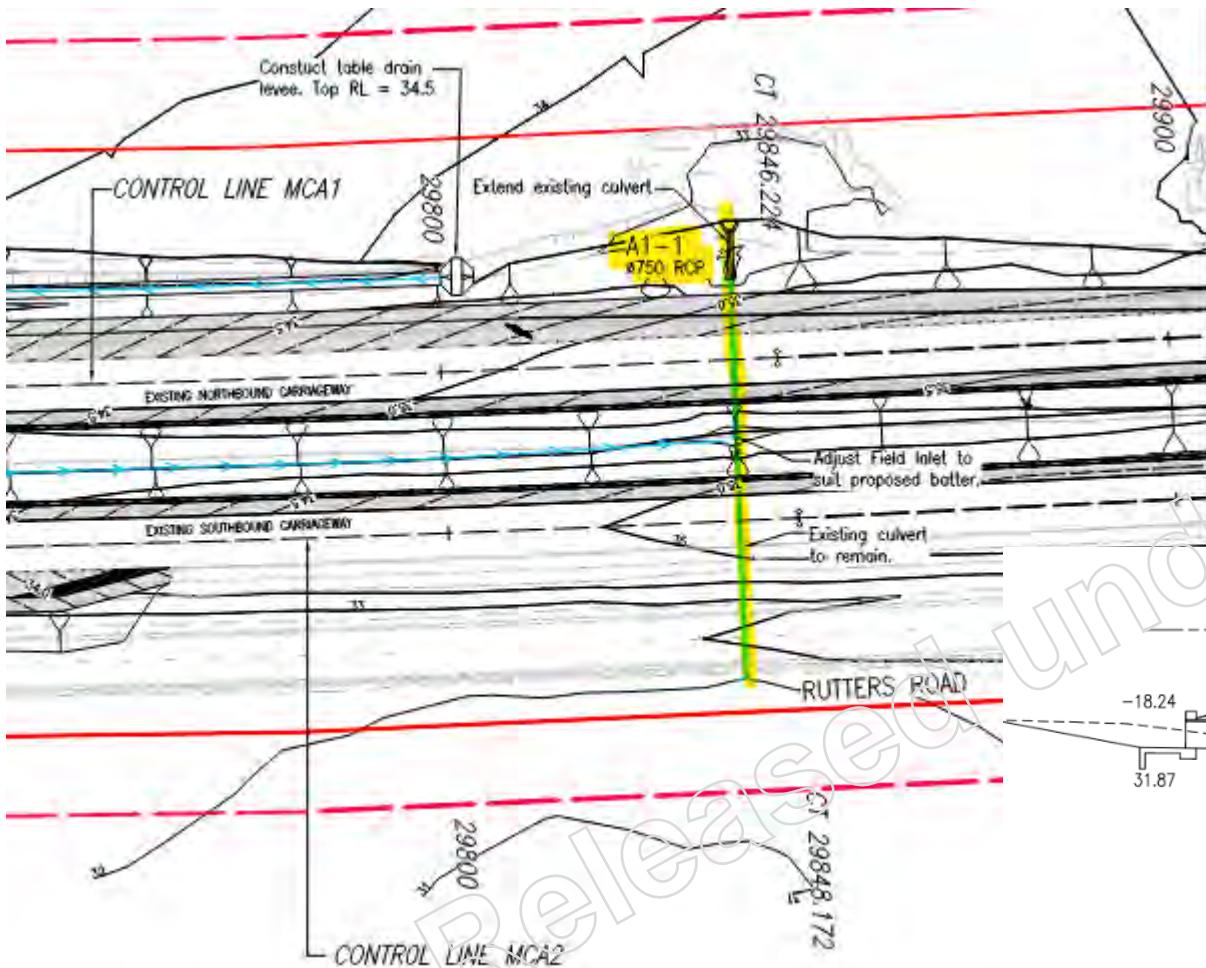


Associated Job Nos	Survey Data		Scales 1:2500 0 25 50 75 100m	MORETON BAY REGIONAL COUNCIL		BRUCE HIGHWAY UPGRADE - PACKAGE 2				
	Datum	GDA94		BRUCE HIGHWAY (BRISBANE - GYMPIE)		TRANSVERSE CATCHMENT LAYOUT PLAN				
Auxiliary Drg Nos	Horiz. Grid	MGA(Zone 56)	CTL CHGE 29200 TO 34837		SHEET 2			Queensland Government		
Height Origin	AHD (Derived)		Reference Points		Drawn N/R	ENGINEERING CERTIFICATION (RPEQ)				
Survey Books	MR100857		Preceding RP 10A/1204	Dist. to start of job (km) 0.00	From start to end of job 5.671	From end to Following RP 0.00	Following RP 10A/490	Designed N/R	Signature N/R	Job No. 250/10A/481355
A Issued For Construction			Dimensions shown in metres except where shown otherwise						Original signed by N/R	Contract. No. CN-12825
Revisions/Descriptions	Certification	Date	Through Chainage from Brisbane	29.200km to 34.837km					No. 19132	Drawing No. 831691
CAD FILES									Date A	Series Number 2SW10-9002 of 3

Southern Culvert – Ch. 29,500 – Pre-Project



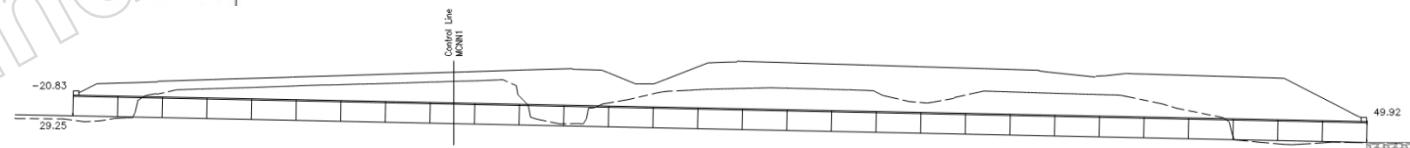
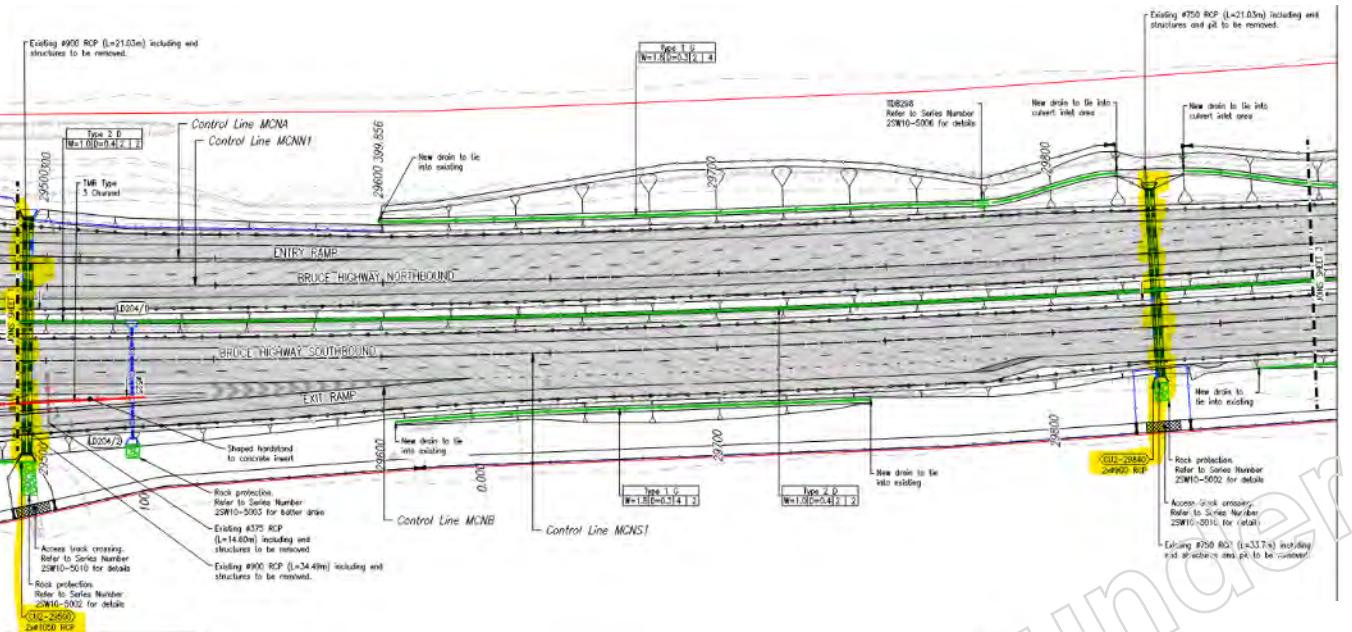
Southern Culvert – Ch. 29,840 – Pre-Project



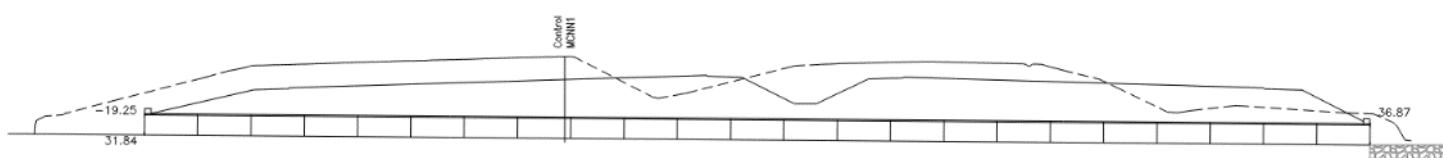
750 RCP (3/2.44) (Class 3, Butt Joint) (28.23 overall length) 29840.5
Wingwall Type 1 (W1,W2 1.5) (U)Conc. 1.4m³
Reinforced Conc. Apron (Type 3) Conc. 0.3m³, C/O Wall Conc. 0.2m³
Overlay Material 6.9m³, Backfill Material 0.6m³
Bedding/Haunch Material 3.4m³ (H2)
Standard Drawings – 1305, 1306, 1359
Catchment Area ha Discharge Q m³/sec
External Dia. 864mm, Pipe Thick. 51mm, Headwall Ht. 230mm
Inlet and outlet excavation 6m

Culvert A1-1

Project works



CU2-29500 2/1050 RCP (Indicative Configuration - 58/2.44) (Class 3, Rubber Ring) (70.76 overall length) CH 29494.143
Skew Angle 0.5° Skew Number 90.5
Wingwall (W1 2.3, W2 1.9)
Reinforced Conc. Apron
Bedding Type - (HS3)
Standard Drawings - 1304, 1359



CU2-29840 2/900 RCP (Indicative Configuration - 46/2.44) (Class 3, Rubber Ring) (56.12 overall length) CH 29829.545
Skew Angle 0.2° Skew Number 89.8
Wingwall (W1 1.9, W2 1.9)
Reinforced Conc. Apron
Bedding Type - (HS3)
Standard Drawings - 1304, 1359

NOTES

- All pipes shall be exposure classification 'N' unless noted otherwise.
- All pipelines with the pipe class shown have been reviewed in accordance with MRTS25. All pipelines have limiting Load Case complicating construction on existing construction zones/areas will need to be accounted for in limit the impact burden from construction traffic.

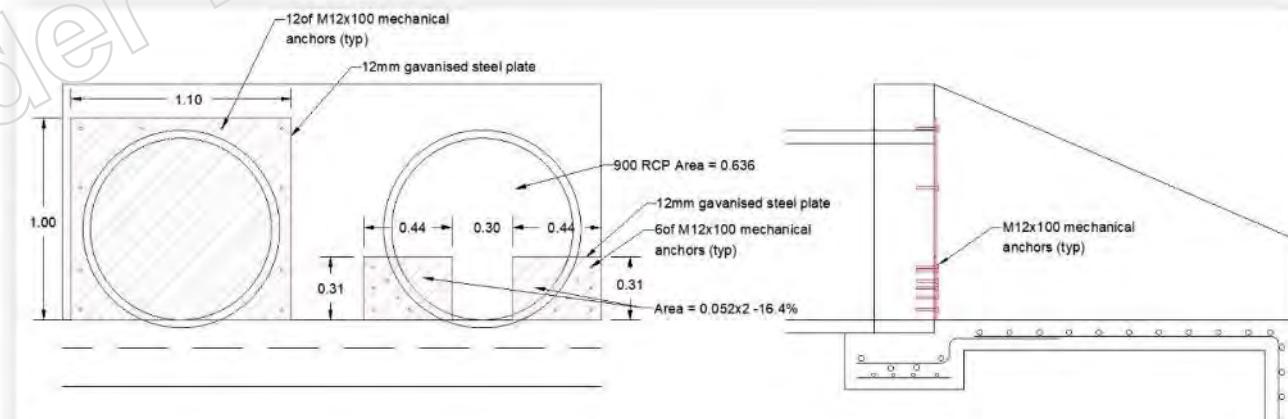
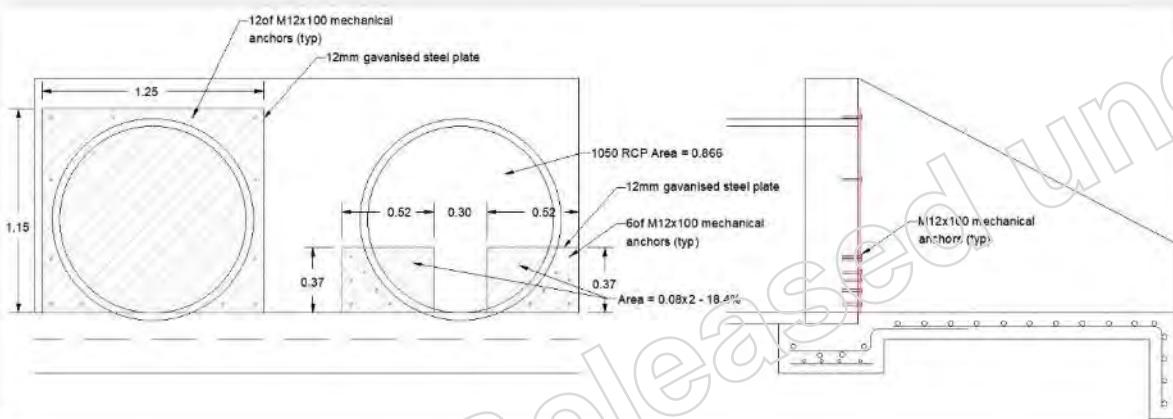
Suggested impact

Location	Discharge (m³/s) – BLATCHFORD REPORT		
	Original BH culverts	Upgraded BH culverts	Increase
CU2_29500 (southern culvert)	2.20 (900 RCP)	4.20 (2/1050 RCP)	+2.0 (91%)
CU2_29840 (northern culvert)	1.45 (750 RCP)	3.19 (2/900 RCP)	+1.74 (120%)

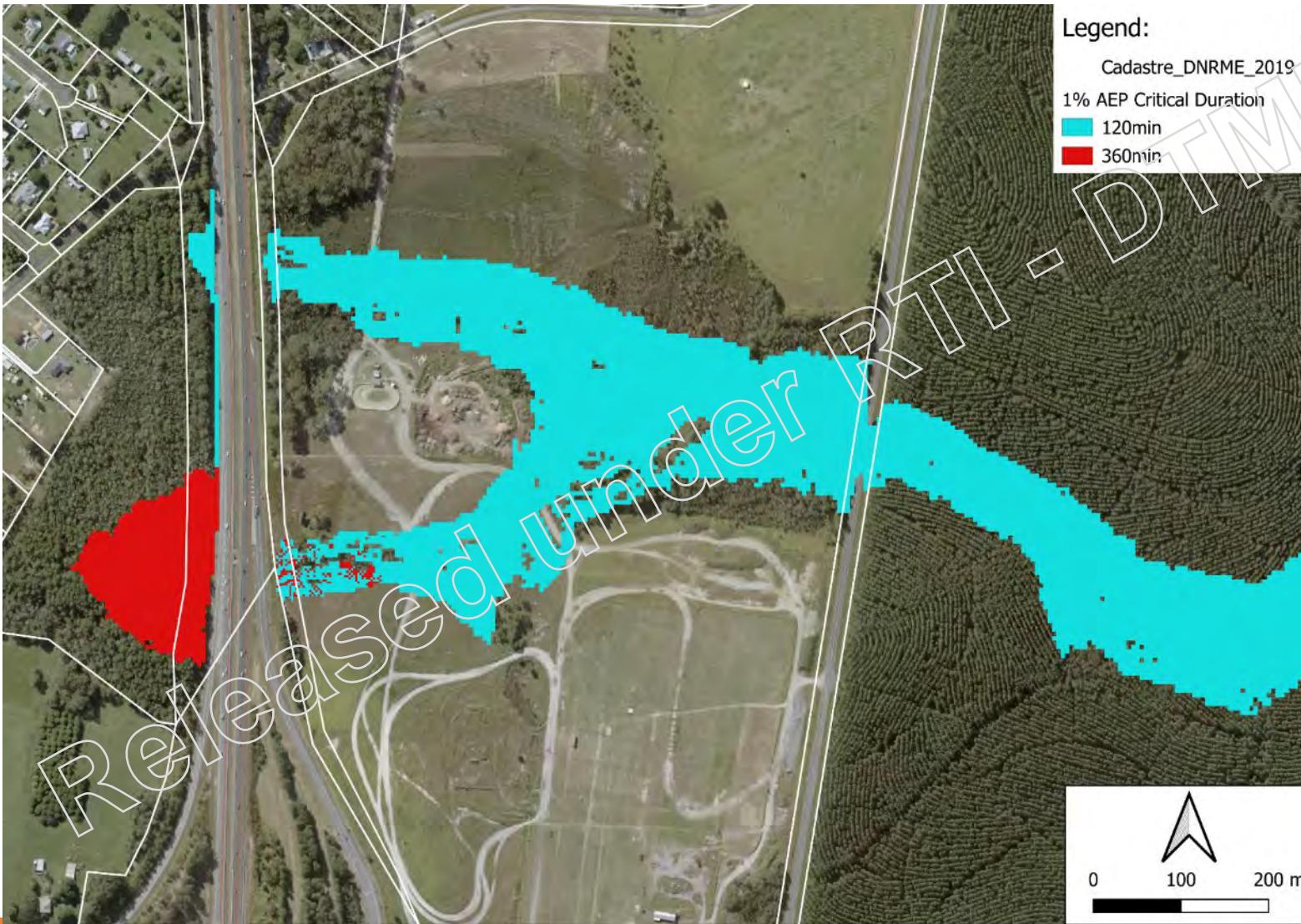
Location	Discharge (m³/s) – JSDJV ASSESSMENT		
	Original BH culverts	Upgraded BH culverts	Increase
CU2_29500 (southern culvert)	1.90 (900 RCP)	3.80 (2/1050 RCP)	+1.9
CU2_29840 (northern culvert)	1.4 (750 RCP)	1.80 (2/900 RCP)	+0.4

Amended design

- Run D043 was completed with the following configuration:
 - Southern culvert (Ch. 29,500) - 1x 1050RCP 100% blocked + 1x 1050RCP 18%
 - Northern culvert (Ch. 29,840) - 1 x 900RCP 100% blocked + 1x 900RCP 16% blocked



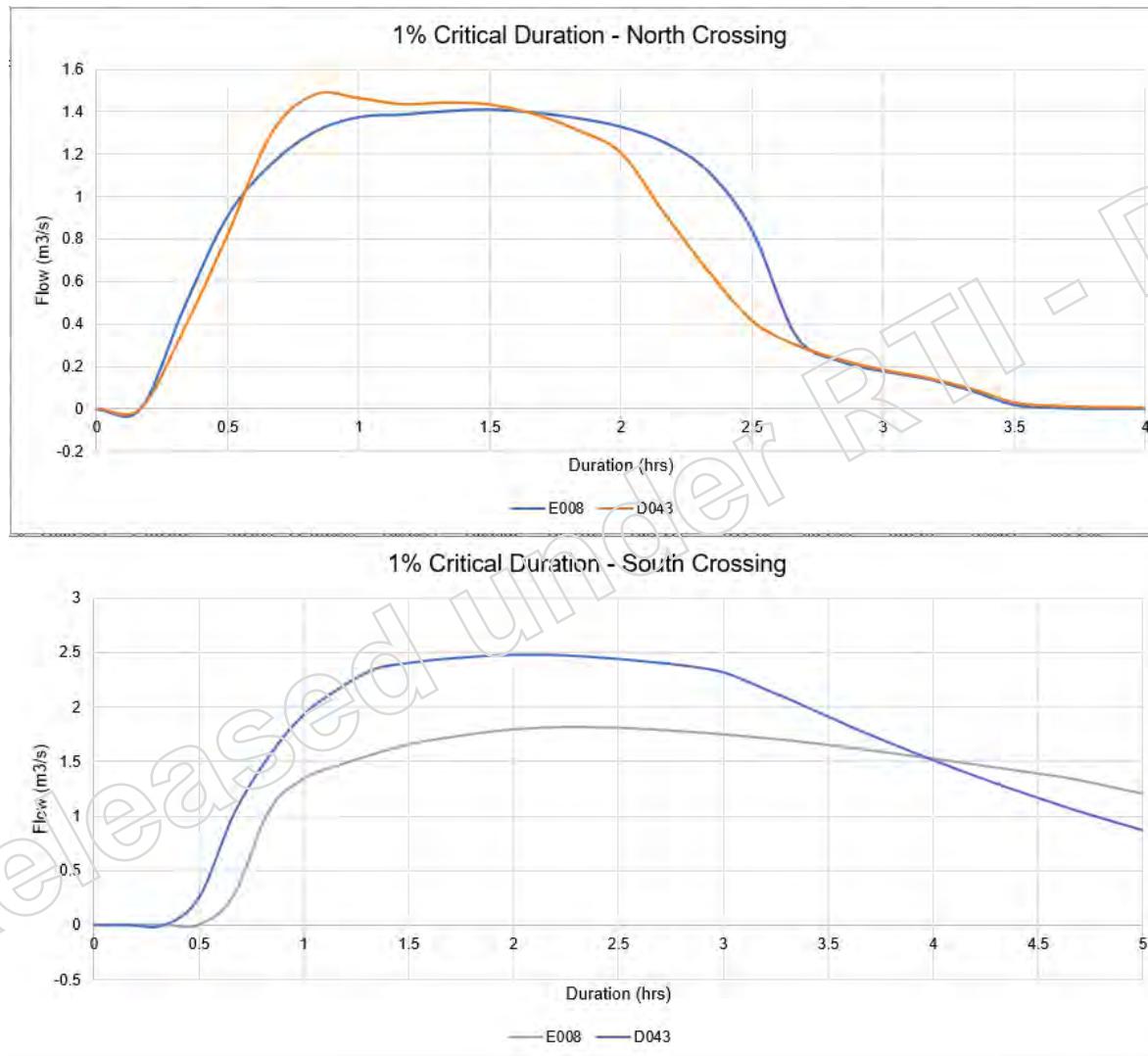
Critical storm event



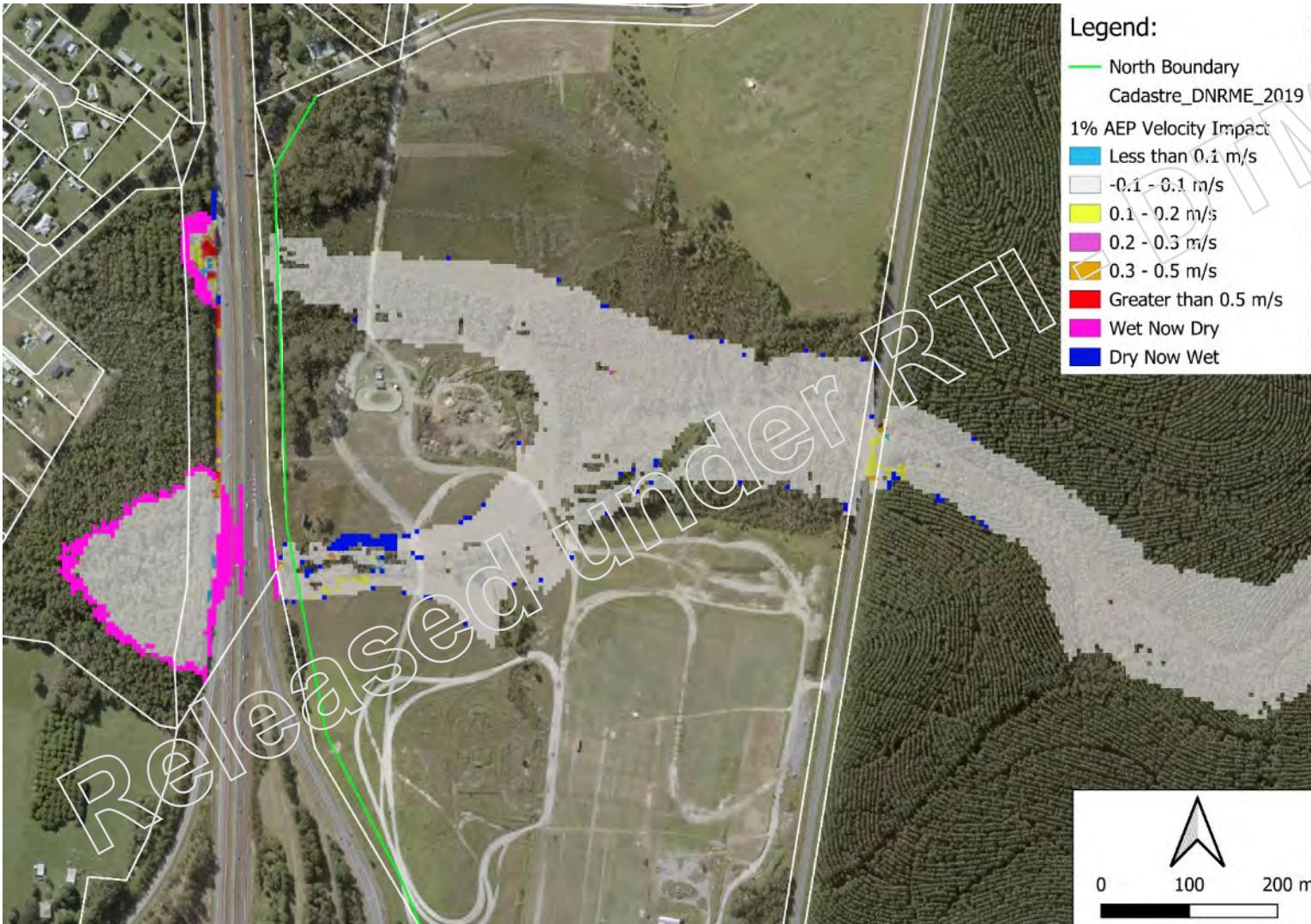
Amended impact

Location	Discharge (m ³ /s)		
	Original BH culverts	Upgraded BH culverts	Amended design
CU2_29500 (southern culvert)	2.20 (900 RCP)	4.20 (2/1050 RCP)	2.5 (1/1050 18% blocked)
CU2_29840 (northern culvert)	1.45 (750 RCP)	3.19 (2/900 RCP)	1.5 (1/900 16% blocked)

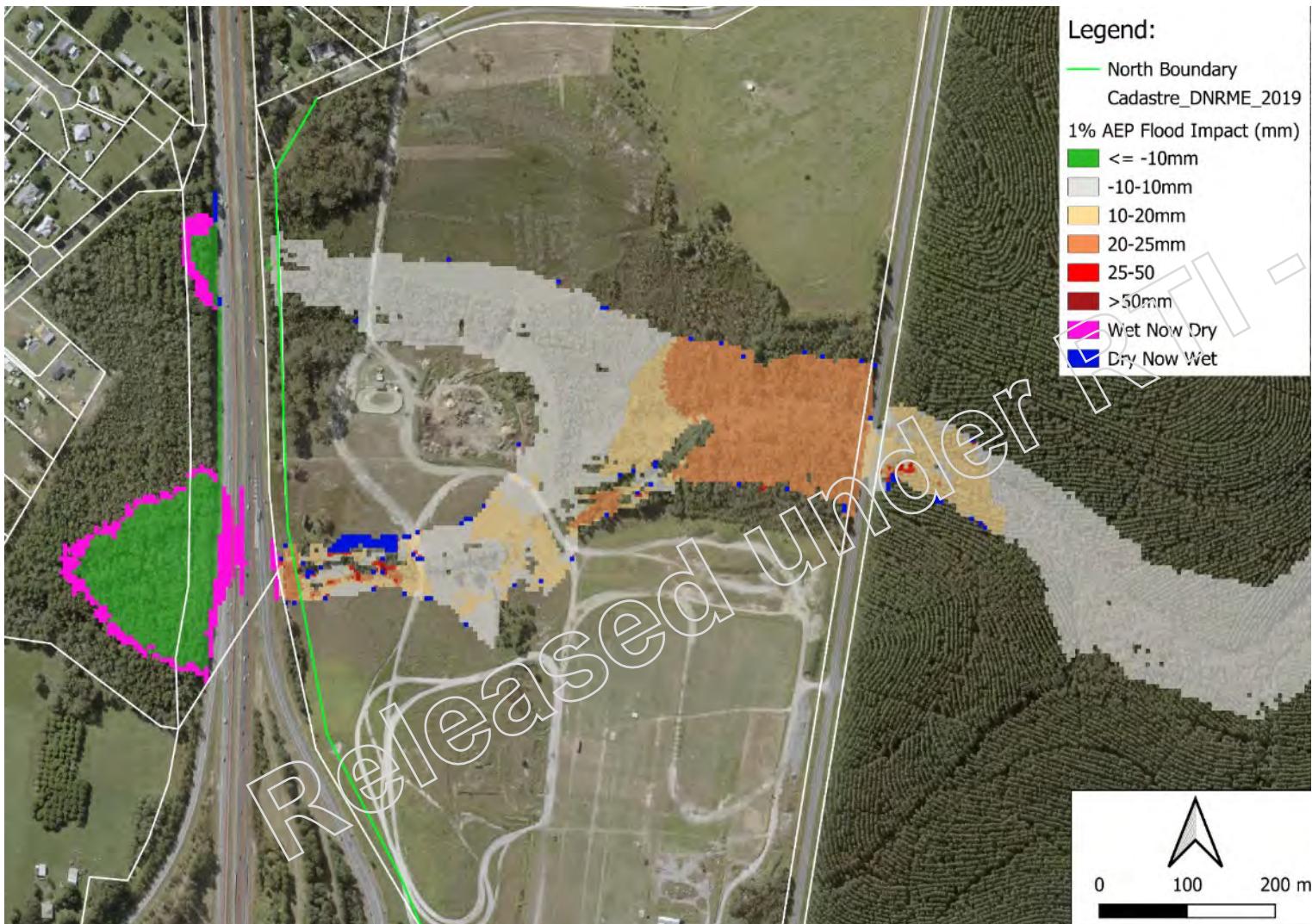
Flow hydrograph



Velocity impact

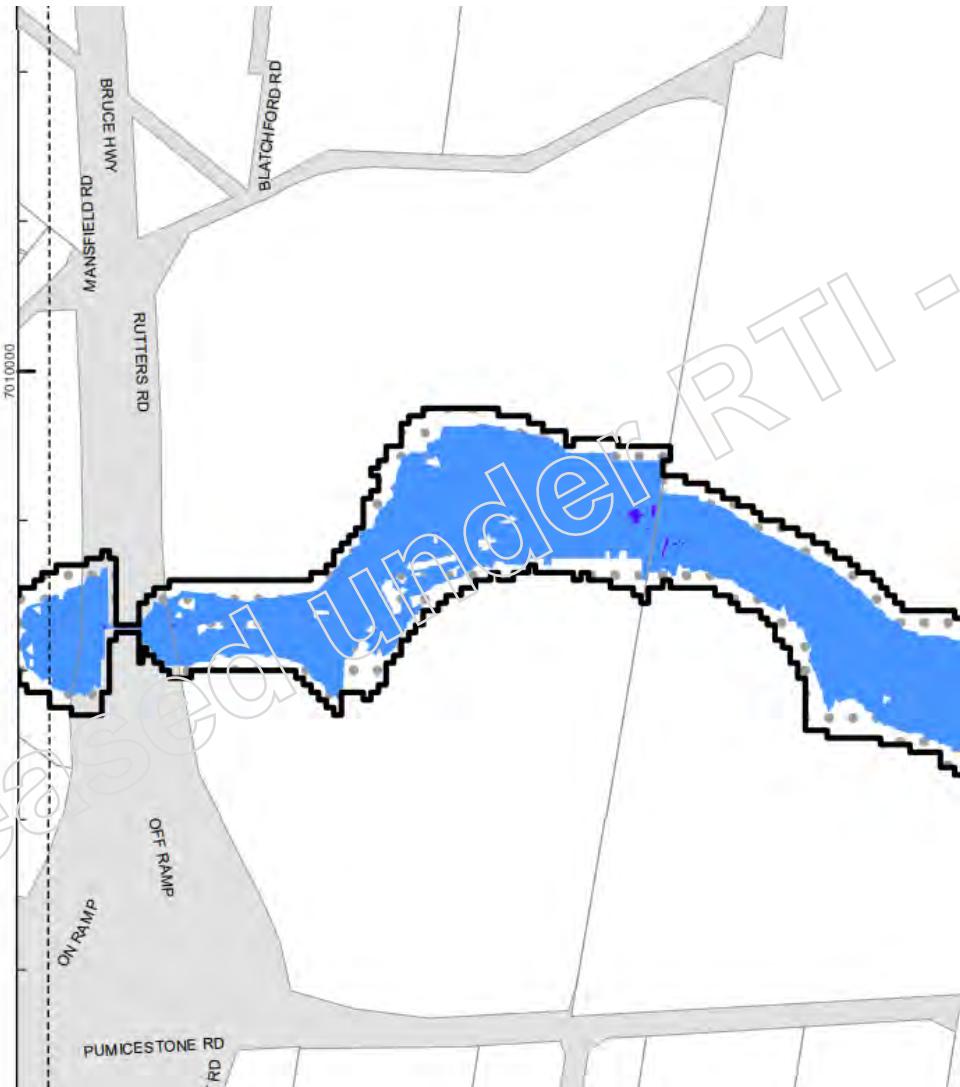


Flood afflux



- In summary:
 - Orange areas represent afflux levels of less than 25mm (when further interrogated, it is more like 23mm as a maximum).
 - The model results display dotted areas in red, indicating up to 50mm of afflux at those dots. It's important to note that these areas are primarily concentrated along the creek's edges. They seem to be artifacts resulting from the modelling process and are more likely a consequence of the relatively coarse model resolution of 5 m, rather than an accurate representation of real afflux.

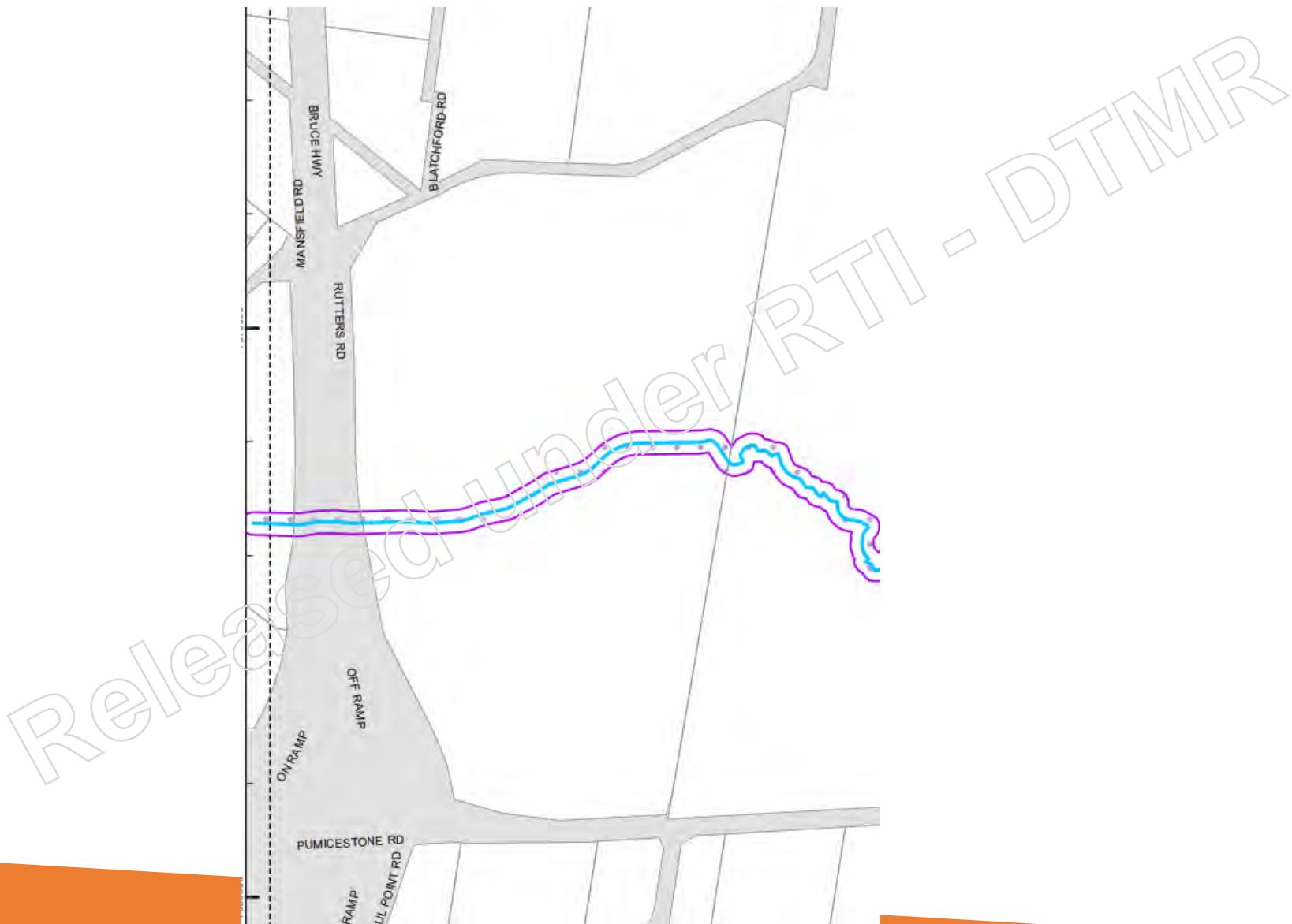
CoMB Flood Hazard Mapping



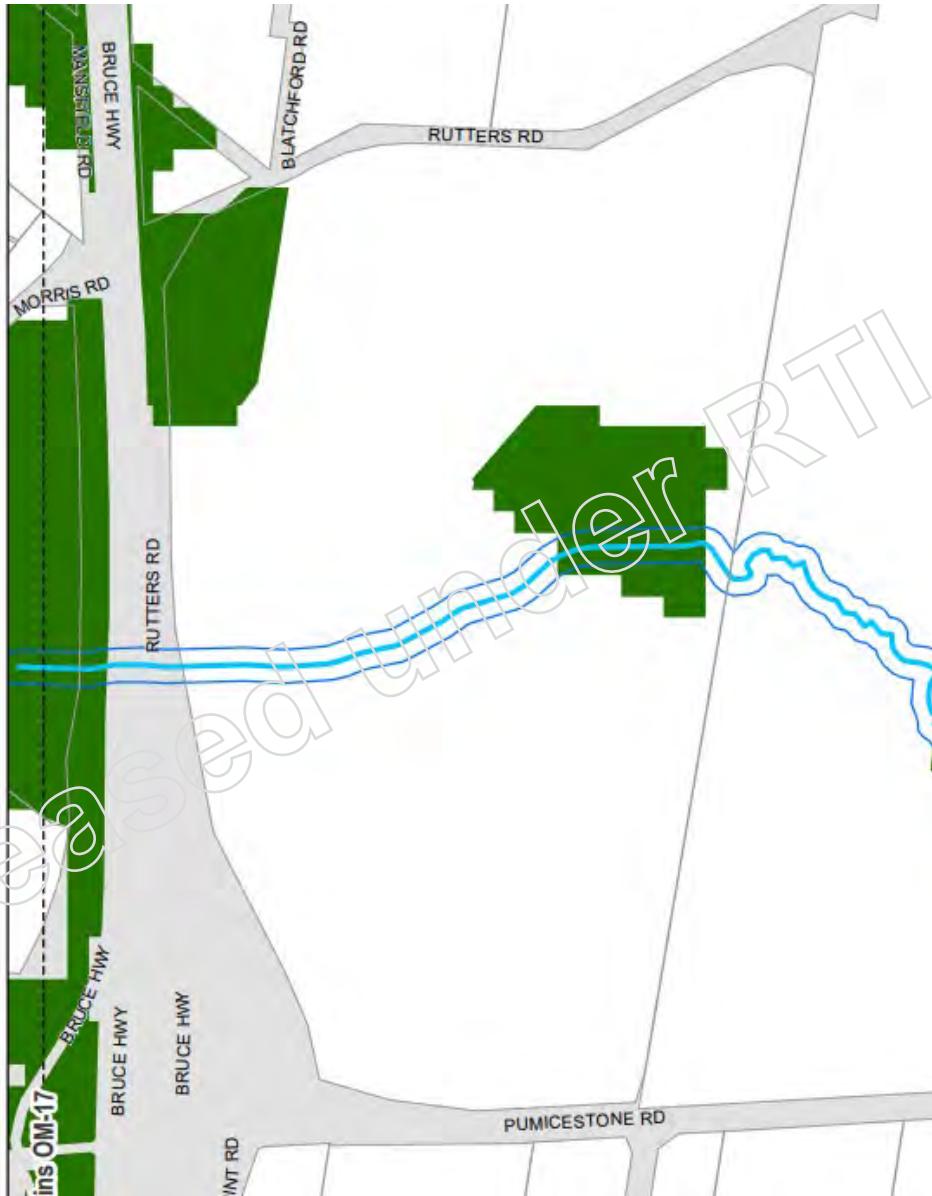
CoMB Overland flow path



CoMB Riparian and wetland setback



CoMB Environmental areas



From: N/R
To: [Alexander K McCart](#)
Cc: [Arif N Cheema](#)
Subject: RE: C2SIW - Meeting with N/R
Date: Tuesday, 6 February 2024 10:50:36 PM
Attachments: [481355-DJV-2HFO-PTN-000001.pptx](#)

Hi Folks,

Here are some slides for discussion tomorrow.

Many thanks,

N/R

From: Alexander K McCart <Alexander.K.McCart@tmr.qld.gov.au>

Sent: Thursday, January 11, 2024 12:19 PM

To: N/R <@jacobs.com>

Cc: Arif N Cheema <arif.n.cheema@tmr.qld.gov.au>

Subject: [EXTERNAL] RE: C2SIW - Meeting with N/R

Hi N/R

Are you able to confirm if you are available these dates?

- Wednesday 21st Feb between 10am-12pm
- Friday 23rd Feb between 10am-12pm
- Monday 26th Feb between 1pm-3pm

Kind regards,

Alexander McCart

Principal Engineer (Significant Projects - Bruce Highway Upgrade Caboolture Bribie Island Road Interchange to Steve Irwin Way (C2SIW)) | North Coast Region

Program Delivery and Operations Branch | Infrastructure Management and Delivery Division

Department of Transport and Main Roads

P: 07 5413 2178 | M: N/R
140 Old Toorbul Point Rd | Caboolture Qld 4510
PO Box 1600 | Maroochydore Qld 4558
alexander.k.mccart@tmr.qld.gov.au
www.tmr.qld.gov.au

From: Alexander K McCart
Sent: Tuesday, 19 December 2023 3:26 PM
To: N/R <@jacobs.com>
Cc: Arif N Cheema <Arif.N.Cheema@tmr.qld.gov.au>
Subject: C2SIW - Meeting with N/R

Hi N/R

Are you available at either of the below times to meet with DTMR and

N/R

22nd of January – Available 9am-12pm
13th of February – Available 9am-12pm

Kind regards,

Alexander McCart

Principal Engineer (Significant Projects - Bruce Highway Upgrade Caboolture Bribie Island Road Interchange to Steve Irwin Way (C2SIW)) | North Coast Region
Program Delivery and Operations Branch | Infrastructure Management and Delivery Division
Department of Transport and Main Roads

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alexander.k.mccart@tmr.qld.gov.au
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From: [REDACTED] **N/R**
To: [REDACTED] **Ale** **Cart:** Thuvarkan Maheswaran
Subject: RE: [REDACTED] **N/R** Details - Pipe Blocking
Date: Monday, 9 October 2023 9:01:36 AM
Attachments: image001.png
image002.png
image003.png
image004.png
image005.png
image006.png
image007.png
image008.png
image009.png

Hi Alex

Following up on the pipe information, as requested.

I hope you had a great weekend

[REDACTED] **N/R**

Consultant, Communication and Stakeholder Engagement, Aurecon

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Gubbi Gubbi Country
55 Plaza Parade Tower 1 Level 3 - Office 3.10 Maroochydore Australia 4558
aurecongroup.com



DISCLAIMER

From: Alexander K McCart <Alexander.K.McCart@tmr.qld.gov.au>
Sent: Thursday, October 5, 2023 11:11 AM
To: [REDACTED] **N/R** @aurecongroup.com>; Thuvarkan Maheswaran <Thuvarkan.Z.Maheswaran@tmr.qld.gov.au>
Subject: RE: [REDACTED] **N/R** Details - Pipe Blocking

Hi [REDACTED] **N/R**

I followed up with [REDACTED] **N/R** today as I hadn't received a response yet about getting some data in the same format as the [REDACTED] **N/R** report.

If we don't hear back by Monday lets proceed with what you have drafted.

Can you remind me Monday and I will triple check with [REDACTED] **N/R**

Kind regards,

Alexander McCart
Principal Engineer (Significant Projects - Bruce Highway Upgrade Caboolture Bribie Island Road Interchange to Steve Irwin Way (C2SIW)) | North Coast Region
Program Delivery and Operations Branch | Infrastructure Management and Delivery Division
Department of Transport and Main Roads

P: 07 5413 2178 | M: [REDACTED] **N/R**
140 Old Toorbul Point Rd | Caboolture Qld 4518
PO Box 1600 | Maroochydore Qld 4558
alexander.k.mccart@tmr.qld.gov.au
www.tmr.qld.gov.au

From: [REDACTED] **N/R** @aurecongroup.com>
Sent: Tuesday, 3 October 2023 2:17 PM
To: Alexander K McCart <Alexander.K.McCart@tmr.qld.gov.au>; Thuvarkan Maheswaran <Thuvarkan.Z.Maheswaran@tmr.qld.gov.au>
Subject: FW: [REDACTED] **N/R** Details - Pipe Blocking

Hello to you both,

This is one of the emails that I sent last night that went MIA

[REDACTED] **N/R**

Consultant, Communication and Stakeholder Engagement, Aurecon

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aurecongroup.com



DISCLAIMER

From: [REDACTED] **N/R**
Sent: Tuesday, October 3, 2023 2:01 PM
To: Alexander K McCart <Alexander.K.McCart@tmr.qld.gov.au>; Arif N Cheema <Arif.N.Cheema@tmr.qld.gov.au>
Cc: Thuvarkan Maheswaran <Thuvarkan.Z.Maheswaran@tmr.qld.gov.au>
Subject: RE: [REDACTED] **N/R** Details - Pipe Blocking

Subject to legal professional privilege

Hi all

I have included a slightly updated version of the original proposed response below. Can you please review with consideration to details of revised drainage design.

I refer to your correspondence on behalf of your clients, [REDACTED] N/R [REDACTED] about hydrology concerns at 530 Pumicestone Road, Elimbah (the Property) relating to the Bruce Highway Upgrade – Caboolture-Bribie Island Road to Steve Irwin Way (Exit 163).

The original design of the highway upgrade aimed to improve the flood immunity of the highway while minimising impacts to adjacent properties. This design was in accordance with best-practice guidelines.

The Department of Transport and Main Roads considered the technical Memorandum from DesignFlow / Hydrology and Water Management Consulting.

Designers have now remodelled culvert options to achieve an influx of 0-0.25mm to the adjoining land Lot 9 on SP25514. The revised construction will result in only a marginal increase in flow, which will have no impact on your client's property and proposed development.

Thanks.

N/R

Consultant, Communication and Stakeholder Engagement, Aurecon

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55 Plaza Parade Tower 1 Level 3 - Office 3.10 Maroochydore Australia 4558
aurecongroup.com



DISCLAIMER

From: Alexander K McCart <Alexander.K.McCart@tmr.qld.gov.au>
Sent: Friday, September 22, 2023 3:37 PM
To: Arif N Cheema <Arif.N.Cheema@tmr.qld.gov.au> [REDACTED] @aurecongroup.com
Cc: Thuvarakann Maheswaran <Thuvarakann.Z.Maheswaran@tmr.qld.gov.au>
Subject: [REDACTED] N/R Details - Pipe Blocking

Hi,

So the details for the pipe blocking is as follows.

- CU2_29840 (northern culvert)
- 1x 900RCP 100% blocked
 - 1x 900RCP 16% blocked (200mm fill in culvert)

- CU2_29500 (southern culvert)
- 1x 1050RCP 100% blocked
 - 1x 1050RCP 18% blocked (250mm fill in culvert)

This will achieve the required "less than 25mm" afflux.

I calculated it back to a flow area but have also asked designers if they can do Discharge (m³/s) for the new arrangement so it matches the [REDACTED] N/R Report.

Structure ID	Flow Area Old	Flow Area (Original Design)	Flow Area New Design	Area Percentage Increase
Northern Culverts	0.44	1.27	0.53	21%
Southern Culverts	0.64	1.73	0.71	12%

From [REDACTED] N/R Report

Table 1: Bruce Highway culvert upgrades

Location (refer to Figure 2)	Original BH Culverts ¹		Upgraded BH Culverts ²	
	Structure ID	No./Size/Type	Structure ID	No./Size/Type
1. Northern Culverts	TMR_A1-1	1/ 0.75m dia RCP	CU2-29840	2/ 0.9m dia RCP
2. Southern Culverts	TMR_R3-2	1/ 0.9m dia RCP	CU2-29500	2/ 1.05m dia RCP

Location (refer to Figure 3)	Discharge (m³/s)		
	Original BH culverts	Upgraded BH culverts	Increase
1. Northern Culverts	1.45	3.19	+1.74 (120%)
2. Southern Culverts	2.20	4.20	+2.0 (91%)

Kind regards,

Alexander McCart

Principal Engineer (Significant Projects - Bruce Highway Upgrade Caboolture Bribie Island Road Interchange to Steve Irwin Way (C2SIW)) | North Coast Region
Program Delivery and Operations Branch | Infrastructure Management and Delivery Division
Department of Transport and Main Roads

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alexander.k.mccart@tmr.qld.gov.au
www.tmr.qld.gov.au

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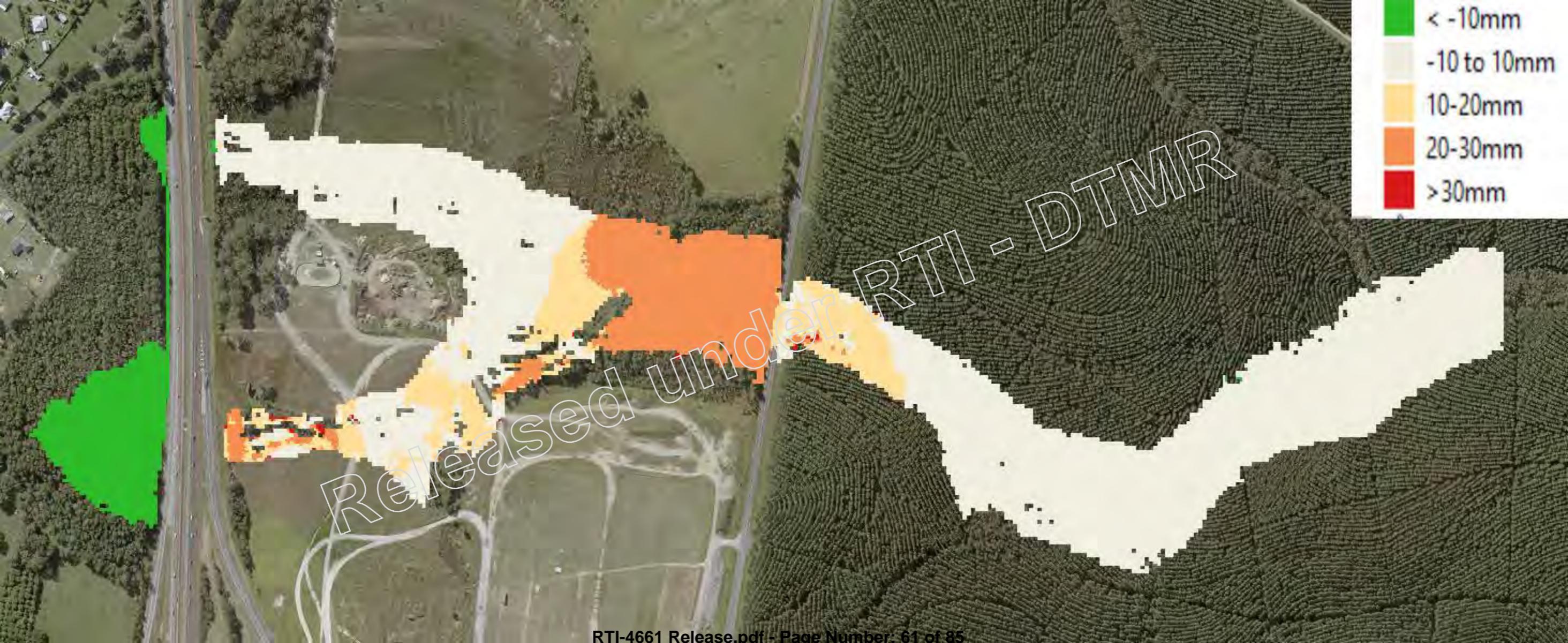
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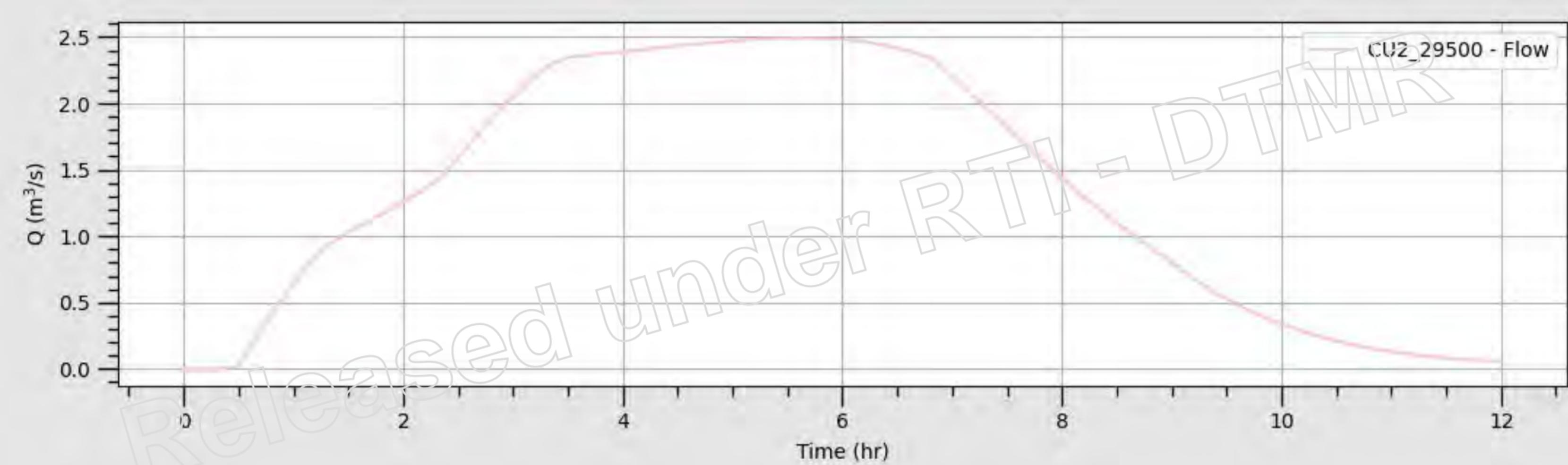
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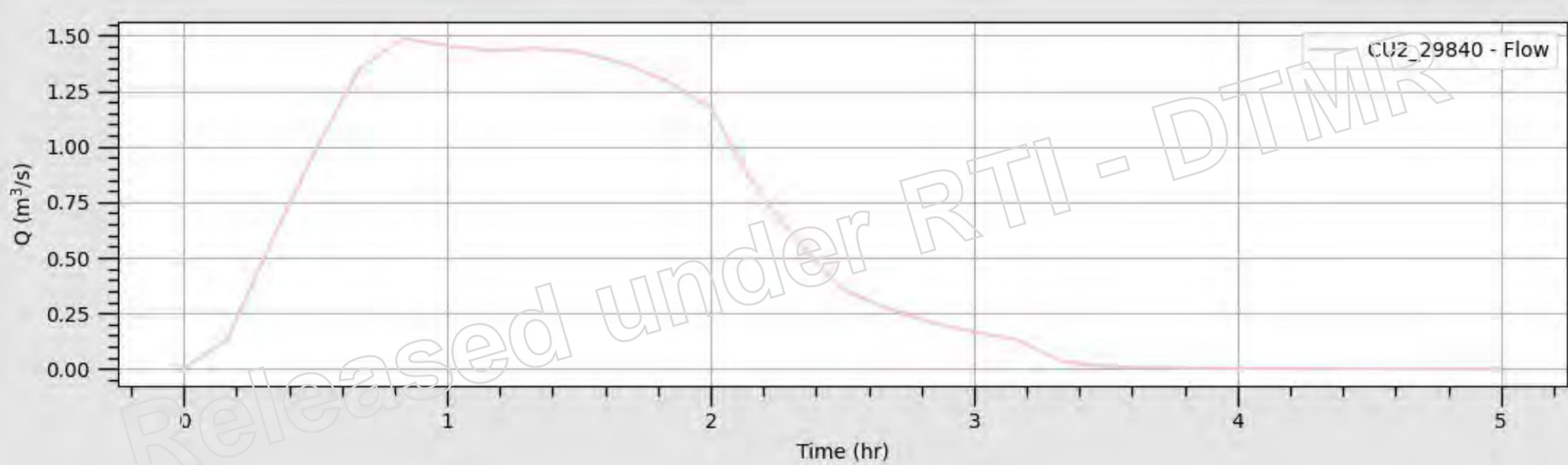
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N/R
From: Alexander K McCart
To: Arif N Cheema
Cc: FW: C2SIW
Subject: 530 Pumicestone Road Elimbah - Lot 9 on SP25514 - Bruce Highway Upgrade at Elimbah - 30/11/2022 - Report from Design Flow
Date: 10 October 2023 11:30:34 AM
Attachments: [image001.jpg](#)
[image002.jpg](#)
[image003.jpg](#)
[image004.jpg](#)
[afflux_d044.xls](#)
[CU29500 Flow.xls](#)
[CU29500 Flow.xls](#)

Hi Alex,

Run D043 was completed with the following configuration:

CU2_29840 (northern culvert) - 1x 900RCP 100% blocked + 1x 900RCP 16% blocked (200mm fill in culvert)
CU2_29500 (southern culvert) - 1x 1050RCP 100% blocked + 1x 1050RCP 18% blocked (250mm fill in culvert)

Results are below:

	U/S Flood Level (1% AEP)	Flow (1% AEP)
CU2_29840 (northern culvert)	33.4 m AHD	1.5 m3/s
CU2_29500 (southern culvert)	30.96 m AHD	2.5 m3/s

I have attached the flood afflux maps for the 1% AEP together with the flow hydrographs.

Many thanks,

N/R

From: Alexander K McCart <Alexander.K.McCart@lmr.qld.gov.au>
Sent: Friday, 22 September 2023 3:28 PM
To: **N/R** <N.R@jacobs.com>
Cc: Arif N Cheema <Arif.N.Cheema@lmr.qld.gov.au>
Subject: [EXTERNAL] RE: C2SIW: 530 Pumicestone Road Elimbah - Lot 9 on SP25514 - Bruce Highway Upgrade at Elimbah - 30/11/2022 - Report from Design Flow

Hi,

We also get an afflux map for the finalised scenario for the pipes.

- CU2_29840 (northern culvert) - 1x 900RCP 100% blocked + 1x 900RCP 16% blocked (200mm fill in culvert)
CU2_29500 (southern culvert) - 1x 1050RCP 100% blocked + 1x 1050RCP 18% blocked (250mm fill in culvert)

Also, is there a way to calculate the new discharge (m3/s)?

From: **N/R** report -

Location (refer to Figure 1)	Discharge (m³/s)		
	Original BH culverts	Upgraded BH culverts	Increase
1. Northern Culverts	1.45	3.19	+1.74 (120%)
2. Southern Culverts	2.20	4.20	+2.0 (91%)

Kind regards,

Alexander McCart
Principal Engineer (Significant Projects - Bruce Highway Upgrade Caboolture Bribie Island Road Interchange to Steve Irwin Way (C2SIW)) | North Coast Region
Program Delivery and Operations Branch | Infrastructure Management and Delivery Division
Department of Transport and Main Roads

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www.lmr.qld.gov.au

From: Alexander K McCart
Sent: Friday, 22 September 2023 1:57 PM
To: **N/R** <N.R@jacobs.com>
Subject: FW: C2SIW: 530 Pumicestone Road Elimbah - Lot 9 on SP25514 - Bruce Highway Upgrade at Elimbah - 30/11/2022 - Report from Design Flow

Hi,

Is this the latest we have for **N/R**

Did we do up a detail?

Kind regards,

Alexander McCart
Principal Engineer (Significant Projects - Bruce Highway Upgrade Caboolture Bribie Island Road Interchange to Steve Irwin Way (C2SIW)) | North Coast Region
Program Delivery and Operations Branch | Infrastructure Management and Delivery Division
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alexander.k.mccart@lmr.qld.gov.au
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From: **N/R** <N.R@jacobs.com>
Sent: Friday, 26 May 2023 5:39 PM
To: Alexander K McCart <Alexander.K.McCart@lmr.qld.gov.au>
Cc: **N/R** <N.R@jacobs.com>
Subject: FW: C2SIW: 530 Pumicestone Road Elimbah - Lot 9 on SP25514 - Bruce Highway Upgrade at Elimbah - 30/11/2022 - Report from Design Flow

Hi Alex,

We have undertaken some modelling of the culvert options to avoid or minimise the impact to an acceptable level on the adjoining land Lot 9 on SP25514.

We note that the objective was to achieve an afflux of 0-25mm on the site.

To investigate this, we have looked at a number of options and I have summarised the outcomes of this below.

Run D042 (maximise northern blockage):

- CU2_29840 (northern culvert) - 1x 900RCP 100% blocked + 1x 900RCP 90% blocked
CU2_29500 (southern culvert) - 1x 1050RCP 100% blocked + 1x 1050RCP 90% blocked
- **1%AEP with climate change results:**
 - WSL U/S Bruce Highway - 33.13 m AHD (31.48 road level \ 350mm freeboard)
 - Issue that with the large blockage in the north, this pushes flow to the south which is lower
 - Afflux just U/S of Clinkers Rd - approx. 0 mm
 - Max afflux on the property - 40-50mm d/s of the southern culvert and one localised spot further D/S that is around 40mm. Mostly no change or less than 20mm.

Run D041 (maximise southern blockage):

- CU2_29840 (northern culvert) - 1x 900RCP 100% blocked + 1x 900RCP 90% blocked
CU2_29500 (southern culvert) - 1x 1050RCP 100% blocked + 1x 1050RCP 90% blocked
- **1%AEP with climate change results:**
 - WSL U/S Bruce Highway - 30.93 m AHD (31.48 road level \ 550mm freeboard)
 - Afflux U/S of Clinkers Rd - 25 mm
 - Max afflux on the property - Isolated spots of 50mm. mostly 24-26mm in the orange sections.

D037 (balanced blockage):

- CU2_29840 (northern culvert) - 1x 900RCP 100% blocked + 1x 900RCP 14% blocked
CU2_29500 (southern culvert) - 1x 1050RCP 100% blocked + 1x 1050RCP 17% blocked
- **1%AEP with climate change results:**
 - WSL U/S Bruce Highway - 30.92 m AHD (31.48 road level \ 560mm freeboard)
 - Afflux U/S of Clinkers Rd - 24 mm
 - Max afflux on the property - Isolated spots of 45mm.

D039 (max blockage south):

- CU2_29840 (northern culvert) - 1x 900RCP 100% blocked + 1x 900RCP 14% blocked
CU2_29500 (southern culvert) - 1x 1050RCP 100% blocked + 1x 1050RCP 30% blocked
- **1%AEP with climate change results:**
 - WSL U/S Bruce Highway - 31.10 m AHD (31.48 road level \ 380mm freeboard)

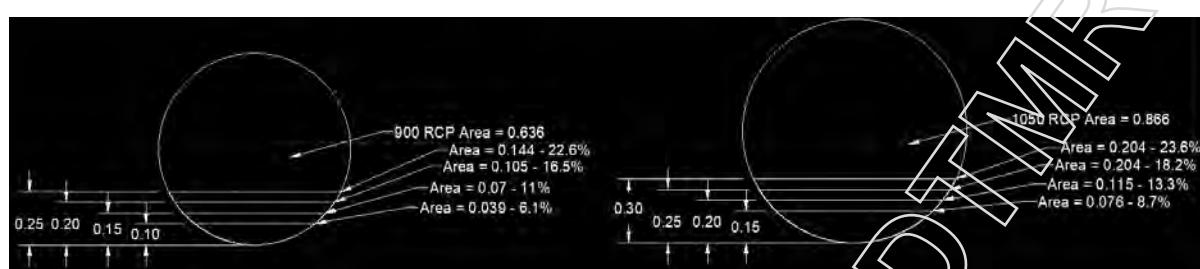
- Afflux U/S of Clinkers Rd – 15 mm
- Max afflux on the property – 15mm
- 5% AEP has higher afflux. Afflux of approx. 50mm at Clinkers Rd .

please see attached plots for each option with legend as per below:



Based on these results, and what is feasible (acceptable fill in culverts as per figure below), I would recommend we go with (similar to D037):

- CU2_29840 (northern culvert) - 1x 900RCP 100% blocked + 1x 900RCP 16% blocked (200mm fill in culvert)
- CU2_29500 (southern culvert) - 1x 1050RCP 100% blocked + 1x 1050RCP 18% blocked (250mm fill in culvert)
- I would expect this to achieve <24mm afflux and the isolated spots would lighten up a bit. Also, limit the impact in the less rare events.
- Any more fill in the culvert would be difficult to grade out



Happy to chat when ready.

Cheers,

N/R
N/R Jacobs | Principal Design Manager | Transport (Northern) APAC People & Places Solutions
M-4
32 Cordelia Street | South Brisbane, 4101 | Australia
www.jacobs.com



From: Alexander K McCart <Alexander.K.McCart@tmr.qld.gov.au>
Sent: Wednesday, 15 March 2023 12:05 PM
To: **N/R** Jacobs <N.R.Jacobs@tjacobs.com>
Subject: [EXTERNAL] FW: C2SIW [REDACTED] 530 Pumicestone Road Elimbah - Lot 9 on SP25514 - Bruce Highway Upgrade at Elimbah - 30/11/2022 - Report from Design Flow

H **N/R**

Just sent you a link to these files.

Can you give me a call once you have got them. Thanks

Kind regards,

Alexander McCart
Principal Engineer (Significant Projects - Bruce Highway Upgrade Caboolture Bribie Island Road Interchange to Steve Irwin Way (C2SIW)) | North Coast Region
Program Delivery and Operations Branch | Infrastructure Management and Delivery Division
Department of Transport and Main Roads

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www.tmr.qld.gov.au

From: Arif N Cheema <Arif.N.Cheema@tmr.qld.gov.au>
Sent: Monday, 6 March 2023 1:03 PM
To: Alexander K McCart <Alexander.K.McCart@tmr.qld.gov.au>
Subject: RE: C2SIW [REDACTED] 530 Pumicestone Road Elimbah - Lot 9 on SP25514 - Bruce Highway Upgrade at Elimbah - 30/11/2022 - Report from Design Flow

Thanks man, would you be able to forward these to **N/R** and get him to re-assess hydrological model , if needed.

Kind regards,

Arif Cheema
Project Manager | Significant Projects - Bruce Highway Upgrade Caboolture Bribie Island Road Interchange to Steve Irwin Way (C2SIW) | North Coast Region
Program Delivery and Operations Branch | Infrastructure Management and Delivery Division
Department of Transport and Main Roads

P: 07 5413 2169 | M: **N/R**
140 Old Toorbul Point Rd, Caboolture Qld 4510
PO Box 1600 | Maroochydore Qld 4558
arif.n.cheema@tmr.qld.gov.au
www.tmr.qld.gov.au

From: Alexander K McCart <Alexander.K.McCart@tmr.qld.gov.au>
Sent: Monday, 6 March 2023 12:11 PM
To: Carlos Gonzalez <Carlos.Z.Gonzalez@tmr.qld.gov.au>; Arif N Cheema <Arif.N.Cheema@tmr.qld.gov.au>
Cc: Christopher A Russell <Christopher.A.Russell@tmr.qld.gov.au>
Subject: RE: C2SIW: [REDACTED] 530 Pumicestone Road Elimbah - Lot 9 on SP25514 - Bruce Highway Upgrade at Elimbah - 30/11/2022 - Report from Design Flow

Hi,

I have grabbed a copy and removed from T:drive - thanks.

Kind regards,

Alexander McCart
Principal Engineer (Significant Projects - Bruce Highway Upgrade Caboolture Bribie Island Road Interchange to Steve Irwin Way (C2SIW)) | North Coast Region
Program Delivery and Operations Branch | Infrastructure Management and Delivery Division
Department of Transport and Main Roads

P: 07 5413 2178 | M: **N/R**
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PO Box 1600 | Maroochydore Qld 4558
alexander.k.mccart@tmr.qld.gov.au
www.tmr.qld.gov.au

From: Carlos Gonzalez <Carlos.Z.Gonzalez@tmr.qld.gov.au>
Sent: Friday, 3 March 2023 1:06 PM
To: Arif N Cheema <Arif.N.Cheema@tmr.qld.gov.au>
Cc: Alexander K McCart <Alexander.K.McCart@tmr.qld.gov.au>; Christopher A Russell <Christopher.A.Russell@tmr.qld.gov.au>
Subject: RE: C2SIW: [REDACTED] 530 Pumicestone Road Elimbah - Lot 9 on SP25514 - Bruce Highway Upgrade at Elimbah - 30/11/2022 - Report from Design Flow

Guys, all received documents from MBRC are saved here

N/R

Please grab them before they delete

From: Arif N Cheema <Arif.N.Cheema@tmr.qld.gov.au>

Sent: Tuesday, 28 February 2023 1:12 PM

To: Carlos Gonzalez <Carlos.Z.Gonzalez@lmr.qld.gov.au>

Cc: Alexander K McCart <Alexander.K.McCart@lmr.qld.gov.au>; Christopher A Russell <Christopher.A.Russell@lmr.qld.gov.au>

Subject: C251W [REDACTED] 530 Pumicestone Road Elimbah - Lot 9 on SP25514 - Bruce Highway Upgrade at Elimbah - 30/11/2022 - Report from Design Flow

N/R

Hi Carlos, I will give you a call to discuss the attached claim for 530 Pumicestone Rd Elimbah.

Kind regards,

Arif Cheema

Project Manager | Significant Projects - Bruce Highway Upgrade Caboolture Bribie Island Road Interchange to Steve Irwin Way (C2SIW | North Coast Region

Program Delivery and Operations Branch | Infrastructure Management and Delivery Division

Department of Transport and Main Roads

P: 07 5412 2169 | N/R
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PO Box 1600 | Maroochydore Qld 4558
arif.n.cheema@lmr.qld.gov.au
www.lmr.qld.gov.au

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Released under RTI - DTMR



Released under RTI - DTMR

From: Alexander K McCart
To: Sacha A Nielsen; Arif N Cheema; Trevor A Land; Simone E Cameron
Subject: FW: 29500 & 29840 Culvert Plates
Date: Tuesday, 13 August 2024 3:39:00 PM

Hi,

Just as an FYI the plates for the [REDACTED] N/R culverts have been installed.

We made the decision to install whilst we still had contractor on site, knowing that they could easily be removed if required.

Kind regards,

Alexander McCart

Principal Engineer (Significant Projects - Bruce Highway Upgrade Caboolture Bribie Island Road Interchange to

Steve Irwin Way (C2SIW)) | North Coast Region

Program Delivery and Operations Branch | Infrastructure Management and Delivery Division

Department of Transport and Main Roads

P: 07 5413 2178 | M: [REDACTED] N/R
Level 1 | 50 Wises Road | Buderim Qld 4556
PO Box 1600 | Maroochydore Qld 4558
alexander.k.mccart@tmr.qld.gov.au
www.tmr.qld.gov.au

From: [REDACTED] N/R @aurecongroup.com>
Sent: Tuesday, August 13, 2024 2:58 PM
To: Alexander K McCart <Alexander.K.McCart@tmr.qld.gov.au>
Subject: FW: 29500 & 29840 Culvert Plates

Hi Alex

FYI see attached installed steel plates at the 2 culvert headwalls.

[REDACTED]
N/R
Senior Civil Engineer, Aurecon

At Aurecon, we encourage flexible working. If you receive an email from us outside your work hours, we don't expect you to read it, act on it, or reply until you return.

DISCLAIMER

From: [REDACTED] N/R @fultonhogan.com.au>
Sent: Tuesday, August 13, 2024 2:37 PM
To: [REDACTED] N/R @aurecongroup.com>
Cc: [REDACTED] N/R @aurecongroup.com> [REDACTED] N/R
[REDACTED] N/R @fultonhogan.com.au>
Subject: 29500 & 29840 Culvert Plates

[External email] This email was sent from outside Aurecon. Do not click links or open attachments unless you were expecting the email and know that the content is safe.

Hi [REDACTED] N/R

See attached of installed culvert plates IMG_2599 is at the culvert at 29500 and IMG_2596 at culvert 29840.

Kind regards,

N/R

Site Engineer | Fulton Hogan Construction | Level 1, Building 8, 2404 Logan Road, Eight Mile Plains, QLD, 4113 | P.O. Box 6263, Upper Mt Gravatt, QLD, 4122, Australia | Mobil N/R



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From: **N/R**
 To: **N/R**
 Subject: RE: CSIW
 Date: Thursday, November 2023 12:55:10 PM
 Attachment: [1050 RCP.dwg](#) [1050 RCP.pdf](#) [1050 RCP.xls](#) [1050 RCP.sldprt](#) [1050 RCP.sldasm](#) [1050 RCP.slddrw](#) [1050 RCP.sldcat](#) [1050 RCP.sldprt](#) [1050 RCP.sldasm](#) [1050 RCP.slddrw](#) [1050 RCP.sldcat](#)

Hi Alex,

We've looked at this with the concept of applying a steel plate in lieu of concrete and advise that this would be an acceptable approach from our perspective.
Under atmospheric exposure, the galvanised plate would have >100 years design life. Noting that it is transiently wet from surface water flow, this would diminish it slightly but applying a 12mm plate would give significant life beyond that required for a replaceable piece.

Table 6.1.2 - Expected Design Life of HDG elements under atmospheric exposure

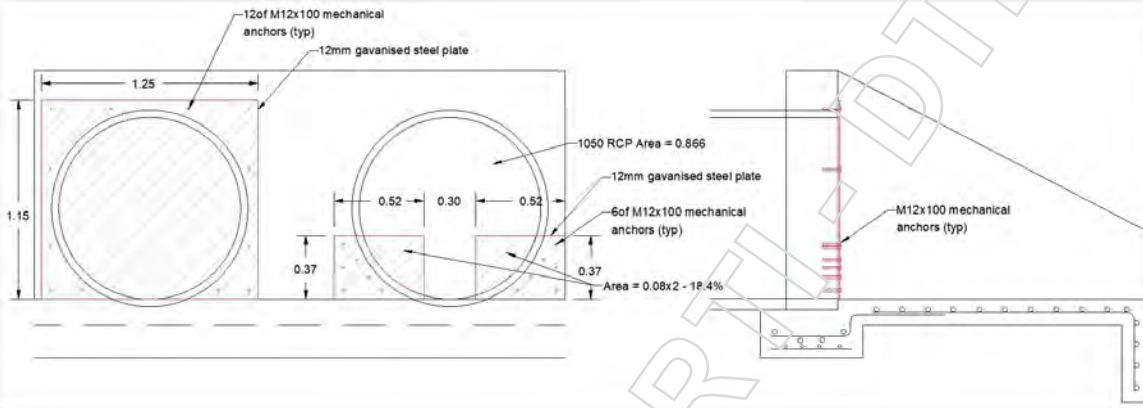
System Designation	Coating Mass (g/m²)	Steel Thickness (mm)	Nominal Coating Thickness (µm)	Durability - C3 Medium Atmospheric Corrosivity Category	Life to First Maintenance	Anticipated Total Service Life (Note 2)
HDG375 (Note 3)	375	N/A	52.5	25 - 75	75	
HDG390	390	>1.5 - ≤ 3.0	55	30 - 75	75	
HDG600	600	>6.0	85	40 - >100	>100	

- 1) Anticipated service life is calculated based on expected steady state corrosion rate for this particular atmospheric corrosivity category
- 2) Galvanising data for steel obtained from Table 6.2 AS2312.2014 and Table 1 AS/NZS 4680 - 2006
- 3) Galvanising data for threaded fasteners obtained from Table 2 AS/NZS 1214
- 4) Time to first maintenance assumes uniform corrosion rates and no damage to galvanising surface

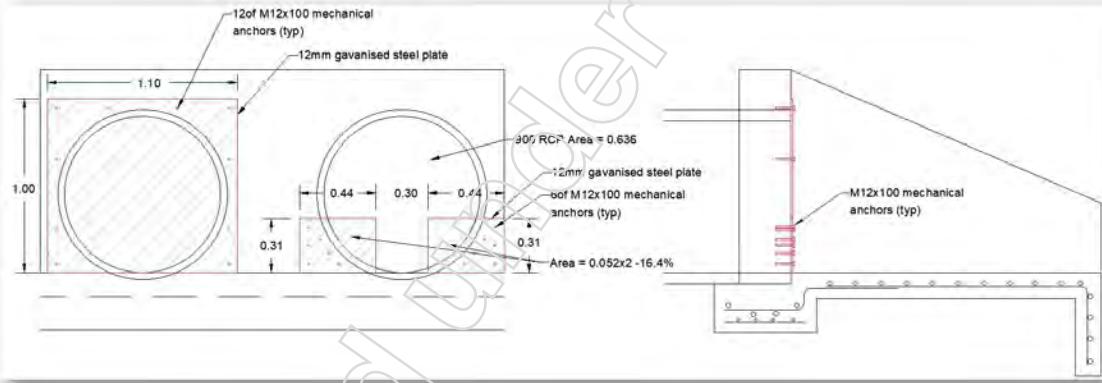
The steel plate is a good solution to allow it to be removed or adjusted or similar as opposed to a concrete plinth that is not. This is in the case that performance needs to be adjusted at any point due to any in-service issues. Note, pile liners are 12mm steel and with load driving into ground and 100 year service life as a reference point.

Below is a concept for each culvert:

Southern:



Northern:

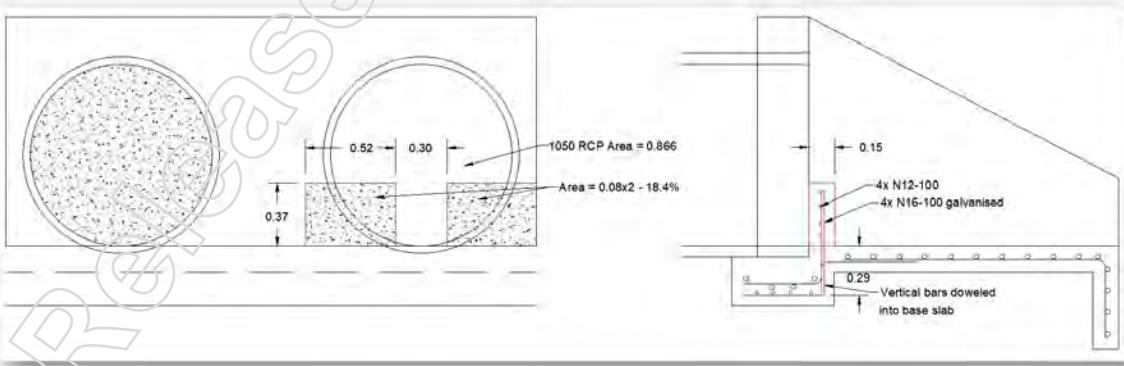


The plate would be Grade 250LD to AS/NZS 3678 hot dip galvanised to HDG600 in accordance with AS/NZS 4680 with bolts as chemset anchors "HILTI HIT-RE-500" or equivalent hot dipped galvanised to AS/NZS 4680 with minimum thickness of 42µm or stainless steel grade 316.

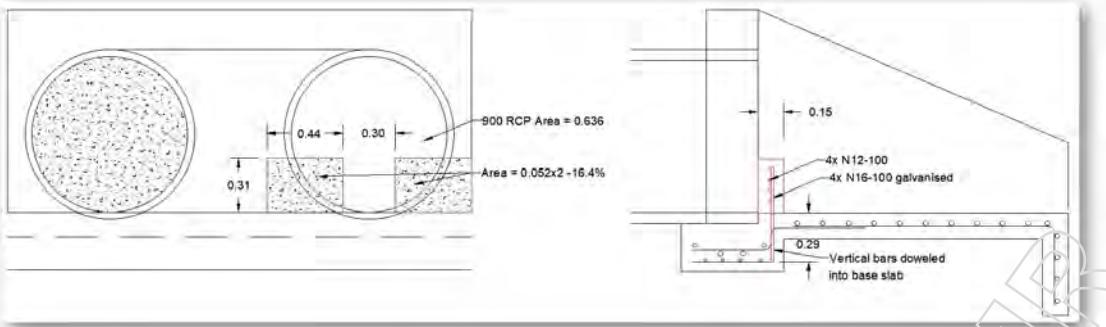
Are you happy to go with the steel option?

In the case of the concrete option, it would look like below:

Southern:



Northern:



Many thanks,

N/R

N/R

From: Friday, 20 October 2023 11:30 AM

To: Alexander K McCarr <alexander.k.mccarr@tmr.qld.gov.au>

Cc: Arif Cheema (Arif.N.Cheema@tmr.qld.gov.au) <arif.N.Cheema@tmr.qld.gov.au>

Subject: RE: C2SIW: [REDACTED] - 530 Pumicestone Road Elimbah - Lot 9 on SP25514 - Bruce Highway Upgrade at Elimbah - 30/11/2022 - Report from Design Flow

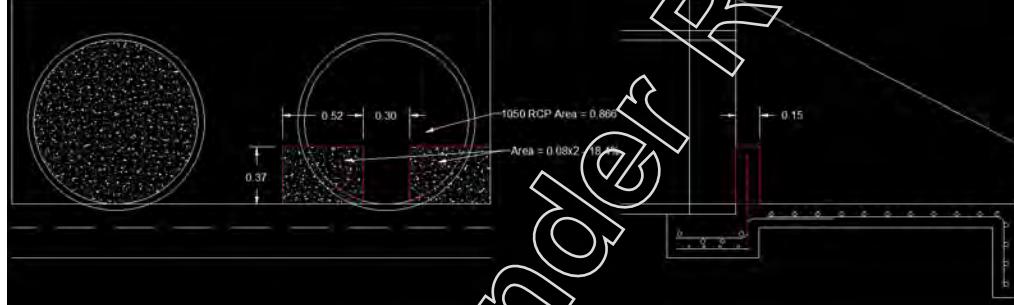
Hi Alex,

To give you an idea of the approach for the restriction of flow through these culverts, this is a sketch that we will develop up for construction. I wouldn't think you would need to give a detail [REDACTED] but let me know if you do.

Northern Culverts:



Southern culverts:



Many thanks,

N/R

Jacobs | Principal | Design Manager | Transport (Northern) APAC People & Places Solutions

M: [REDACTED] N: [REDACTED] @jacobs.com

32 Cordelia Street, Room Brisbane, 4101 | Australia

www.jacobs.com



N/R

From: Wednesday, 18 October 2023 5:39 PM

To: Alexander K McCarr <alexander.k.mccarr@tmr.qld.gov.au>

Cc: Arif Cheema (Arif.N.Cheema@tmr.qld.gov.au) <arif.N.Cheema@tmr.qld.gov.au>

Subject: FW: C2SIW: [REDACTED] - 530 Pumicestone Road Elimbah - Lot 9 on SP25514 - Bruce Highway Upgrade at Elimbah - 30/11/2022 - Report from Design Flow

Resending with second image

N/R

N/R

From: Wednesday, 18 October 2023 5:36 PM

To: Alexander K McCarr <alexander.k.mccarr@tmr.qld.gov.au>

Cc: Arif N Cheema (Arif.N.Cheema@tmr.qld.gov.au)

Subject: RE: C2SIW: [REDACTED] - 530 Pumicestone Road Elimbah - Lot 9 on SP25514 - Bruce Highway Upgrade at Elimbah - 30/11/2022 - Report from Design Flow

Hi Alex,

Please find attached the final two additional figures of the same run D043.nwdchd, as discussed.

In summary, the orange areas represent afflux levels of less than 25mm (when further interrogated, it is more like 23mm as a maximum).

However, the model results display dotted areas in red, indicating up to 50mm of afflux at those dots. It's important to note that these areas are primarily concentrated along the creek's edges. They seem to be artifacts resulting from the modelling process and are more likely a consequence of the relatively coarse model resolution of 5m, rather than an accurate representation of real afflux.

I trust this gives you information for the performance. I will get you a detail for the treatment at the culverts but this can be explained as: *The culvert capacities will be restricted to reduce the flow discharge to that represented in the modelling. One culvert will be fully blocked with the second culvert partially blocked with a slotted weir maintaining low flow however restricting the remaining aperture to 84% of full capacity for the northern culvert and 82% of full capacity for the southern culvert. This will be retrofitted to the culverts.*

Many thanks,

N/R

From: Alexander K McCarr <alexander.k.mccarr@tmr.qld.gov.au>

Sent: Wednesday, 18 October 2023 12:48 PM

To: [REDACTED] N: [REDACTED] @jacobs.com

Cc: Arif N Cheema (Arif.N.Cheema@tmr.qld.gov.au)

Subject: [EXTERNAL] RE: C2SIW: [REDACTED] - 530 Pumicestone Road Elimbah - Lot 9 on SP25514 - Bruce Highway Upgrade at Elimbah - 30/11/2022 - Report from Design Flow

Hi Alex,

Can please get this ASAP, and perhaps including a summarised version of the resulting inflow/afflux. We have told the resident that we are achieving a maximum afflux/influx of 25mm but the attached banding is 20-30mm with isolated areas at greater than 30mm.

Should we slightly increase the percentage blockage?

We may need to run it past E&I before getting a legal review on it, thanks. We are currently consulting with legal regarding what we are actually required to provide to them.

Kind regards,

Alexander McCarr

Principal Engineer (Significant Projects - Bruce Highway Upgrade Caboolture Brible Island Road Interchange to Steve Irwin Way (C2SIW)) | North Coast Region

Program Delivery and Operations Branch | Infrastructure Management and Delivery Division

Department of Transport and Main Roads

P: 07 5413 2178 | M: [REDACTED]

140 Old Titorub Point Rd, Caboolture Qld 4510

PO Box 1600, Maroochydore Qld 4558

alexander.k.mccarr@tmr.qld.gov.au

www.tmr.qld.gov.au

From: Alexander K McCarr

Sent: Tuesday, 17 October 2023 2:02 PM

To: [REDACTED] N: [REDACTED] @jacobs.com

Subject: RE: C2SIW: [REDACTED] - 530 Pumicestone Road Elimbah - Lot 9 on SP25514 - Bruce Highway Upgrade at Elimbah - 30/11/2022 - Report from Design Flow

Hi Alex,

Kind regards,

Alexander McCarr

Principal Engineer (Significant Projects - Bruce Highway Upgrade Caboolture Brible Island Road Interchange to Steve Irwin Way (C2SIW)) | North Coast Region

Program Delivery and Operations Branch | Infrastructure Management and Delivery Division

Department of Transport and Main Roads

P: 07 5413 2178 | M: [REDACTED]

140 Old Titorub Point Rd, Caboolture Qld 4510

PO Box 1600, Maroochydore Qld 4558

alexander.k.mccarr@tmr.qld.gov.au

www.tmr.qld.gov.au

From: [REDACTED] N: [REDACTED] @jacobs.com

Sent: Wednesday, 11 October 2023 11:30 AM
 To: Alexander K McCart <Alexander.K.McCart@tmr.qld.gov.au>
 Cc: Arif N Cheema <Arif.N.Cheema@tmr.qld.gov.au>
 Subject: FW: C2SiW [REDACTED]@aurecongroup.com

N/R

Hi Alex,
 Run D043 was completed with the following configuration:
 CUZ_29840 (northern culvert) - 1 x 900RCP 100% blocked + 1 x 900RCP 16% blocked (200mm fill in culvert)
 CUZ_29500 (southern culvert) - 1 x 1050RCP 100% blocked + 1 x 1050RCP 18% blocked (250mm fill in culvert)

Results are below:

	U/S Flood Level (1% AEP)	Flow (1% AEP)
CUZ_29840 (northern culvert)	33.4 m AHD	1.5 m3/s
CUZ_29500 (southern culvert)	30.96 m AHD	2.5 m3/s

I have attached the flood afflux maps for the 1% AEP together with the flow hydrographs.

Many thanks,

N/R

From: Alexander K McCart <Alexander.K.McCart@tmr.qld.gov.au>

Sent: Friday, 22 September 2023 3:28 PM

To: **[REDACTED]** jacobs.com>

Cc: Arif N Cheema <Arif.N.Cheema@tmr.qld.gov.au>

Subject: [EXTERNAL] RE: C2SiW [REDACTED]@aurecongroup.com

Hi,

Can we also get an afflux map for the finalised scenario for the pipes.

• CUZ_29840 (northern culvert) - 1 x 900RCP 100% blocked + 1 x 900RCP 16% blocked (200mm fill in culvert)

• CUZ_29500 (southern culvert) - 1 x 1050RCP 100% blocked + 1 x 1050RCP 18% blocked (250mm fill in culvert)

Also, is there a way to calculate the new discharge (m3/s)?

From: **[REDACTED]** report -

Location	Discharge (m³/s)		
(Refer to Figure 3)	Original BH culverts	Upgraded BH culverts	Increase
1. Northern Culverts	1.45	3.19	+1.74 (12.0%)
2. Southern Culverts	2.20	4.20	+2.0 (91%)

Kind regards,

Alexander McCart

Principal Engineer (Significant Projects - Bruce Highway Upgrade Caboolture Bribie Island Road Interchange to Steve Irwin Way (C2SiW)) | North Coast Region

Program Delivery and Operations Branch | Infrastructure Management and Delivery Division

Department of Transport and Main Roads

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 PO Box 16001 Maroochydore Qld 4558
alexander.k.mccart@tmr.qld.gov.au
www.tmr.qld.gov.au

From: Alexander K McCart

Sent: Friday, 22 September 2023 3:57 PM

To: **[REDACTED]** N/R @jacobs.com>

Subject: FW: C2SiW [REDACTED]@aurecongroup.com

Hi,

Is this the latest we have for **[REDACTED]**

Did we do up a detail?

Kind regards,

Alexander McCart

Principal Engineer (Significant Projects - Bruce Highway Upgrade Caboolture Bribie Island Road Interchange to Steve Irwin Way (C2SiW)) | North Coast Region

Program Delivery and Operations Branch | Infrastructure Management and Delivery Division

Department of Transport and Main Roads

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 PO Box 16001 Maroochydore Qld 4558
alexander.k.mccart@tmr.qld.gov.au
www.tmr.qld.gov.au

From: **[REDACTED]** N/R @jacobs.com>

Sent: Friday, 26 May 2023 5:39 PM

To: Alexander K McCart <Alexander.K.McCart@tmr.qld.gov.au>

Cc: **[REDACTED]** N/R @jacobs.com>

Subject: FW: C2SiW [REDACTED]@aurecongroup.com

Hi Alex,

We have undertaken some modelling of the culvert options to avoid or minimise the impact to an acceptable level on the adjoining land lot 9 on SP25514.

We note that the objective was to achieve an afflux of 0-25mm on the site.

To investigate this, we have looked at a number of options and I have summarised the outcomes of this below.

Run D042 (maximise northern blockage):

- CUZ_29840 (northern culvert) - 1 x 900RCP 100% blocked + 1 x 900RCP 90% blocked
- CUZ_29500 (southern culvert) - 1 x 1050RCP 100% blocked + 1 x 1050RCP 0% blocked

• **1%AEP with climate change results:**

- WSL U/S Bruce Highway - 31.13 m AHD (31.48 road level \ 350mm freeboard)
 - Issue with the large blockage in the north, this pushes the flow to the south which is lower
 - Afflux just U/S of Clinkers Rd - approx. 0 mm
 - Afflux U/S of Clinkers Rd - 25 mm
 - Max afflux on the property - isolated spots of 50mm, mostly 24-26mm in the orange sections.

Run D041 (maximise southern blockage):

- CUZ_29840 (northern culvert) - 1 x 900RCP 100% blocked + 1 x 900RCP 0% blocked
- CUZ_29500 (southern culvert) - 1 x 1050RCP 100% blocked + 1 x 1050RCP 15% blocked

• **1%AEP with climate change results:**

- WSL U/S Bruce Highway - 30.93 m AHD (31.48 road level \ 550mm freeboard)
 - Afflux U/S of Clinkers Rd - 25 mm
 - Max afflux on the property - Isolated spots of 50mm, mostly 24-26mm in the orange sections.

Run D037 (balanced blockage):

- CUZ_29840 (northern culvert) - 1 x 900RCP 100% blocked + 1 x 900RCP 14% blocked
- CUZ_29500 (southern culvert) - 1 x 1050RCP 100% blocked + 1 x 1050RCP 30% blocked

• **1%AEP with climate change results:**

- WSL U/S Bruce Highway - 30.92 m AHD (31.48 road level \ 580mm freeboard)
 - Afflux U/S of Clinkers Rd - 15 mm
 - Max afflux on the property - 15mm
 - 5% AEP has higher afflux. Afflux of approx. 50mm at Clinkers Rd.

Please see attached plots for each option with legend as per below:



Based on these results, and what is feasible (acceptable fill in culverts as per figure below), I would recommend we go with (similar to D037):

- CUZ_29840 (northern culvert) - 1 x 900RCP 100% blocked + 1 x 900RCP 16% blocked (200mm fill in culvert)
- CUZ_29500 (southern culvert) - 1 x 1050RCP 100% blocked + 1 x 1050RCP 18% blocked (250mm fill in culvert)

• I would expect this to achieve <24mm afflux and tile isolated spot would lighten up a bit. Also, limit the impact in the less rare events.

• Any more fill in the culvert would be difficult torade off.

Happy to chat when ready.

Cheers,

N/R

Jacobs | Principal Design Manager | Transport (Northern) APAC People & Places Solutions

M: **[REDACTED]** N/R @jacobs.com

32 Cordelia Street | South Brisbane, 4101 | Australia

www.jacobs.com



From: Alexander K McCart <Alexander.K.McCart@tmr.qld.gov.au>

Sent: Wednesday, 15 March 2023 12:05 PM

To: **[REDACTED]** N/R @jacobs.com>

Subject: FW: C2SiW [REDACTED]@aurecongroup.com

N/R

Just give you a link to these files.

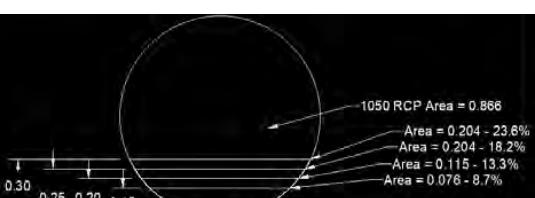
Can you give me a call once you have got them. Thanks.

Kind regards,

Alexander McCart

Principal Engineer (Significant Projects - Bruce Highway Upgrade Caboolture Bribie Island Road Interchange to Steve Irwin Way (C2SiW)) | North Coast Region

Program Delivery and Operations Branch | Infrastructure Management and Delivery Division



Department of Transport and Main Roads

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PO Box 1600 | Maroochydore Qld 4558
alexander.k.mccart@tmr.qld.gov.au
www.tmr.qld.gov.au

From: Arif N Cheema <Arif.N.Cheema@tmr.qld.gov.au>

Sent: Monday, 6 March 2023 1:03 PM

To: Alexander K McCart <Alexander.K.McCart@tmr.qld.gov.au>

Subject: RE: C2SWI: [REDACTED] - 530 Pumicestone Road Elimbah - Lot 9 on SP25514 - Bruce Highway Upgrade at Elimbah - 30/11/2022 - Report from Design Flow

Kind regards,

Arif Cheema

Project Manager | Significant Projects - Bruce Highway Upgrade Caboolture Bribie Island Road Interchange to Steve Irwin Way (C2SIW) | North Coast Region

Program Delivery and Operations Branch | Infrastructure Management and Delivery Division

Department of Transport and Main Roads

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PO Box 1600 | Maroochydore Qld 4558
arif.n.cheema@tmr.qld.gov.au
www.tmr.qld.gov.au

From: Alexander K McCart <Alexander.K.McCart@tmr.qld.gov.au>

Sent: Monday, 6 March 2023 12:11 PM

To: Carlos Gonzalez <Carlos.Z.Gonzales@tmr.qld.gov.au>; Arif N Cheema <Arif.N.Cheema@tmr.qld.gov.au>

Cc: Christopher A Russell <Christopher.A.Russell@tmr.qld.gov.au>

Subject: RE: C2SWI: [REDACTED] - 530 Pumicestone Road Elimbah - Lot 9 on SP25514 - Bruce Highway Upgrade at Elimbah - 30/11/2022 - Report from Design Flow

H,

I have grabbed a copy and removed from T:drive – thanks.

Kind regards,

Alexander McCart

Principal Engineer (Significant Projects - Bruce Highway Upgrade Caboolture Bribie Island Road Interchange to Steve Irwin Way (C2SIW)) | North Coast Region

Program Delivery and Operations Branch | Infrastructure Management and Delivery Division

Department of Transport and Main Roads

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PO Box 1600 | Maroochydore Qld 4558
alexander.k.mccart@tmr.qld.gov.au
www.tmr.qld.gov.au

From: Carlos Gonzalez <Carlos.Z.Gonzales@tmr.qld.gov.au>

Sent: Friday, 3 March 2023 1:05 PM

To: Arif N Cheema <Arif.N.Cheema@tmr.qld.gov.au>

Cc: Alexander K McCart <Alexander.K.McCart@tmr.qld.gov.au>; Christopher A Russell <Christopher.A.Russell@tmr.qld.gov.au>

Subject: RE: C2SWI: [REDACTED] - 530 Pumicestone Road Elimbah - Lot 9 on SP25514 - Bruce Highway Upgrade at Elimbah - 30/11/2022 - Report from Design Flow

Guys, all received documents from MBRC are saved here

N/R

Please grab them before they delete

From: Arif N Cheema <Arif.N.Cheema@tmr.qld.gov.au>

Sent: Tuesday, 28 February 2023 1:12 PM

To: Carlos Gonzalez <Carlos.Z.Gonzales@tmr.qld.gov.au>

Cc: Alexander K McCart <Alexander.K.McCart@tmr.qld.gov.au>; Christopher A Russell <Christopher.A.Russell@tmr.qld.gov.au>

Subject: RE: C2SWI: [REDACTED] - 530 Pumicestone Road Elimbah - Lot 9 on SP25514 - Bruce Highway Upgrade at Elimbah - 30/11/2022 - Report from Design Flow

In addition, I will give you a call to discuss the attached claim for 530 Pumicestone Rd Elimbah.

Kind regards,

Arif Cheema

Project Manager | Significant Projects - Bruce Highway Upgrade Caboolture Bribie Island Road Interchange to Steve Irwin Way (C2SIW) | North Coast Region

Program Delivery and Operations Branch | Infrastructure Management and Delivery Division

Department of Transport and Main Roads

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From: N/R
To: Christopher A Russell; Alexander K McCart; N/R
Cc: Jagath C Abeynayake
Subject: RE: N/R Query - Follow Up
Date: Thursday, 27 June 2024 1:28:54 PM
Attachments: image001.png
image002.png
image003.png
image004.png

Hi Alex,

I can make the call at 2pm if needed.

Thanks,

N/R | Jacobs | QLD & SA Water Resources Team Leader | Senior Surface Water Engineer
M: N/R @jacobs.com
32 Cordelia Street | South Brisbane, QLD 4101 | Australia

From: Christopher A Russell <Christopher.A.Russell@tmr.qld.gov.au>
Sent: Thursday, June 27, 2024 1:03 PM
To: Alexander K McCart <alexander.k.mccart@tmr.qld.gov.au>; N/R @jacobs.com>;
N/R @jacobs.com>
Cc: Jagath C Abeynayake <Jagath.C.Abeynayake@tmr.qld.gov.au>
Subject: [EXTERNAL] RE: N/R Query - Follow Up

Sounds good Alex – send Jagath and I a Teams invite once you have a time.

Best regards
Chris

Chris Russell

Director - Hydraulics and Flooding | Hydraulics, Design and Spatial
Engineering & Technology | Department of Transport and Main Roads
Floor 19 | Brisbane City - 313 Adelaide Street | 313 Adelaide Street | Brisbane City Qld 4000
GPO Box 1412 | Brisbane Qld 4001
P: (07) 30668210 | M: N/R
E: Christopher.A.Russell@tmr.qld.gov.au
W: www.tmr.qld.gov.au

From: Alexander K McCart <Alexander.K.McCart@tmr.qld.gov.au>
Sent: Thursday, June 27, 2024 1:01 PM
To: Christopher A Russell <Christopher.A.Russell@tmr.qld.gov.au>; N/R @jacobs.com>;
N/R @jacobs.com>
Cc: Jagath C Abeynayake <Jagath.C.Abeynayake@tmr.qld.gov.au>
Subject: RE: N/R Query - Follow Up

Hi,

I'm available I'll try touch base with N/R and see if he is available.

Even if N/R is not available I would still like to catch up and discuss a few things with yourself and Jagath.

Kind regards,

Alexander McCart
Principal Engineer (Significant Projects - Bruce Highway Upgrade Caboolture Bibbie Island Road Interchange to Steve Irwin Way (C2SIW)) | North Coast Region
Program Delivery and Operations Branch | Infrastructure Management and Delivery Division
Department of Transport and Main Roads

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alexander.k.mccart@tmr.qld.gov.au
www.tmr.qld.gov.au

From: Christopher A Russell <Christopher.A.Russell@tmr.qld.gov.au>

Sent: Thursday, June 27, 2024 12:59 PM

To: Alexander K McCart <Alexander.K.McCart@tmr.qld.gov.au>; [REDACTED] N/R [@jacobs.com>;
\[REDACTED\] N/R \[jacobs.com>\]\(mailto:jacobs.com\)](mailto:@jacobs.com)

Cc: Jagath C Abeynayake <Jagath.C.Abeynayake@tmr.qld.gov.au>

Subject: RE: [REDACTED] N/R Query - Follow Up

Hi Alex

I've spoken to Jagath re his review – can we have a quick Teams chat with you and Jacob's this afternoon (Jagath is away tomorrow).

I'm available after 2:00pm.

Thanks

Chris

Chris Russell

Director - Hydraulics and Flooding | Hydraulics, Design and Spatial
Engineering & Technology | Department of Transport and Main Roads
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GPO Box 1412 | Brisbane Qld 4001
P: (07) 30668210 | M: [REDACTED] N/R
E: Christopher.A.Russell@tmr.qld.gov.au
W: www.tmr.qld.gov.au

From: Alexander K McCart <Alexander.K.McCart@tmr.qld.gov.au>

Sent: Wednesday, June 26, 2024 2:13 PM

To: [REDACTED] N/R [@jacobs.com>; \[REDACTED\] N/R \[@jacobs.com>; Christopher A Russell <\\[Christopher.A.Russell@tmr.qld.gov.au\\]\\(mailto:Christopher.A.Russell@tmr.qld.gov.au\\)>
Cc: Jagath C Abeynayake <\\[Jagath.C.Abeynayake@tmr.qld.gov.au\\]\\(mailto:Jagath.C.Abeynayake@tmr.qld.gov.au\\)>
Subject: RE: \\[REDACTED\\] N/R Query - Follow Up\]\(mailto:@jacobs.com\)](mailto:@jacobs.com)

Hi [REDACTED] N/R

Thank you for this additional information. I will aim to get back to you tomorrow afternoon regarding the tech memo.

Kind regards,

Alexander McCart

Principal Engineer (Significant Projects - Bruce Highway Upgrade Caboolture Bribie Island Road Interchange to Steve Irwin Way (C2S!W)) | North Coast Region
Program Delivery and Operations Branch | Infrastructure Management and Delivery Division
Department of Transport and Main Roads

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alexander.k.mccart@tmr.qld.gov.au
www.tmr.qld.gov.au

From: N/R @jacobs.com>
Sent: Wednesday, June 26, 2024 1:44 PM
To: Alexander K McCart <Alexander.K.McCart@tmr.qld.gov.au>; N/R @jacobs.com>; Christopher A Russell <Christopher.A.Russell@tmr.qld.gov.au>
Cc: Jagath C Abeynayake <Jagath.C.Abeynayake@tmr.qld.gov.au>
Subject: RE: N/R Query - Follow Up

Hi all,

See the results of the scenario where both culverts have no inlet restriction. Based on the revised results, the northern 900 RCP culvert likely doesn't need the inlet plate, but the southern culvert does to some degree. Once you've had a chance to go through the below and attached information it may be best to set up a quick meeting to decide what we do going forward with regards to the content in the technical memo.

In the instance of the southern culvert the increase from a 900 RCP to a 1050 RCP (0.23m² increase in area with a velocity of approximately 2-3 m/s) really changes the flow behaviour through the culvert. The increase in available capacity through the culvert also changes the critical duration from 360min to 120mins. The peak flow may be higher, but flood levels recede quicker as shown by the attached PO charts for the 5% and 1% AEP events.

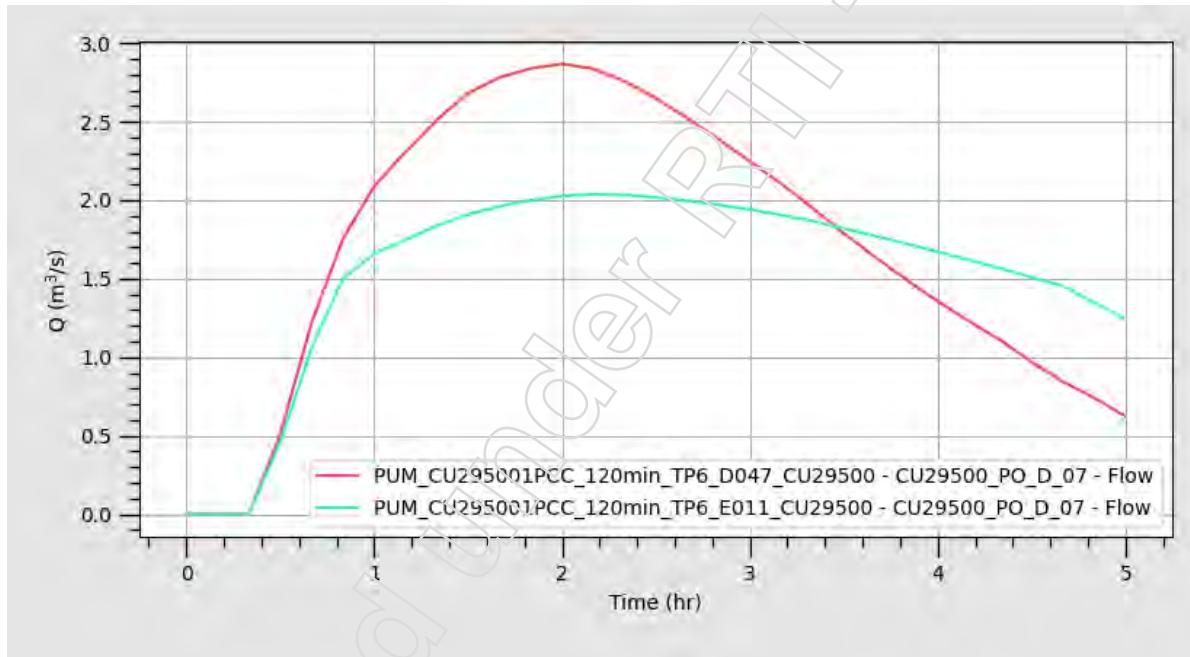


Figure 1 1% AEP Southern Culvert flow

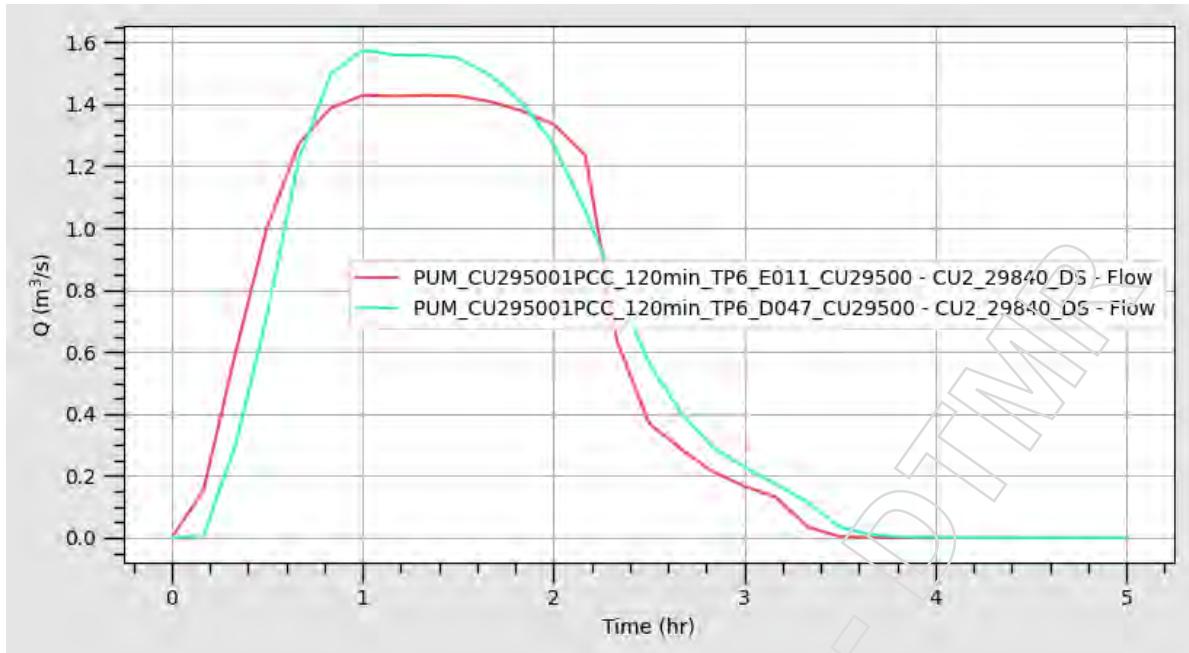


Figure 2 1% AEP Northern Culvert flow

Thanks,

N/R [redacted] Jacobs | QLD & SA Water Resources Team Leader | Senior Surface Water Engineer
 M: [redacted] N/R [redacted] @jacobs.com
 32 Cordelia Street | South Brisbane, QLD 4101 | Australia

From: [redacted] N/R
Sent: Tuesday, June 25, 2024 11:08 AM
To: Alexander K McCart <Alexander.K.McCart@tmr.qld.gov.au> [redacted] N/R [redacted] @jacobs.com>;
 Christopher A Russell <Christopher.A.Russell@tmr.qld.gov.au>
Cc: Jagath C Abeynayake <Jagath.C.Abeynayake@tmr.qld.gov.au>
Subject: RE: [redacted] N/R Query - Follow Up

Hi Alexander and all,

We'll re-issue the tech note based on the outcome of the following.

As presented in the technical note there were some instances where flows were being reduced as compared to the existing situation and was leading to some slight reduction in flood levels downstream of the highway.

I'm meant to be on leave but have instructed somebody to re-run the model for the critical duration/temporal pattern with one culvert fully operational with no upstream plate and no increase to the entrance form loss. They are also going to add more water level PO for water level hydrographs downstream for inundation timings. We should be able to provide updated maps and water level plots for review by tomorrow afternoon.

----- Previous comments -----

- Fig 5 – is the inflow for the northern culvert too close to the culvert inlet? – In this instance I don't believe it matters too much as it is a pond upstream with a flat water level.
- Fig 6 – is the designated red roughness zone (0.04) too low for the dense vegetated area shown? Acknowledged it the downstream area of the model could have been slightly rougher; however, we have just completed a sensitivity test which shows the culverts under Clinker Road are the critical influence for levels on the property rather than the Manning's n (colouring is standard TMR colours). The sensitivity test was conducted with a Manning's of 0.08.



Thanks,

N/R Jacobs | QLD & SA Water Resources Team Leader | Senior Surface Water Engineer
M: N/R @jacobs.com
32 Cordelia Street | South Brisbane, QLD 4101 | Australia

From: Alexander K McCart <Alexander.K.Mccart@tmr.qld.gov.au>
Sent: Tuesday, June 25, 2024 8:06 AM
To: N/R @jacobs.com; N/R @jacobs.com
Cc: Christopher A Russell <Christopher.A.Russell@tmr.qld.gov.au>; Jagath C Abeynayake <Jagath.C.Abeynayake@tmr.qld.gov.au>
Subject: [EXTERNAL] FW: N/R Query - Follow Up

Hi,

Can you please review below and provide the requested information.

Could you please advice how long this information would take to provide also. As the matter I currently under legal review it is becoming more urgent to get this information.

Kind regards,

Alexander McCart
Principal Engineer (Significant Projects - Bruce Highway Upgrade Caboolture Bribie Island Road Interchange to Steve Irwin Way (C2SIW)) | North Coast Region
Program Delivery and Operations Branch | Infrastructure Management and Delivery Division
Department of Transport and Main Roads

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PO Box 1600 | Maroochydore Qld 4558
alexander.k.mccart@tmr.qld.gov.au
www.tmr.qld.gov.au

From: Jagath C Abeynayake <Jagath.C.Abeynayake@tmr.qld.gov.au>
Sent: Monday, June 24, 2024 3:24 PM
To: Alexander K McCart <Alexander.K.McCart@tmr.qld.gov.au>
Cc: Christopher A Russell <Christopher.A.Russell@tmr.qld.gov.au>
Subject: RE: Blatchfords Query - Follow Up

Hi Alex,

Thanks for your time discussing this technote and the background of this work.

As I understand it, the existing culverts (1/0.75 RCP and 1/0.9 RCP) have been replaced with new oversized culverts (2/0.9 RCP and 2/1.05 RCP) as part of the highway upgrade project. Due to likely impacts (related to N/R Query), the district has proposed to block these culverts using steel plates to ensure they do not discharge flows higher than the pre-development stage. Accordingly, one of the two pipes of each culvert crossing is proposed to be fully blocked, with the other culvert 16-18% blocked.

This configuration seems overly complicated, and TUFLOW is not capable of properly modelling culvert hydraulics for such inlet configurations. Therefore, I suggest requesting the consultant to provide impact maps for the following scenario as well: one of the pipes of each crossing is completely blocked, and the other is fully open. Additionally, it would be worthwhile to see the time of inundation maps.

Furthermore, according to the provided flood impact maps, the afflux downstream appears to be either negative or within a less than 10 mm range, indicating it may be over mitigated. Note that we can accept some afflux if it is within a reasonable range, depending on the flooding extent and future land use.

Please give me a call if you need to discuss this further.

Best regards

Jagath Abeynayake CPEng RPEQ
Principal Engineer (Hydraulics) | Hydraulics, Design and Spatial
Engineering & Technology | Department of Transport and Main Roads

From: Alexander K McCart <Alexander.K.McCart@tmr.qld.gov.au>
Sent: Monday, June 24, 2024 8:27 AM
To: N/R @jacobs.com>; N/R @jacobs.com>
Cc: Arif N Cheema <Arif.N.Cheema@tmr.qld.gov.au>; Jagath C Abeynayake <Jagath.C.Abeynayake@tmr.qld.gov.au>; Christopher A Russell <Christopher.A.Russell@tmr.qld.gov.au>
Subject: RE: N/R Query - Follow Up

Hi N/R

If you could share with Jagath, Christopher and I that would be great. I've CC'd them.

Thanks.

Kind regards,

Alexander McCart
Principal Engineer (Significant Projects - Bruce Highway Upgrade Caboolture Island Road Interchange to Steve Irwin Way (C2SIW)) | North Coast Region
Program Delivery and Operations Branch | Infrastructure Management and Delivery Division
Department of Transport and Main Roads

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From: [REDACTED] N/R @jacobs.com>
Sent: Monday, June 24, 2024 8:14 AM
To: [REDACTED] N/R @jacobs.com>; Alexander K McCart <Alexander.K.McCart@tmr.qld.gov.au>
Cc: Arif N Cheema <Arif.N.Cheema@tmr.qld.gov.au>
Subject: RE: [REDACTED] N/R Query - Follow Up

Hi [REDACTED] N/R

I'll get them packaged up today. [Alexander K McCart](mailto:Alexander.K.McCart@tmr.qld.gov.au) are there any issues with myself sharing the files from my One-drive to be accessed by TMR? If I know the TMR hydraulics E&T person specifically I can give them direct access.

Thanks,

[REDACTED] N/R | [Jacobs](#) | QLD & SA Water Resources Team Leader | Senior Surface Water Engineer
M: [REDACTED] N/R @jacobs.com
32 Cordelia Street | South Brisbane, QLD 4101 | Australia

From: [REDACTED] N/R @jacobs.com>
Sent: Monday, June 24, 2024 8:05 AM
To: Alexander K McCart <alexander.k.mccart@tmr.qld.gov.au>
Cc: Arif N Cheema <arif.n.cheema@tmr.qld.gov.au>; [REDACTED] N/R @jacobs.com>
Subject: Re: [REDACTED] N/R Query - Follow Up

Hi [REDACTED] N/R are you able to help Alex with this?

Cheers,

[REDACTED] N/R

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From: Alexander K McCart <Alexander.K.McCart@tmr.qld.gov.au>
Sent: Monday, June 24, 2024 7:25:05 am
To: [REDACTED] N/R @jacobs.com>
Cc: Arif N Cheema <arif.n.cheema@tmr.qld.gov.au>; [REDACTED] N/R @jacobs.com>
Subject: [EXTERNAL] RE: [REDACTED] N/R Query - Follow Up

Hi [REDACTED] N/R

E&T have requested the results files. Are you able to supply them? Could you also give an indication on how long this will take.

Thanks.

Kind regards,

Alexander McCart
Principal Engineer (Significant Projects - Bruce Highway Upgrade Caboolture Bribie Island Road Interchange to Steve Irwin Way (C2SIW)) | North Coast Region
Program Delivery and Operations Branch | Infrastructure Management and Delivery Division
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P: 07 5413 2178 | M: [REDACTED] N/R

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alexander.k.mccart@tmr.qld.gov.au
www.tmr.qld.gov.au

From: N/R @jacobs.com>
Sent: Friday, June 14, 2024 5:56 PM
To: Alexander K McCart <Alexander.K.McCart@tmr.qld.gov.au>
Cc: Arif N Cheema <Arif.N.Cheema@tmr.qld.gov.au>; N/R @jacobs.com>
Subject: RE: N/R Query - Follow Up

I tried to issue the model through ProjectWise as well but not sure if it got to you. So, the one I sent through the file transfer and ProjectWise are the same file. So, as it is about 750mb, only have to download one.

This just included the model, but if they require the output files we could gather that up too, just a much larger file is all.

Further, would you be able to let me know what the process of issue will be? Will you send this through Minter Ellison and they handle the external communications with their representation?

Many thanks,

N/R
From: N/R
Sent: Friday, June 14, 2024 5:52 PM
To: 'Alexander K McCart' <Alexander.K.McCart@tmr.qld.gov.au>
Cc: Arif N Cheema <arif.n.cheema@tmr.qld.gov.au>; N/R @jacobs.com>
Subject: RE: N/R Query - Follow Up

Hi Alex,

Apologies for the delay but I have transmitted you the technical note through ProjectWise and the model files through file transfer.

Hopefully it meets your requirements. I do expect you and/or E&T might have some requests for adjustments and N/R would be happy to discuss this as required.

There is an assessment in there about the implications of additional blockage to road immunity and would have a spin off of balancing this with the downstream impact. Currently, the impact is been modelled to be neutral, therefore, if we want further protection to the highway in case of exceptional blockage, there may be an opportunity to reduce the closure of the second culvert and allowing more water onto their property. But as said, it currently models no impact on their property.

The initial modelling showed more impact but with more detailed modelling, we have been able to (and this isn't through manipulation or trickery) to more realistically represent the culvert and other factors and be more accurate on the impact. While this is a good outcome wrt to the impact, it may raise some questions but this is the reason for it. Technically we are still within the 0-25mm impact technically.

I'll keep an eye out for any emails and can chime in when in reception and able to.

Many thanks,

N/R

From: N/R
Sent: Tuesday, June 4, 2024 11:54 AM

To: Alexander K McCart <Alexander.K.McCart@tmr.qld.gov.au>

Cc: Arif N Cheema <arif.n.cheema@tmr.qld.gov.au>

Subject: RE: [REDACTED] N/R Query - Follow Up

Hi Alex,

As discussed, we will collate the model for the Pumicestone catchment to enable you to pass this on as required. Further, to document the assessment undertaken to determine the impacts of the alternative culvert design we will put together a succinct technical note on the matter to again pass on as required.

We are in the process of preparing this and plan to finish our reviews end of this week for submission to you Monday.

Many thanks,

[REDACTED]
N/R

From: Alexander K McCart <Alexander.K.McCart@tmr.qld.gov.au>

Sent: Monday, May 27, 2024 3:47 PM

To: [REDACTED] N/R @jacobs.com>

Cc: Arif N Cheema <arif.n.cheema@tmr.qld.gov.au>

Subject: [EXTERNAL] FW: Blatchfords Query - Follow Up

Subject to legal professional privilege

Hi Mark,

Are you able to assist in preparing this information to be provided to [REDACTED] N/R

If you could give an estimate on time to pull it together that would be great. Thanks.

Kind regards,

Alexander McCart

Principal Engineer (Significant Projects - Bruce Highway Upgrade Caboolture Bribie Island Road Interchange to Steve Irwin Way

(C2SIW) | North Coast Region

Program Delivery and Operations Branch | Infrastructure Management and Delivery Division

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From: Christopher A Russell <Christopher.A.Russell@tmr.qld.gov.au>

Sent: Monday, May 27, 2024 2:38 PM

To: Alexander K McCart <Alexander.K.McCart@tmr.qld.gov.au>

Cc: Arif N Cheema <Arif.N.Cheema@tmr.qld.gov.au>

Subject: RE: [REDACTED] N/R Query - Follow Up

Hi Alex

Given the context, I've got no problem giving them the model (existing and proposed design cases only) plus supplementary reporting to assist with their deliberations.

Hope this helps close it out.

Best regards
Chris

Chris Russell

Director - Hydraulics and Flooding | Hydraulics, Design and Spatial
Engineering & Technology | Department of Transport and Main Roads
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E: Christopher.A.Russell@tmr.qld.gov.au
W: www.tmr.qld.gov.au

From: Alexander K McCart <Alexander.K.McCart@tmr.qld.gov.au>
Sent: Monday, May 27, 2024 2:07 PM
To: Christopher A Russell <Christopher.A.Russell@tmr.qld.gov.au>
Cc: Arif N Cheema <Arif.N.Cheema@tmr.qld.gov.au>
Subject: N/R Query - Follow Up

Subject to legal professional privilege

Hi Christopher,

We have had some more back and forth with the N/R legal team and they have continued to request additional information. I was hoping to have a discussion with you regarding what information we traditionally would supply to people enquiring regarding hydraulic information. The attached summary is all we have received from our designer regarding the "revised design".

Attached is the latest correspondence for your reference, in the past they have also requested the following information. Was hoping you could advise if we traditionally provide hydraulic modelling if requested (RTI) and also if we provide the hydraulic/stormwater reports.

To allow for meaningful negotiation given the current n

1. Designs, drawings and plans;
2. Construction schedule;
3. Hydraulic modelling;
4. Stormwater and flood impact reports.

Kind regards,

I will give you a call later today and maybe we can organise a time to have a meeting. Thanks.

Kind regards,

Alexander McCart
Principal Engineer (Significant Projects - Bruce Highway Upgrade Caboolture Bribie Island Road Interchange to Steve Irwin Way (C2S1W)) | North Coast Region
Program Delivery and Operations Branch | Infrastructure Management and Delivery Division
Department of Transport and Main Roads

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alexander.k.mccart@tmr.qld.gov.au

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